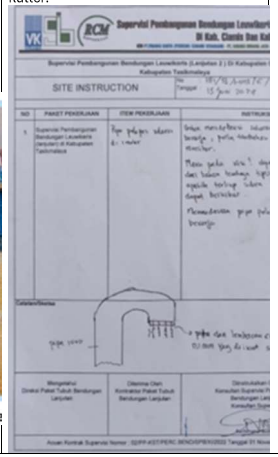
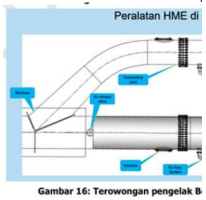
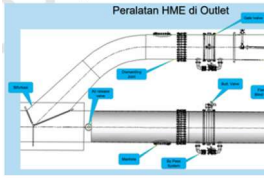
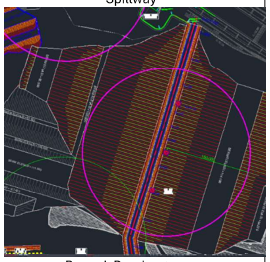
No	URAIAN/SARAN	TINDAK LANJUT OLEH PEMRAKARSA BENDUNGAN/ KONSULTAN SUPERVISI	TANGGAPAN KAJIAN BALAI TEKNIK BENDUNGAN
			installation location.
4.	At the end of June 2024, it is planned that a hoist trial will be carried out in the intake gate area. The scaffolding should not be removed first considering that the supporting concrete is not yet mature.	As a result of being stored in the warehouse for too long, the hoist had problems with the rusty motor brake jamming, and technicians from the vendor (PT. Barata Indonesia) had been scheduled to arrive.	Suggestions are heeded and acted upon.
5.	To make it easier for officers to know that the installed air vent pipe is functioning properly, they should pay attention to the following suggestions: a. An inspection window should be added near the end of the air vent pipe. b. Consider having the end of the air vent pipe elevated so that it is visible through the inspection window.  Gambar 15: *Air vent pipe* yang te	A 0.1 mm thick brass ribbon is added, which is tied to a stainless steel wire. Later, if there is air release, the ribbon will flutter. 	Suggestions have been followed up.

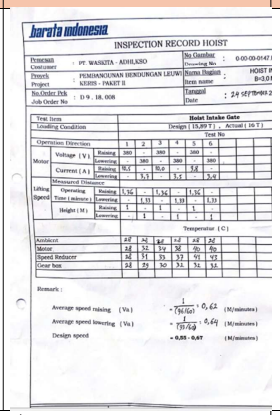
No	URAIAN/SARAN	TINDAK LANJUT OLEH PEMRAKARSA BENDUNGAN/ KONSULTAN SUPERVISI	TANGGAPAN KAJIAN BALAI TEKNIK BENDUNGAN
			
6.	To make it easier to differentiate the elevation of the spillway crest and the early release crest, the consultant should convey the layout of the spillway and early release.	Pintu Early Release 	Saan became attentive and followed up. The consultant should also present as-built drawings which include layout plans, cross-sections and longitudinal sections which are juxtaposed together with actual photos of the building in the field.
7.	At the waterway/penstock outlet downstream of the Leuwikeris Dam,		

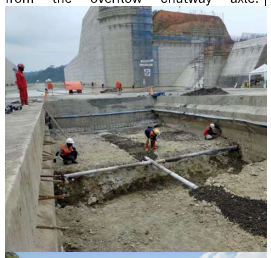
No	URAIAN/SARAN	TINDAK LANJUT OLEH PEMRAKARSA BENDUNGAN/ KONSULTAN SUPERVISI	TANGGAPAN KAJIAN BALAI TEKNIK BENDUNGAN
	you should pay attention to the following:		
	a. Consultants should add flow meters to both irrigation pipes and hydropower plants to measure flow rates.	A flow meter will be added before entering the PLTMH pipe	Suggestions are taken into account and followed up. Procurement of flow meters should be carried out in parallel while impounding is carried out.
	b. It is important to ensure that the hydroelectric pipes have a tailrace gate to ensure that there is no backwater from the river to the turbine.  Gambar 16: Terowongan pengelak B	The tail race gate will be built simultaneously with the PLTMH package  Gambar 16: Terowongan pengelak Bendungan Leu	Suggestions are taken into account and followed up.
8.	Taking into account the suggestions at the Technical Session on April 1 2024. In the 24 m high intake tower, it is planned to make stairs as a mobilization route. In addition to the stairs, a personal lift should also be installed for the convenience and safety of OP officers in carrying out their duties. Personal lift design drawings should be submitted in the report.	Currently, due to limited funds, the stairs are void. Using stairs, advice on using a man lift will be conveyed at POP.	- The consultant should recommend the construction of a stairway to simplify the operation and maintenance process for officers/operators. - Stairway design drawings should be included with the personal lift and the drawings should be submitted to BTB.
9.	It is reported that the current saddle support specification for the penstock is K225. a. Based on previous experience in the field, the saddle support is often damaged/broken due to vibration. The quality of the concrete should use K300 to make it safer b. The distance between penstsok segments is 5 m. The consultant should ensure that the deflection occurs in a safe condition	It has been confirmed by PPK and the Service Provider that they will use K-300 quality concrete	The results of confirmation of the quality of K-300 concrete (f'c = 24.9 MPa) should be presented to BTB in the final report which is accompanied by documentation of the results of the DT and/or NDT concrete tests.

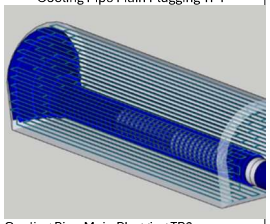
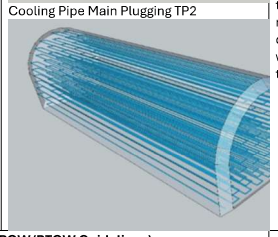
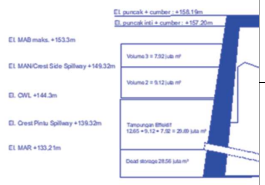
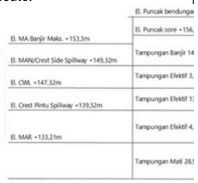
No	URAIAN/SARAN	TINDAK LANJUT OLEH PEMRAKARSA BENDUNGAN/ KONSULTAN SUPERVISI	TANGGAPAN KAJIAN BALAI TEKNIK BENDUNGAN
10.	The 450 m long Trashboom has not been described by the Consultant. It is recommended that the tools and anchors for fastening at the bottom be made and installed immediately before impounding is carried out	The tools and anchors have been made and the trashboom parts have begun to be installed.  	Suggestions have been followed up.
11.	It is recommended that hydromechanical and electrical equipment located in open spaces be equipped with protective equipment in the form of a canopy.	For stop logs, a stop log house has been provided which is equipped with an OHTC and Monorail Hoist	Suggestions have been followed up. - Actual photos in the field should be presented regarding hydromechanical equipment that has been installed with a canopy. - Design drawings of protective buildings should be submitted in the completion report and submitted to BTB.
12.	Emergency Genset with a capacity of 150 Kva to be equipped with a daily tank whose capacity is capable of supplying fuel for at least 24 hours of operation	Suggestions are accepted, a Diesel Tank will be added for the Generator	Suggestions have been followed up.
13.	To determine the point of the lightning protection pole and its grounding, coordination should be carried out with the instrumentation work implementer so that the lightning protection system does not interfere with the dam instrumentation. Likewise, for early warning system equipment in the form of sirens, it should be installed in areas that are quite high.	Two lightning protection points have been added, 1 in the Intake area and 1 in the Puncak Bendung area. Mapping / Images are on the PPT display. Intake Area –	Suggestions have been followed up.

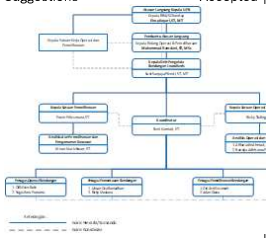
No	URAIAN/SARAN	TINDAK LANJUT OLEH PEMRAKARSA BENDUNGAN/ KONSULTAN SUPERVISI	TANGGAPAN KAJIAN BALAI TEKNIK BENDUNGAN
		Spillway  Puncak Bendung area 	
14.	It is recommended that all hydromechanical and electrical equipment be checked according to their respective functions.	Suggestions are accepted, the Intake shaft pipe has been checked with an NDT (non-destructive test) while the door will be wet tested and dry tested, as well as the Valve has been wet tested at the factory according to technical specifications.	Suggestions have been followed up.

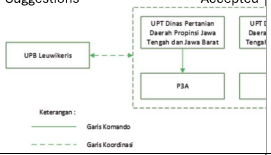
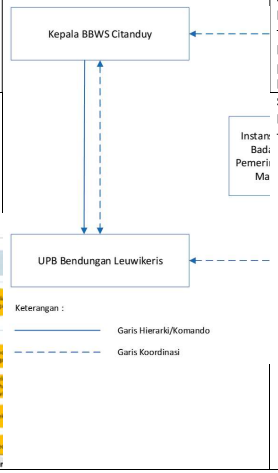
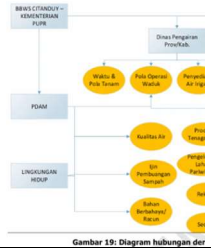
No	URAIAN/SARAN	TINDAK LANJUT OLEH PEMRAKARSA BENDUNGAN/ KONSULTAN SUPERVISI	TANGGAPAN KAJIAN BALAI TEKNIK BENDUNGAN
		Example of test results: **INSPECTION & Test Check Sheet** Page No. Rev. No. DATE Project Name: Bandungan Lowlands Dam Project — Customer Item Name: Electric Butterfly Valve — Item No. Flange Std.: ISO 7005 (PN16) — DWG. No. Nomial Size: 2000 — Quantity: 1 — Inspecter Body Material: GCD450 — Disc Material: GCD450 — Supervisor Kind of Inspection & Test — Specification — 1 Visual Inspection — Approved Spec. — ok Dimensional Check — Approved Spec. — ok Performance Test: Hydrostatic Test — 2.4 Mpa, 180 sec — ok Performance Test: Seat Leakage Test — 1.76 Mpa, 60 sec — ok Performance Test: Operating Check — Full Open 315 sec, Full Close 315 sec — ok Coating Inspection: Inside Check — Ral 9005 200㎛ — ok Coating Inspection: Outside Check — Ral 5005 200㎛ — ok Test Result — Approval Note.	

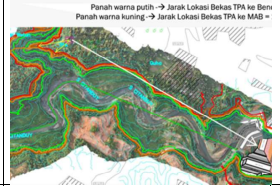
No	URAIAN/SARAN	TINDAK LANJUT OLEH PEMRAKARSA BENDUNGAN/ KONSULTAN SUPERVISI	TANGGAPAN KAJIAN BALAI TEKNIK BENDUNGAN
		 barata indonesia INSPECTION RECORD HOIST Pemesan / Costumer : PT. WASKITA - ADHI,KSO Proyek / Project : PEMBANGUNAN BENDUNGAN LEUWIKELING - KEBUS - PAKET II No.Order Pek / Job Order No : D 9 . 18. 008 No Gambar / Drawing No : 0-00-00-0147 Nama Bagian / Item name : HOIST P B=3.0 Tanggal / Date : 24 SEPTEMBER 2 Test Item : Hoist Intake Gate Loading Condition : Design (15,89 T) , Actual (16 T) Test No Operation Direction 1 2 3 4 5 6 Motor Voltage (V) Raising 380 - 380 - 380 Lowering - 380 - 380 - 380 Current (A) Raising 16,1 - 16,0 - 5,8 Lowering - 3,1 - 3,1 - 3,4 Lifting Speed Measured Distance Operating Time (Minute) Raising 1,36 - 1,36 - 1,36 Lowering - 1,31 - 1,31 - 1,31 Height (M) Raising 1 - 1 - 1 Lowering - 1 - 1 - 1 Temperature (C) Ambient 28 32 34 34 28 28 Motor 28 32 34 38 40 40 Speed Reducer 28 31 33 33 41 41 Gear box 28 29 30 31 34 34 Remark : Average speed raising (Va) = 1/(96,60) = 0,62 (M/minutes) Average speed lowering (Va) = 1/(59,40) = 0,64 (M/minutes) Design speed = 0,55 - 0,67 (M/minutes)	
J. Preparation for Initial Filling of the Reservoir			
1.	When casting main plugging work, you should pay attention to the following things:		
	a. a. The depth/thickness of the main plugging casting in stage 1 is 2.5 m, so the process is quite dangerous for officers who compact the concrete with a vibrator. This thickness should be reconsidered for officer safety.	In our opinion (consultants) in the main plugging area there is no need to install a piezometer or OW anymore, which is of concern about the potential for uplift in the Spillway (Chuteway) channel. The potential for uplift is very small because under the floor of the Spillway channel a drain/evaporated pipe has been installed to release water seepage downstream, so that the pore water pressure in that area is small, to control the ground water level, it has been installed on the right side (Chuteway) of the observation well (OW 5) with a depth of 50 meters, with a distance of 49 meters	Suggestions have not been followed up.- Consider casting thickness with a maximum thickness of 500 mm (SNI 03-3976-1995) - If you still want to use a

No	URAIAN/SARAN	TINDAK LANJUT OLEH PEMRAKARSA BENDUNGAN/ KONSULTAN SUPERVISI	TANGGAPAN KAJIAN BALAI TEKNIK BENDUNGAN
		from the overflow chutway axle.  	segmental scheme per 2.50 m, you should make a plugging concrete mixture, to prevent the occurrence of voids in the plugging concrete and the contact area between the plugging concrete and the bypass channel, consider using additives in the form of plasticisers, retarders and non shrinkage agent. The concrete mix design with these additives should be determined based

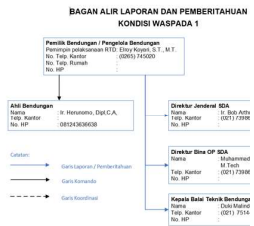
No	URAIAN/SARAN	TINDAK LANJUT OLEH PEMRAKARSA BENDUNGAN/ KONSULTAN SUPERVISI	TANGGAPAN KAJIAN BALAI TEKNIK BENDUNGAN
			on a trial mix.
	b. Longitudinal, transverse and 3D cooling pipe designs should be provided.	Suggestions are accepted and acted upon Cooling Pipe Main Plugging TP1  Cooling Pipe Main Plugging TP2 	The image submitted is a 3D model schematic of the cooling pipe design. The consultant should present a design drawing (as built drawing) of the plugging method design that will be used to the BTB.
	E. B. Dam Management Plan (OP and POW/RTOW Guidelines)		
1.	To fulfill the technical requirements in accordance with article 62 paragraph (6) PUPR Ministerial Regulation No. 27/PRT/M/2015 concerning Dams, the Consultant must prepare a Dam Management Plan. Details of the preparation of POW and RTOW to be separated as separate documents as part of the Dam Management Plan.	Suggestions Accepted and Acted on	Suggestions are heeded and acted upon.
2.	When a special incident occurred when the circumvention tunnel collapsed, a handling method was provided by the Consultant using foam and shotcrete. It should be provided in more detail regarding the handling method, including work methods, foam strength, shotcrete thickness, etc. Drawings regarding handling of collapse incidents are also presented in detail in the As Built Drawing.	Suggestions accepted are attached For handling special incidents of avoidance tunnel collapses, the treatment does not use the shotcrete method.	Suggestions have been followed up.
3.	Presented an illustration of the Leuwikeris Dam,		
	a. a. The Control Water Level elevation is at +147.32 masl, while in the discussion of hydrology the CWL is at +144.3 masl. Data inconsistencies should be corrected.		Suggestions have been followed up.
	b. b. The images presented are less representative. Retouch the image with a systematic scale.	 **Gambar 18: ilustrai skema tampunga**	Suggestions have been followed up.
4.	In the organizational structure of the Leuwikeris Dam UPB, the following things should be taken into account:		

No	URAIAN/SARAN	TINDAK LANJUT OLEH PEMRAKARSA BENDUNGAN/ KONSULTAN SUPERVISI	TANGGAPAN KAJIAN BALAI TEKNIK BENDUNGAN
	a. a. The term "operations chief" should be supplemented with "operations and monitoring vista".	Suggestions Accepted 	Suggestions have been followed up. The results of the change in the name of the organizational structure should be stated in the final report and RTD document and submitted to the BTB.
	b. b. If officers for operations and monitoring have never had experience with dams, consideration should be given to recruiting officers from contractors or consultants who previously participated in the construction of the Leuwikeris Dam or officers who already have experience with dams.	Suggestions Accepted	Suggestions are of interest. Consultants and dam managers should recruit officers at the head of the task force who have experience related to dams and/or conduct dam operation training for prospective officers.
	c. c. The consultant should carry out a job analysis and workload analysis to find out the number of OP officers needed based on real conditions in the field.	Suggestions epted Attached	Suggestions have been followed up. **Appendix I.4.c.**

No	URAIAN/SARAN	TINDAK LANJUT OLEH PEMRAKARSA BENDUNGAN/ KONSULTAN SUPERVISI	TANGGAPAN KAJIAN BALAI TEKNIK BENDUNGAN
	d. d. The writing "dam coordinator" should be changed to "UPB Leuwikeris".	Suggestions Accepted 	Suggestions have been followed up.
	e. e. In the diagram of relationships (administration) with other agencies, the agricultural service and the water user farmers' association (P3A) should be added.		Suggestions have been followed up. Presented in point f below.
	f. f. The flow of relations with other agencies is considered less informative, because it does not describe the correct coordination system. This route should be re-evaluated and improvements made.	 Gambar 19: Diagram hubungan der	Suggestions have been followed up.

No	URAIAN/SARAN	TINDAK LANJUT OLEH PEMRAKARSA BENDUNGAN/ KONSULTAN SUPERVISI	TANGGAPAN KAJIAN BALAI TEKNIK BENDUNGAN
		<table><tr><th>Instansi</th><th>Bentuk Kerjasama/kese</th></tr><tr><td>Dinas Pengairan Provinsi atau Kabupaten</td><td>Pola operasi waduk Pola tata tanam Penyediaan air irigasi Pengendalian banjir</td></tr><tr><td>Dinas Pertanian Provinsi atau Kabupaten</td><td>Pola operasi waduk Pola tata tanam Instensitas pertanaman</td></tr><tr><td>Pengelola PLTA</td><td>Pola operasi waduk Produksi tenaga listrik</td></tr><tr><td>PDAM</td><td>Pola operasi waduk Air baku</td></tr><tr><td>Dinas Perikanan</td><td>Kualitas air waduk Elevasi minimum muka air</td></tr><tr><td>Dinas Pariwisata</td><td>Pengelolaan lahan pariwisa Rekreasi</td></tr><tr><td>Kepolisian Lingkungan Hidup</td><td>Keturiti Kualitas air Penghijauan dikawasan ta Ijin pembuangan limbah Bahan – bahan berbahaya</td></tr></table>	
5.	Presented the river scheme at the Leuwikeris Dam. The creation of this scheme should be consulted first with the Hydrology TA.	Suggestions Accepted	Suggestions are taken into account and followed up.
6.	There is a final disposal site (TPA) which is included in the inundation area which has not been cleaned up until now. To maintain the quality of reservoir water, it is best to clean up the waste in the former landfill area. As well as adding sampling in an effort to monitor water quality at the former landfill location during the filling period as an anticipation of the potential for pollutants at the location.	Handhawar TPA, Cijeungjing District, Ciamis Regency was officially closed on March 1 2018 (Source: Mind of the People on March 6 2018) Currently it is an Integrated Waste Disposal Site (TPST) with the management of organic waste into fertilizer, and decomposing organic waste using maggots, while non-degradable waste since 2021 has been transferred to the Karya Mulya Ciminyak landfill, Cisaga, Ciamis Regency Cisaga, Ciamis Regency. (Water quality test results attached) 	Suggestions have been followed up. Water quality monitoring at former landfill sites should continue to be carried out.

No	URAIAN/SARAN	TINDAK LANJUT OLEH PEMRAKARSA BENDUNGAN/ KONSULTAN SUPERVISI	TANGGAPAN KAJIAN BALAI TEKNIK BENDUNGAN
			
7.	The completeness of the OP guidelines should be checked again taking into account the suggestions from previous discussions, OP training modules including the OP Principles Module and the Dam Safety Evaluation and Inspection Module.	Suggestions are accepted and acted upon	The updated OP Guidance Document should be submitted to BTB together with other technical documents.
8.	Dam OP guidelines should be prepared by Dam OP Experts who have a Large Dam Expertise Certificate, together with related experts including: geotechnical/instrumentation experts, hydromechanical experts, hydrologists, etc.	Suggestions accepted	The updated OP Guidance Document should be submitted to BTB together with other technical documents.
9.	The draft OP guidelines should be immediately revised, discussed with the directors and UPB, the results of the improvements then submitted to the BTB for special discussion before the Plenary Session.	Suggestions are accepted and acted upon	The updated OP Guidance Document should be submitted to BTB together with other technical documents.
10.	In the table of contents of the draft OP Guidelines presented during the Pre-Plenary discussion, only Reservoir Operation Instructions, Maintenance Instructions and Monitoring Instructions are included. It should be	Suggestions are accepted and acted upon	The updated OP Guidance Document should be submitted to BTB together

No	URAIAN/SARAN	TINDAK LANJUT OLEH PEMRAKARSA BENDUNGAN/ KONSULTAN SUPERVISI	TANGGAPAN KAJIAN BALAI TEKNIK BENDUNGAN
	equipped with SOPs for Operation, Monitoring and Inspection, Maintenance and Security of the Dam Area.		with other technical documents.
L. EMERGENCY ACTION PLAN			
1.	In the emergency evaluation and classification, it was stated that there were several conditions, namely abnormal, alert, alert and watchful conditions. The emergency classification should be changed to Alert 1, Alert 2, Alert and Caution.	The emergency classification has been corrected to Alert 1, Alert 2, Alert and Caution.  RENCANA TINDAK DARURAT BENDUNGAN LEUWI BAB IV DETEKSI KEADAAN DARURAT, EVALUASI DAN KLASIFIKASI 4.1 Deteksi Keadaan Darurat 4.1.1 Situasi Di Bendungan 4.1.2 Indikasi Kerusakan Bendungan 4.2 Evaluasi dan Klasifikasi Keadaan Darurat 4.2.1 Kondisi Waspada 1 4.2.2 Kondisi Waspada 2 4.2.3 Kondisi Siaga 4.2.4 Kondisi Awas	Suggestions have been followed up.
2.	In the notification flow chart in several conditions, the names of the officials and officers responsible are not yet listed. a. The communication/notification flow chart should be equipped with the names of officials appropriate to the conditions at the time of the initial filling plan. b. It should be equipped with notification/report formats for each level of preparedness.	In the notification flow chart in several conditions, the names of officials and officers responsible have been included based on the results of current implementation in the field a. The Flow Chart has been equipped with the names of officials according to the conditions during the initial filling plan  BAGAN ALIR LAPORAN DAN PEMBERITAHUAN KONDISI WASPADA 1 Pemilik Bendungan / Pengelola Bendungan Ahli Bendungan Direktur Jenderal SDA Direktur Bina OP SDA Kepala Balai Teknik Bendungan Catatan: Garis Laporan / Pemberitahuan Garis Komando Garis Koordinasi b. Notification/report formats for each level of preparedness have been created for each level of preparedness, which can be seen in attachments 4.1 – 4.4 of the RTD Document	Suggestions have been followed up. Suggestions have been followed up.

No	URAIAN/SARAN	TINDAK LANJUT OLEH PEMRAKARSA BENDUNGAN/ KONSULTAN SUPERVISI	TANGGAPAN KAJIAN BALAI TEKNIK BENDUNGAN
3.	The words "problem indication" should be replaced with an indication of the potential for dam collapse.	Editorial improvements to the RTD document have been followed up.	Suggestions are heeded and acted upon.
4.	The Dam Construction SNVT should be able to update the RTD no later than FY 2025.	RTD updates will be followed up	Suggestions are heeded and acted upon.
M. Discussion Conclusion			
1.	The suggestions above should be immediately followed up, the technical requirements documents should be revised and a follow-up report prepared to be submitted to the Dam Engineering Center for the discussion process to continue.		Ok.
2.	The consultant should review the suggestions in the minutes of the previous discussion. Suggestions that are still relevant and have not been followed up should also be immediately followed up, according to the previous inspection report.		Ok.
3.	Technical requirements documents should be revised based on the suggestions above and suggestions from previous discussions that are still relevant		Ok.

2.1. Follow-up Study of the Minutes of the KKB Technical Session 1 April 2024

No	DESCRIPTION/SUGGESTIONS	FOLLOW-UP BY DAM INITIATOR/SUPERVISION CONSULTANT	RESPONSE TO THE CENTER OF DAM ENGINEERING STUDY
A. Dam Construction History			
1	In the implementation of the construction of the Leuwikeris Dam, many technical problems occurred, a history of the dam construction should be made in the form of a matrix complete with efforts to overcome them and included in the Detailed Engineering Design	The history of technical problems that occurred is arranged in a matrix as in attachment R.1	Suggestions have been followed up. This should be explained in detail in the Design Revision Report.
B. Requirements for Requirements for Reservoir Filling Permit			
1	In the framework of the initial reservoir filling permit process, the	The report is currently in the process of completing its preparation, and it	Suggestions are fully heeded and

No	DESCRIPTION/SUGGESTIONS	FOLLOW-UP BY DAM INITIATOR/SUPERVISION CONSULTANT	RESPONSE TO THE CENTER OF DAM ENGINEERING STUDY
	Citanduy River Regional Office has submitted several administrative and technical requirements documents. In accordance with the SE Minister of PUPR No.1 of 2019 concerning Guidelines for Initial Filling of Reservoirs, this document should be accompanied by: a. Administrative Requirements 1) Application for Reservoir Initial Filling Permit b. Technical Requirements 1) Construction Implementation Report, which is equipped with explanations regarding geological and engineering geological conditions, foundation repair work, instrumentation work, construction quality testing work, hydromechanical work, etc. 2) Report on the Implementation of Reservoir Inundation Area Preparation 3) Follow-up reports on discussion minutes and inspection reports, including: a) Follow-up Inspection Report February 15 2024 b) Follow-up Inspection Report January 4 2024 c) Follow-up Inspection Report 10 August 2023 d) Follow-up to Technical Discussion Minutes 17 July 2023 e) Follow-up to Technical Discussion Minutes June 21, 2023 f) Follow-up Inspection Report March 31, 2023 g) Follow-up ReportInspection November 26, 2022 h) Follow-up Inspection Report October 24, 2022 i) Follow-up Inspection Report June 29, 2022 j) Follow-up Technical Discussion 18 November 2020 k) Follow-up to Inspection Report 8 September 2020 l) Follow-up Technical Discussion January 5 2020	will be prepared in the form of a separate report.	acted upon.

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C. Technical Data			
1	The name of the Leuwikeris Dam type presented in all technical documents is "zonal rock fill with upright core". The naming should be adjusted to the applicable rules/standards, namely "Zonal Random Rock Filling with Cores Upright."	The suggestion has been followed up by changing the naming in technical data.	LIB technical data has not been submitted. Suggestions have been followed up.
D. Geology and Engineering Geology			
1	On the Engineering Geological Map of the Dam and its Complementary Buildings, it appears that there is a shoulder zone foundation in the form of alluvial soil. In addition, there is a slope of the reservoir basin which is colluvial soil and residual soil.		
	a. It was reported that compaction had been carried out to increase the bearing capacity of the alluvial soil foundation in the shoulder	It has been carried out, on the alluvial foundation a relative density test has been carried out, apart from that a loading test has also been carried out using the plate bearing test method.	The evaluation results of the tests carried out should be explained in the report

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	zone, the quality of which was controlled by conducting a relative density test. The results of the relative density test should be explained to evaluate the density of the alluvial soil foundation.	Attached	
	b. The monitoring plan that will be carried out during the initial filling of the reservoir should be explained regarding the potential for landslides because the alluvial soil foundation is below the low water level, as well as the potential for landslides on the slopes of the reservoir basin in the form of colluvial soil and residual soil.  Figure 5: Engineering Geological Map of the Dam and its Complementary Buildings	A simulation analysis of reservoir filling has been carried out on the cliff slope on the right side upstream of the dam, which has now been followed up with the installation of counterweights. For long-term monitoring, sliding stakes will be installed to monitor the movement of the slope. (attached	It's been followed up.
2	On Longitudinal Engineering Geological Cross Sections Dam, it is recommended as follows:		
	a. It appears that the top layer of the left abutment of the dam is residual soil, which is also the slope of the right wall of the spillway building. It should be explained that foundation	On the left side of the top of the dam, the residual soil has been excavated until it finds a layer of bedrock/original rock with class CM and then the excavation is replaced with the same material as the core	It's been followed up

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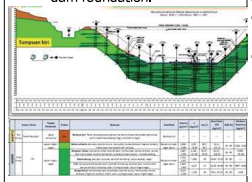
	repairs were carried out on the residual soil layer at the left support of the dam, to anticipate seepage through the residual soil layer, and to anticipate the potential for landslides of the residual soil layer entering the spillway.	embankment, then on the embankment leading to the spillway a slope of the embankment with a slope of 1:2 is made. with the outside closed using transition and rip-rap. (attached)	
	b. The cross-section should depict the configuration of the diaphragm wall and grouting for handling seepage at the dam foundation.  Figure 6: Longitudinal Engineering Geological Section of the Dam	Handling of seepage in the dam foundation is carried out using the diaphragm wall method in the river bed area and grouting at the right abutment and left abutment. Both the diaphragm wall and grouting have been depicted in the cross-sectional drawing. (attached)	The configuration of the diaphragm wall and grouting is not yet visible in the longitudinal engineering geological sections and cross sections presented.
3	On the longitudinal geological cross-section of the bypass tunnel, the following is recommended:		
	a. During construction, a collapse occurred in the tunnel roof caused by springs and seepage. On the cross-section, the points of spring discharge and seepage should be marked with symbols. On the map and other cross-sectional images, symbols should also be depicted of the points of spring discharge and seepage encountered during	It has been followed up, seepage points in the tunnel have been plotted along the tunnel. (attached)	It's been followed up

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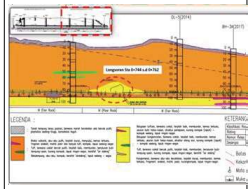
	construction.		
	b. It was reported that tunneling was carried out using two methods, namely by blasting and by excavation. There should be a mark on the cross section that differentiates the location of use of each method.  Figure 7: Longitudinal Geological Section of the Dam Tunnel (Upstream).		This has been followed up by adding information on the excavation method with information in blue using the breaker method and red using the blasting method. (attached)
E. Foundation Repair			
1	For homogeneity of the foundation along the core zone, before backfilling on the supports is carried out, the concrete cap at the base of the core zone should be made continuously from trough to support.		It has been followed up, for the right support the concrete cap starts from the base of the core zone, for the left support the concrete cap starts from an elevation of +82 m (12 m from the base of the core zone) because at the left support the condition of the lower

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			foundation is relatively more compact than the right support. (attached)
2	Until now, work on installing hydromechanical equipment in the circumvention tunnel cannot be carried out because the grouting work has not been completed.		
	a. Considering that the initial filling of the reservoir is proposed to be carried out in May 2024, efforts should be planned to achieve the target completion time for each work.	This will be followed up with an action plan for each job in accordance with the reservoir filling schedule plan	Suggestions are heeded and acted upon.
	b. Consider grouting carried out from the upstream side first towards the main plugging, so that you can then continue with the work of installing hydromechanical equipment while grouting is carried out downstream of the main plugging.	Coordination has been carried out regarding the implementation of hydromechanical and grouting work items, so that the implementation of each work item is not disrupted. In principle, the grouting work carried out is re-grouting (repair) work to repair locations where seepage is still found.	Suggestions are heeded and acted upon.
	c. It was conveyed that there are several seepage points upstream in the main plugging area, to overcome this seepage, re-grouting work is currently being carried out, specifications for the ratio of cement and water for the re-grouting work should be made and a method and time sequence for its implementation should be made.	The main re-grouting work is carried out in the primary plugging area in parallel with the installation of hydromechanical work then continued with grouting from upstream to downstream of the main plugging, the cement ratio used is (1:2) water : cement in locations where seepage is dripping/flowing with Always pay attention to the risk of clogging if the mixture is too thick to use a thinner mixture	Suggestions are heeded and acted upon.
F. Quality Control of Embankment			

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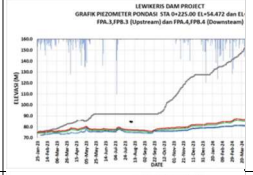
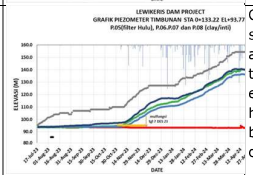
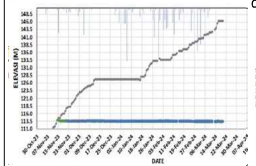
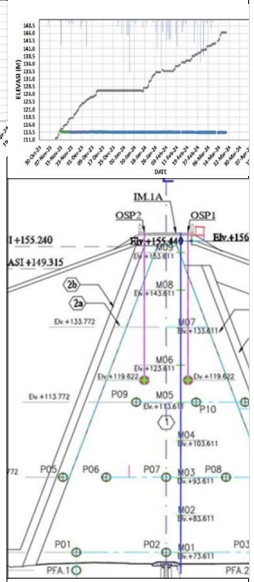
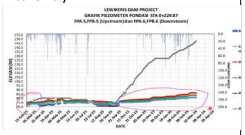
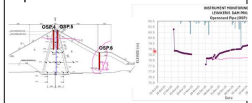
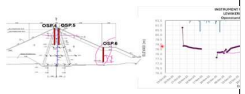
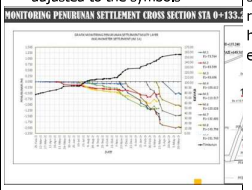
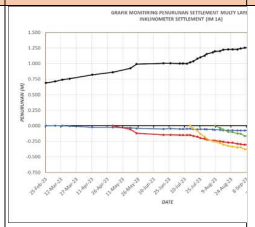
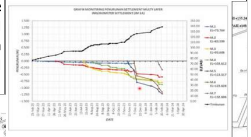
Construction			
1	When the Technical Session took place, there had not been any discussion regarding the evaluation of the results of embankment construction quality control. Reports and presentation materials should be prepared to be discussed at the discussion furthermore.	Suggestions are accepted and followed up by making a presentation.	- The results of the quality control evaluation should be presented in a completion report and submitted to BTB. - The presentation material should be presented and explained at the next plenary session.
G. Concrete Quality Control			
1	When the Technical Session took place, there had not been any discussion regarding the evaluation of concrete quality control results. Reports and presentation materials should be prepared to be discussed in the next discussion	Reports and presentation materials (PPT) have been prepared	- The results of the quality control evaluation should be presented in a completion report and submitted to BTB. - The presentation material should be presented and explained at the next plenary

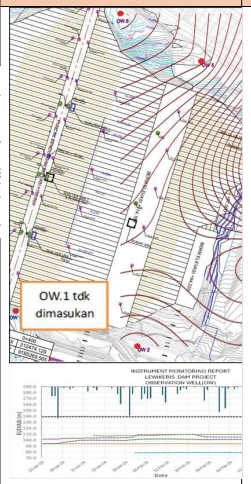
No	DESCRIPTION/SUGGESTIONS	FOLLOW-UP BY DAM INITIATOR/SUPERVISION CONSULTANT	RESPONSE TO THE CENTER OF DAM ENGINEERING STUDY
			session.
H. Instrumentation Analysis			
1	On the Vibrating Wire (VW) piezometer, open standpipe piezometer (OSP) and observation well (OW) monitoring graphs, data on measurements of water levels that occur upstream of the dam should be plotted, so that their influence can be evaluated. of the reading data obtained	The river water level will be plotted on each monitoring graph and will later become the reservoir water level (MAW) 	The suggestion has been followed up.
2	The consultant estimates that the cable of the VW piezometer pile P37 which is installed in random material is broken, so that from the start of installation it does not show any reading response, efforts should be made so that the piezometer can function again	 Monitoring graph P.37 position at random downstream, semi-tight after installing the piezometer, it functions well. Vibrating Wire is an electrical device assuming a break, to detect breaks at the position where the break in the cable has been embedded and efforts have been made to make it work again.	Consultants should pay attention to thatThe equipment handed over must be in working condition.
3	VW piezometer readings P09, P10, and P-11 at STA 0+133.22 show less responsive results. The cause of the less responsive results should be evaluated and the response of the	For P11 in the automatic filter there is no value because it is free drain, for piezometers P09 and P10 at the clay location the piezometer value has not seen a response due to the progress	Suggestions should be heeded and acted upon.

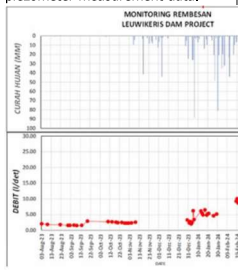
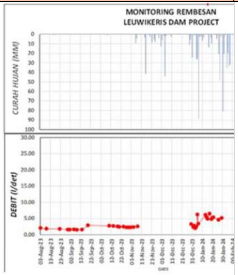
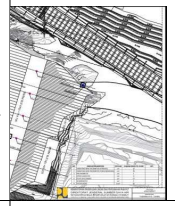
No	DESCRIPTION/SUGGESTIONS	FOLLOW-UP BY DAM INITIATOR/SUPERVISION CONSULTANT	RESPONSE TO THE CENTER OF DAM ENGINEERING STUDY
	piezometer readings should continue to be monitored considering that the results of the piezometer readings are used to describe the contour of pore water pressure.  Figure 8: Monitoring graph of VWP 09, P10, and P- 11 at STA 0+133.2	of the embankment, assuming there is bubble pressure in the piezometer that has not yet come out. The piezometer still functions with the value monitored on the reading device.  Figure 8: Monitoring graph of VWP 09, P10, and P-11 at STA 0+133.22	
4	In the monitoring graph of the VW	The pore pressure downstream and	Suggestions

No	DESCRIPTION/SUGGESTIONS	FOLLOW-UP BY DAM INITIATOR/SUPERVISION CONSULTANT	RESPONSE TO THE CENTER OF DAM ENGINEERING STUDY
	piezometer foundation STA 0+229.87, it appears that the foundation piezometers upstream of the wall and grouting diaphragm (FPA5 and FPB5) show readings that are not significantly different from the downstream foundation piezometers (FPA6 and FPB6). This condition indicates that the wall diaphragm and grouting have not been effective in reducing the foundation pore water pressure. For dam safety during the initial filling of the reservoir, intensive monitoring of piezometer readings should be carried out.	upstream of the diaphragm wall does not yet show significant pressure because there is no load or flooding. Monitoring is carried out every day intensively  Figure 9: VW piezometer monitoring graph for STA 0+229.87 foundation	should be heeded and acted upon.
5	Pore water pressure contour analysis should be carried out using reasonable piezometer reading data. For piezometers that show abnormal readings, the readings should be assumed to be based on Bishop's formula, as follows: $\Delta u = A \times B \times \Delta\sigma 1$ where: Δu = Pore water pressure increases with increasing embankment load $\Delta\sigma 1$ = increase in embankment load A = embankment density/compressibility factor B = embankment water content and saturation factors	Attached Embankment density/compressibility graph 95 -100. (98) Chart of embankment water content and saturation 39-59 (51) TP.2 42	Suggestions have been followed up.
6	On the open standpipe piezometer (OSP) monitoring graph in the downstream shoulder zone, pore water pressure readings (transient pore pressure occurs), which indicates that the shoulder zone is not free drain (random soil). The effect of transient pore pressure should be	The OSP piezometer has a pressure reading that is predicted to be due to drilling, the pressure reading is that the water used from drilling has not yet come out, the OSP response is very slow. And the OSP piezometer will carry out Flussing and taking water in the OSP.	Suggestions have been followed up.

No	DESCRIPTION/SUGGESTIONS	FOLLOW-UP BY DAM INITIATOR/SUPERVISION CONSULTANT	RESPONSE TO THE CENTER OF DAM ENGINEERING STUDY
	considered in the stability analysis. Check the possibility that the upstream shoulder zone is also semi-impermeable  **Figure 10: Open standpipe piezometer (OSP) monitoring graph in the downstream shoulder zone**	 Figure 10: Open standpipe piezometer (OSP) monitoring graph in the downstream shoulder zone	
7	In the multilayer settlement monitoring graph STA 0+133.22 IM1, it appears that there will be a sudden decline in November 2023. a. To facilitate evaluation, the coloring of the graph should be adjusted to the color of the symbols on the cross section. b. According to the Consultant, a sudden decline occurredbecause the reading is taken from the surface of the embankment so the reference point changes. Readings after November 2023 should be re-evaluated based on reading data in the February - October 2023 range.	a. The graphic coloring will be adjusted to the symbols  b. Suggestion	The explanation regarding the sudden decrease in multilayer settlement reading results has not been explained.

No	DESCRIPTION/SUGGESTIONS	FOLLOW-UP BY DAM INITIATOR/SUPERVISION CONSULTANT	RESPONSE TO THE CENTER OF DAM ENGINEERING STUDY
	c. If readings after November 2023 cannot be evaluated, deformation analysis should be carried out using reading data in the range February - October 2023 and multilayer settlement reading data at other STAs that are considered reasonable.  **Figure 11: Monitoring graph and cross section**	 c. Suggestion For deformation analysis, use sta 0+182  Figure 11: Monitoring graph and cross section	
8	There are six Observation Wells installed, with one anomalous OW, namely OW-1. OW-1 cannot provide indicated monitoring readings because its installation location does not reach the depth of the Ground Water Table. The consultant added that initially there were readings on OW-1 but, they gradually disappeared. Therefore, when	Creating Observation Well contours, OW.1 data is temporarily not input	The suggestion has been followed up

No	DESCRIPTION/SUGGESTIONS	FOLLOW-UP BY DAM INITIATOR/SUPERVISION CONSULTANT	RESPONSE TO THE CENTER OF DAM ENGINEERING STUDY
	constructing the OW contour, consider eliminating the OW-1 measurement results.  **Figure 12: Observation Well reading monitoring graph (OW)**	 Figure 12: Observation Well (OW) reading monitoring graph	
9	The consultant stated that the results of seepage measurements from the v-notch produced a discharge of 9,703 m3/s. This discharge value is quite large considering that the dam is not yet filled. Check the v-notch measurement results by comparing the readings from the piezometer installed in the dam foundation to see if the seepage trend that occurs shows an anomaly or not, where the seepage value from the v-notch is	The results of measurements in the field show the source is from springs directed downstream, and from rainfall. Does not show any anomalies. The V-notch building is still under construction.	llowed up.

No	DESCRIPTION/SUGGESTIONS	FOLLOW-UP BY DAM INITIATOR/SUPERVISION CONSULTANT	RESPONSE TO THE CENTER OF DAM ENGINEERING STUDY
	directly proportional to the piezometer measurement data.  Figure 13: Graph of seepage discharge reading from v-notch		
10	*Strong Motion Accelerograph*(SMA) is planned to be installed in 2 (two) units at the top of the dam and the bedrock downstream of the foot of the dam. Considering that the height of the dam from the deepest foundation excavation reaches 84.9 m, consider adding 1 (one) SMA installed on the downstream slope of the dam, at a height of about half the height of the dam (0.5H).	ered to install 1 more sensor on the downstream slope of the dam (red image) 	hat the SMA is installed on a rock base.
I.	**Dam Stability Analysis Evaluation**		
1	When the Technical Session took place, there had not been any discussion regarding the evaluation of the dam stability analysis. Reports and presentation materials	Suggestions are accepted and will be followed up regarding dam stability analysis is still in process with new material parameters/new data	nd acted upon.

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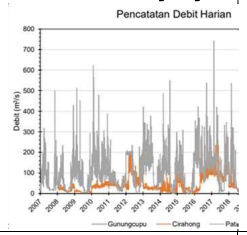
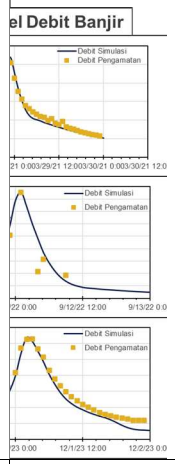
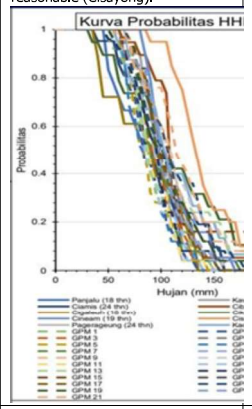
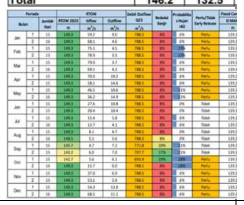
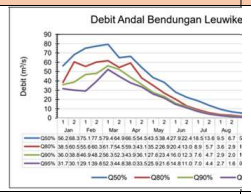
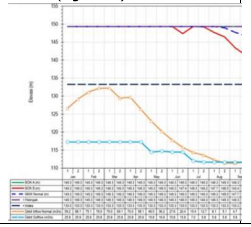
	should be prepared to be discussed in the next discussion		
J.	**Hydrological Analysis**		
1	It was stated that there was a flood during the daily discharge recording in 2021 which had an impact on the dam and it is known that the discharge value was not greater than the daily discharge in 2022 and 2023. Regarding this matter, it is necessary to pay attention to the following things: 		
	a. The daily discharge should be evaluated during flood events that occur whether the bypass channel is able to handle the event in the Q25 return period.	During the flood event in March 2021, discharge records on the Cirahong PDA showed a peak flood discharge of 267 m3/s. Compared with the planned flood discharge at design conditions, the discharge is in the range of a return period of 2 to 5 years. However, in the latest hydrological study in 2024, the low return period flood discharge increased so that the March 2021 flood event was lower than the Q2 flood discharge. This is in line with actual events where in the last 3	llowed up.

No	DESCRIPTION/SUGGESTIONS	FOLLOW-UP BY DAM INITIATOR/SUPERVISION CONSULTANT	RESPONSE TO THE CENTER OF DAM ENGINEERING STUDY
		years there have been 3 incidents in each year with re than 250 m3/s.	
	b. The flood discharge values for 2021, 2022 and 2023 should be presented in hourly periods, and the flood discharge values for 2021 should be evaluated based on monitoring of the Cirahong water estimation post which is also compared with the flood discharge that occurred in 2022 and 2023	ch 2021 has been added to the calibration for the flood discharge calculation model along with the events in September 2022 and December 2023. All three flood events can be modeled quite well. el Debit Banjir 	llowed up.
2.	In the Annual Maximum Daily Rainfall (HHMT) probability curve shown in the image below, it can be seen that there is data that is not		

No	DESCRIPTION/SUGGESTIONS	FOLLOW-UP BY DAM INITIATOR/SUPERVISION CONSULTANT	RESPONSE TO THE CENTER OF DAM ENGINEERING STUDY
	reasonable (Cisayong). 		
	a. This should be checked again by looking at the results of the planned rain calculations.	data recording shows that annual maximum rainfall exceeds 100 mm almost every year for 20 years. If we examine the results of the frequency analysis, the Cisayong station produces a higher planned rainfall for the low return period (2-10 years) than other stations, but for the high return period (100-1000 years) the planned rainfall is quite reasonable.	llowed up.
	b. If the correlation results still produce irrelevant data, it should not be used in the analysis.	fall from Cisayong Station is quite reasonable, Cisayong Station is still used as a comparison	llowed up.
3	In the search for floods with early		

No	DESCRIPTION/SUGGESTIONS	FOLLOW-UP BY DAM INITIATOR/SUPERVISION CONSULTANT	RESPONSE TO THE CENTER OF DAM ENGINEERING STUDY
.	release, the effect of flood reduction with 4 (schemes) was presented, including without reservoir, without early release, 5 m early release, and 10 m early release, which reduced reservoir inundation as presented in the table below. Penggunaan Lahan | Luas Gena: Tanpa Waduk | Dengan Waduk Perkebunan/Kebun 72.7 68.3 Permukiman dan Tempat Kegiatan 20.2 17.2 Sawah 13.8 13.3 Sawah Tadah Hujan 21.7 20.4 Semak Belukar 3.6 3.2 Tegalan/Ladang 14.1 10.0 **Total 146.2 132.5** 		
	a. The early release evaluation should be appropriate and not interfere with the use of irrigation and raw water for the community.	d, in the recapitulation potential disruptions to the use of irrigation and raw water have been considered.	llowed up.
	b. In the flood tracking table, as presented in the table above, the recovery time in August requires 36 days in the dry season which can disrupt water needs for local communities. The flood tracking analysis should be	overy time has been considered in early release operations.	llowed up.

No	DESCRIPTION/SUGGESTIONS	FOLLOW-UP BY DAM INITIATOR/SUPERVISION CONSULTANT	RESPONSE TO THE CENTER OF DAM ENGINEERING STUDY
	re-evaluated, especially regarding the availability of water used for irrigation and raw water that remains sufficient for the community.		
	c. A recapitulation of the results of the early release analysis in reducing flooding at the Leuwikeris Dam should be presented, including clear conclusions.	ase study has been prepared in the table below. In the table it can be concluded that the application of a 5 m reduction in water level throughout the rainy season (8 months) results in a fairly good Q2 flood reduction and the potential for disruption to the use of irrigation water, raw water and hydropower is not significant. In addition, there is no need for rainfall forecasts and the reduction in water level is quite difficult to implement from an operational perspective. (chart attached)	llowed up.
4.	In the analysis of the mainstay discharge of the Leuwikeris Dam shown in the table below, it can be seen that the discharge values at Q50, Q80, Q90, and Q95 are used in the utilization of reservoir water at Q90. Consider using a discharge value of 0.4 m3/second at Q90 as the maintenance flow value for the Leuwikeris Dam, so that other water flows can be utilized for other functions.	e the use of irrigation water is still quite far downstream from the dam, the use of water for irrigation and hydropower is considered as maintenance flow as well. Maintenance flow is determined as the minimum discharge of water from a dam if during a certain period the demand for irrigation and hydropower is low. However, because the PLTA discharge is planned to be a minimum of 5 m3/s, the maintenance flow discharge can be met at all times through the fulfillment of irrigation and hydropower.	llowed up.

No	DESCRIPTION/SUGGESTIONS	FOLLOW-UP BY DAM INITIATOR/SUPERVISION CONSULTANT	RESPONSE TO THE CENTER OF DAM ENGINEERING STUDY
			
5.	The consultant submitted a graph of the reservoir operation pattern (POW) of the Leuwikeris Dam as shown in Figure 17. It can be seen that the BON A and BON B boundaries show a fixed pattern at the normal reservoir water level in the rainy season which makes early release difficult because it will create potential water existing ones are not utilized optimally. The POW should be re-evaluated so that reservoir water can be optimally optimized with a graph of the increase in reservoir water occurring in the rainy season and the use of reservoir water in the dry season (Figure 18). 	he Leuwikeris Dam is not optimal (there is still quite a lot of water that overflows during the rainy season) because the dam storage volume is small compared to the inflow volume (normal storage/inflow ratio is only 4%). Therefore, the POW of the dam produces BON A and BON B values that coincide at the spillway elevation because in those months the inflow discharge cannot be accommodated.	llowed up.

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	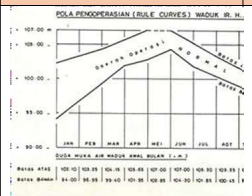		
6.	Sedimentation analysis was carried out in the Leuwikeris Reservoir Sediment Mitigation Study in 2017 and is estimated to produce a rate of sedimentation of 0.77 mm/year (USLE).		
	a. The potential for sedimentation that could occur in critical and very critical land areas should be evaluated.	Sedimentation volume has been calculated for the entire Leuwikeris Dam catchment using the USLE method taking into account both critical and non-critical land. The potential for sedimentation at the Leuwikeris Dam is 97 mm/year).	lowed up.
	b. As a conservation measure, 30 check dams are planned in the Citanduy river system. The magnitude of the potential influence of the check dams in overcoming the sedimentation that occurs should be evaluated.	Sediment Control Buildings (BPS) identified, 6 BPS have undergone detailed engineering design and 3 BPS have been completed. The storage volume of the six BPS designed is 31 thousand m3. Assuming that sedimentation can fill the BPS in 1 year and then dredging is carried out periodically every year, the age of the reservoir can be increased to 60.4 years	lowed up.
7.	Currently, the Leuwikeris Dam has taken water quality samples in		

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	2019 - 2023, but water quality testing has not been carried out on all environmental quality indices. Testing was carried out at 2 points, namely in the reservoir inundation area and near the intake building. Considering that the Leuwikeris Dam has one benefit as raw water, consultants should pay attention to several suggestions following:		
	a. Inspection of the raw water quality of the Leuwikeris Dam should refer to the latest government regulations, namely PP Number 22 of 2021 concerning Implementation of Protection AndEnvironmental Management, Appendix VI.	ved and submitted to the dam manager for further testing in accordance with PP No. 22 of 2021.	to consideration and followed up.
	b. The testing should be in accordance with the environmental quality index which refers to Minister of Environment and Forestry Regulation Number 27 of 2021 concerning the Environmental Quality Index. According to the environmental quality index, there are 10 (ten) parameters that must be tested, including: degree of acidity (pH), dissolved oxygen (DO), biochemical oxygen demand (BOD), chemical oxygen demand (COD), total suspended	ted and has been implemented	llowed up.

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	solids (TSS), total phosphate (T-Phosphate), brightness, chlorophyll-a, total nitrogen, and fecal coliform (Fecal Coli).		
	c. Sampling should be carried out at least twice a year in different seasons, namely the rainy season and the dry season. When taking samples for water quality tests, they are taken at at least 3 (three) different locations, namely upstream of the dam, middle of the reservoir and downstream of the dam.		nd acted upon.
	d. It should be able to convey the results of water quality testing, whether the water quality is good or lightly/moderately/heavily polluted.	Based on the available sampling results, it is known that on average, the water quality from the COD and BOD sampling results meets class 3 quality standards. However, in several cases the COD and BOD samples show water quality ss 4 quality standards.	llowed up.
K.	**Hydromechanical**		
1.	The Leuwikeris Dam is planned to have initial filling of the reservoir in May 2024. If we refer to the hydromechanical readiness schedule, the progress of the intake shaft work has only reached 10% progress.		
	a. The initial reservoir filling plan should consider the readiness of all aspects,	the reservoir is filled in June, the conductor pipe or penstock work has not been completed, in June	

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	especially major matters such as the installation of penstock pipes, considering that the pipe length is up to 500 m.	the transition pipe / Bellmounth will be installed at Main Plugging.	
	b. Impounding activities should be carried out when all penstock pipes and downstream hydromechanical equipment are ready for operation.	Impounding activities planned for the 1st semester. In 2024, the hydromechanical work remains unfinished, namely main plugging, installation of rapid pipes and valve houses. Arrangement of reservoir water during impounding is currently still being planned using overflow gates.	
2.	It was stated that a dry test had been carried out and a wet test had not been carried out on the TP.1 circumvention door. The consultant added that the dry test results showed that the door was not closed tightly within tolerance limits, so water entered the tunnel. Currently it is covered by sediment from the river. Considering that closing the gate is very crucial, a wet test should also be carried out on both bypass doors. Minutes of each test should be submitted in a report along with complete documentation.	d, and the minutes will be included in the documentation.	to account and followed up.
3.	In the 24 m high intake tower, it is planned to make stairs as a mobilization route. Consider installing a personal lift for the convenience of OP officers. Personal lift design drawings should be submitted in the report.	t be applied because the structural calculations do not accommodate loading with a manlift	- Recommendations should be taken into consideration in the Leuwikeris Dam

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			operation permit application by taking into account conditions in the field. - Simulation and structural analysis should be carried out by considering the dead and live load capacity that can be supported by the building.
4.	The intake tower work was reported to have been completed and further work was being carried out in the operational room section (Picture) The consultant added that the electrical panels and rubber seals for the intake door work were not yet available. Consider using a domestic service provider.	For rubber seals and electrical panels dated May 21 2024, Vendor work is still underway.	llowed up.

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	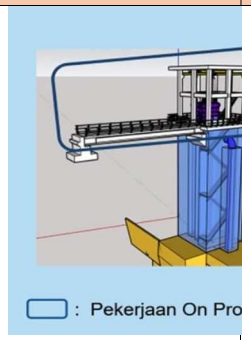	  The construction of the intake house has now been provided with a service bridge	

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5.	*Hollow Cone Valve*(HCV) is designed to enter the river directly, not through a plunge pool. Considering that the distance between the HCV and the river is quite far and the HCV emits, it is feared that scouring/scoring will occur. Consider installing reinforcements, for example by making a plunge pool.	The consultant will discuss with the contractor methods to prevent scouring and the possibility of adding energy reducing materials cation will be carried out in the next package	to account and followed up.
L.	**ing of the Reservoir**		
1.	So that the initial filling of the reservoir can still be carried out in May 2024, BBWS Citanduy proposes that the closing of the bypass gate be carried out at 14 days of concrete plugging age, without waiting. achievement of design concrete quality (28 days).		
	a. The casting of the intake shaft should be carried out after the plugging concrete has reached the age where the quality of concrete with allowable stress is obtained which is able to withstand the water load that will occur due to the initial filling of the reservoir.	ake shaft has been provided with support, so that the load from the intake shaft is spread over the base pipe which has been installed and the support which has been installed.	llowed up.
	b. An analysis of the plugging concrete structure should be carried out at 14 days and 28 days to withstand the water load received by the concrete due to the initial filling of the reservoir.	Primary Pluging quality load using SCC K300 Concrete aged 28 m. Conversion of age from 14 days to 28 days = 0.88 (88%) so the planned concrete quality from K300 becomes: K = 300x0.88 kg/cm2 = 264 kg/cm2	llowed up.

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m			
1.	When submitting a map of the location of the Leuwikeris Dam in the OP Guidelines, the latest as-built drawings should be submitted	and will be adjusted to the as built drawing	ments should be submitted to BTB.
2.	The development history should be supplemented with a conclusion	ached)	on has not been submitted to BTB.
3.	On explanation incident special should Pay attention to the following things:		
	a. The consultant submitted several photos related to special events that occurred at the Leuwikeris Dam. Photo documentation of the special incident should be accompanied by photo captions.	d and a table has been created (attached)	ollowed up.
	b. It was stated that on March 27 2011 there was heavy rain accompanied by high rainfall in the upper reaches of the Citanduy River, this explanation should be equipped with a return period equivalent to the heavy rain that occurred.		ollowed up.
	c. On September 18 2021, the Evasion Tunnel 1 collapsed in the Sta 0+0744 - Sta 0+756 collapse area segment. One of the improvements made was the creation of drainage holes to channel water from the inlet direction which was blocked		ollowed up.

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	by collapsed material. An explanation should be added regarding the direction of the water flow location.		
	d. On September 11 2022, there was high intensity rain which caused the tunnel inlet embankment to break. However, the consultant explained that what was broken was a temporary cofferdam, this explanation should be corrected according to what happened in the field.		ollowed up.
4.	It was stated that there were several incidents an avalanche that has not received attention in the OP Guidelines.		
	a. Recommendations for handling landslides should be included in the OP Guidelines.	l acted upon within OP's guidelines	n followed up.
	b. The consultant should recommend installing monitoring equipment for landslide areas, so that monitoring of landslide handling that has been carried out can be carried out.	l and have been followed up on this recommendation. – LOKASI LONGSORAN n disarankan untuk memasang alat : ontruksi ini digunakan untuk memantau ukaan tanah. dang gelincir longsoran (diperoleh dari ntruksi ini digunakan untuk mengukur ukaan bendungan baik secara vertikal ngan digali) nterweight, kombinasi *welded wiremesh*	
5.	On the organizational structure of the Leuwikeris Dam UPB you should pay attention to the following things:		

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	a. The term "operations chief" should be supplemented with "operations and monitoring vista".	Suggestions welcome e organizational structure chart	ollowed up.
	b. It should be writing "security officerarea" was changed to "area security officer".	Suggestions welcome e organizational structure chart	ollowed up.
	c. If officers for operations and monitoring have never had experience with dams, consideration should be given to recruiting officers from contractors or consultants who previously participated in the construction of the Leuwikeris Dam or officers who already have experience with dams.	re being followed up by BBWS Citanduy	l and monitoring staff are still the same. Consideration should be given to recruiting officers from contractors or consultants who previously participated in the construction of the Leuwikeris Dam or officers who already have experience related to dams.
	d. The line of command in the organizational structure presented is still not correct. In creating the UPB organizational structure, it should refer to the Director General's SE number 02/SE/D/Year 2023 concerning Organizational Guidelines and Work	Suggestions welcome he Director General's SE number 02/SE/D/Year 2023 concerning Organizational Guidelines and Work Procedures for Dam Management Units at the Directorate General of Water Resources.	

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	Procedures for the Dam Management Unit at the Directorate General of Water Resources.		
	e. The consultant should carry out a workload analysis to determine the needs of OP officers based on real conditions in the field.	rkload analysis attached	ad analysis have not yet been submitted.
	f. The relationship (administration) with other agencies should include the agricultural service and the water user farmers' association (P3A).	attached 	ollowed up.
6	There is a final disposal site (TPA) which is included in the inundation area which has not been cleaned up until now. It should be conveyed regarding the readiness of inundation locations in the landfill area because this is related to water quality.	Suggestions are accepted, the final disposal site (TPA) has stopped operating and there is a leachate treatment plant and the processing results still meet the water quality requirements.	Water quality tests should be carried out at former landfill locations.
7	Routine maintenance activities for hydromechanical equipment must be carried out by operations officers, as well as routine maintenance of instrumentation carried out by officers monitoring.	Suggestions welcome	The suggestion has been followed up.
8	OP program (operation, maintenance and monitoring dam) in OP guidelines, should:		
	a. Created based on the results of	Suggestions welcome	The suggestion

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	identifying OP activity needs, which was carried out by conducting joint field inspections between consultants, OP officers and senior OP experts (Head of Maintenance and Head of Operations), as well as conducting reviews of data and reports. existing dam reports;		has been followed up. The results of improvements to the OP guidelines should be submitted to the BTB.
	b. Based on this identification, create a routine (every year) and scheduled/periodic OP program for every 2, 3, 4, 5 years and so on.	Suggestions welcome	The suggestion has been followed up. The results of improvements to the OP guidelines should be submitted to the BTB.
	c. For a maintenance program, group maintenance activities for each section of the dam and describe all required activities, for example: - upstream slope: grass removal, trimming of rip-rap stones, addition of rip-rap stones, cleaning of rubbish, inspection maintenance, etc - peak dam: cleaning,drainage maintenance, painting safety fences, repair layerpavement/ paving blocks, maintenance	Suggestions welcome	The suggestion has been followed up. The results of improvements to the OP guidelines should be submitted to the BTB.

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	checks, etc. - Downstream slope: ……., Spillway building: ……., Retrieval building: , Reservoir: etc.		
	d. Create a routine maintenance program table and a complete scheduled maintenance program with frequency of implementation.	Suggestions welcome	The suggestion has been followed up. The results of improvements to the OP guidelines should be submitted to the BTB.
9.	Dam Operation Instructions, this chapter should explain: a. Scope of dam operation activities: Collection and processing of hydrological data, Preparation of operational procedures, Preparation of Reservoir Operation Patterns (POW), Preparation and implementation of the Annual Reservoir Operation Plan (RTOW), Evaluation of the implementation of reservoir operations, Flood operations and Emergency Operations. b. A detailed explanation of each operational activity in letter a above, the time or frequency of implementation, and the officer carrying it out. c. The collection and processing of hydrological data should be explained in the OP guidelines regarding: 1) Various types of hydrological	We will complete it in preparing the OP Document	The suggestion has been followed up. The results of improvements to the OP guidelines should be submitted to the BTB.

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	data that must be collected, for data that must be measured directly, explain the measurement method, frequency; 2) Measurement of reservoir water level, preferablydone 3x a day (especially during the rainy season); 3) Rainfall measurements, in heavy rain conditions, are carried out every 1 hour or to avoid hassle, consider installing ARR. 4) Measurement of river discharge in the watershed, add calculation procedures from water level elevation to discharge or complete with a graph of the relationship between discharge and water level elevation river. 5) Measurement of evaporation in pan A (Pan A) floating in the reservoir, for reservoirs where panic A is installed. 6) Measurement of sediment transport/reservoir sedimentation rate. 7) Collecting data on output discharge and operational patterns of upstream dams (for series/cascade dams). 8) Collection of information about the seasons of BMKG, etc.		
10	It was stated that the Leuwikeris Dam has a gated spillway.	Suggestions welcome	The suggestion has been

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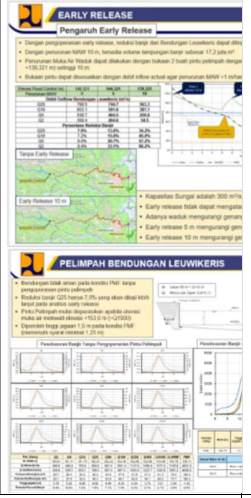
.	a. During the implementation of the early release, explanations regarding Normal Operations, Flood Operations and Emergency Operations can be added to the OP Guidelines. b. The OP guidelines also explain the operational systematics and operating limits of early release doors during non-flooding, flooding and filling/recovery periods. c. In preparing the systematics of door operations, the consultant should ensure that the minimum guard height is 1.25 m.		followed up. The results of improvements to the OP guidelines should be submitted to the BTB.
1 1	In the Reservoir Operation Pattern, it appears that from January to July, November and December the graphs of the Lower Normal Operating Limit (BONB) and Upper Normal Operating Limit (BONA) are all as high as the overflow beacon (where runoff occurs). This condition means that during these months there is runoff in the spillway. a. POW should be re-evaluated. b. If the POW graph is correct, it would be advisable to allocate	Utilization of water from the Leuwikeris Dam is not optimal (there is still quite a lot of water that overflows during the rainy season) because the dam storage volume is small compared to the inflow volume (normal storage/inflow ratio is only 4%). Therefore, the POW of the dam produces BON A and BON B values that coincide at the spillway elevation because in those months the inflow discharge cannot be accommodated.	OK.

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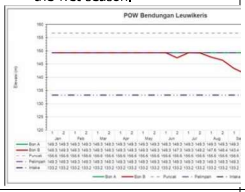
	the water as PLTA/PLTS which is planned to be operated during the wet season. 		
1 2	Before the Plenary Session is held, preparations for the initial filling of the Leuwikeris Dam reservoir should be held again specifically for discussing OP & RTD	Suggestions welcome It was held on May 9 and 10 2024 in Yogyakarta, and on May 14 2024 a Zoom was held with BBWS Pemali Juana	OK.
Emergency Action Plan			
1	The preparation of the RTD has been carried out since 2019, because approximately 4 (four) years have passed, the RTD is no longer valid for current condition		
	a. The consultant should carry out minor repairs and prepare major upgrade plans	Minor improvements have been made and major improvements have been recommended to be carried out in RTD document updating activities	The results of major repairs should be submitted to BTB.
	b. The entire Emergency Action Plan should be updated to suit current conditions and comply with the latest RTD guidelines/regulations	Updating to the latest conditions has been carried out in the form of the latest dam information, notification flow, names of officials and formats reporting/notification.	Suggestions followed up.
2	The consultant delivers the results of the document evaluation RTD compiled in 2019:		

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	a. The 2019 RTD document should be evaluated based on the results of current implementation in the field.	a. Evaluation of RTD documents has been carried out based on data from current implementation results.	OK
	b. Follow up on the evaluation of submitted RTD documents moment this is still not right,should be repaired.	b. The evaluation matrix has been improved	OK
	c. Based onthe results of this evaluation, the consultant should group minor improvements that can be carried out now to prepare for the initial filling of the reservoir (for example: gate operation patterns, flow charts, dam technical data, etc.)	c. Existing minor improvements have been implemented and have been informed in the evaluation matrix, as well as major improvements that can be implemented during RTD updating activities.	The updated RTD Document should be submitted to BTB together with other technical documents.
	d. The RTD should be signed by the Governor of West Java Province considering the potential impact of inundation in 2 administrative areas.	d. The signing of the RTD approval up to the Governor Level will be carried out at the RTD document update, currently the signing of the agreement is still being carried out by the Regent of Ciamis and the Mayor of Banjar and has been determined by the Director General of Natural Resources.	The updated RTD Document should be submitted to BTB together with other technical documents.
	e. The names of officials listed in the RTD Document should be the names of current officials. **Table 3: Evaluation of RTD documents**	e. The names of officials have been updated	Suggestions are followed up.

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	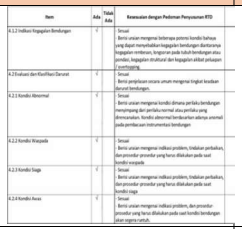		
3	In preparing the RTD, indications of dam failure should be added regarding the potential for landslides and flood elevations, etc., which are related to special events that have occurred. on the dam.	Special events in the form of landslides and flood elevations have been added in attachment 5. Indication of Dam Safety Problems and Preventive Measures in RTD Documents	Attachment 5 referred to has not been submitted.
4	Apart from carrying out a Dam Collapse Analysis, to determine the possibility that residential areas downstream will be flooded due to water output from the spillway (without the dam collapsing), an investigation of river flooding downstream of the dam should also be carried out at various return periods, starting from flood discharge Q5, Q10, Q25 , Q50, Q100. If available, complete the RTD with a "Map of flood inundation due to heavy rain upstream". On When it is predicted that there will be an output of reservoir water that will result in flooding in settlements downstream (mention the discharge of the water or also the water level elevation), put it in	Analysis of inundation due to flooding without collapse at various return periods will be carried out in the RTD update.	The updated RTD Document should be submitted to BTB together with other technical documents.

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	an emergency condition. Alert 2, in this condition the RTD Leader submits a report to the regional government to carry out flood warnings and evacuate residents, potentially affected by flooding.		
	The flow of reporting and notification of dam alert conditions should be updated in accordance with guidelines/regulations Latest RTD. In deciding dam conditions/emergencies and preventive measures, the following principles should be taken into account: **a. Alert 1:**if a problem has been detected at the dam that requires intensive monitoring. In this condition the problems that arise still develop very slowly. Actions taken include: **1)** Careful field observations/examinations , intensive monitoring and evaluation. Intensive monitoring is carried out by increasing the frequency of instrument inspections and measurements and, if necessary, by changing measurement procedures, adapted to the latest survey technology. **2)** The Head of the BWS/BBWS acts as the Lead RTD implementer at the dam, inviting dam experts to assist in conducting dam safety	The flow of reporting and notification of dam emergency conditions has been updated in accordance with the latest RTD guidelines/regulations.	The updated RTD report has not yet been submitted.

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	evaluations and providing technical advice. **b. Alert 2:**if a problem has been detected at the dam that requires continuous 24-hour monitoring or immediate action is needed for physical repairs. In this condition, the problems that arise are still developing slowly and it is predicted that the dam will not collapse. Based on the results of monitoring and evaluation, dam experts believe that the dam safety threats/problems that arise are confident and optimistic that they can be overcome. Action taken: **1)** The situation that occurs must be monitored intensively and corrective action taken immediately. **2)** RTD implementing leaders must mobilize existing resources to make improvements **3)** The RTD executive leader, submits a report to: - Director General of Natural Resources, Directorate of OP Development and KKB/Dam Engineering Center; - Governor/Regent/Mayor, BPBD/BNPB and police (report and notification flowchart to be adjusted). **c. Alert:**namely a condition		

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	where the problem detected in the alert condition continues to get worse or, based on the Dam Expert's evaluation, the existing problem is difficult to overcome (fifty-fifty probability of successful treatment). In this condition, there is no immediate danger, but if the problem continues to develop, it is predicted that the dam could collapse. Action taken: **1)** RTD implementing leaders must continue to make efforts to improve and if possible lower the reservoir water level; **2)** The RTD implementing leader submits a report to the Director General of Natural Resources, Directorate of OP Development and KKB/Dam Engineering Center; **3)** The RTD implementing leader submits a report to the Governor/Regent/Mayor, BNPB/BPBD **4)** Police with copies and notifications to other related parties in accordance with the notification flow chart in the RTD to: - provide danger warnings to residents in areas of potential flood inundation,		

No	DESCRIPTION/SUGGESTIONS	FOLLOW-UP BY DAM INITIATOR/SUPERVISION CONSULTANT	RESPONSE TO THE CENTER OF DAM ENGINEERING STUDY
	and - carry out the evacuation of part of the population (partial evacuation) in areas of potential flood inundation near dams and vulnerable residents. **d.** Caution: In this condition, the damage is developing rapidly/progressively, it is estimated that the corrective actions taken will not be successful and the dam will soon collapse, or a collapse has occurred or there is a threat of flooding from the dam. If the repair efforts carried out during the alert are not successful and it is estimated that the dam will soon collapse, or there is a threat of flooding from the dam. The first action that must be taken immediately: The RTD implementing leader conveys report toGovernor/Regent/Mayor, BNPB/BPBD, Police and other related parties in accordance with the flow chart in the RTD to provide warnings to residents and carry out evacuation of residents in areas of potential flood inundation. Reports were also submitted to the Director General of Natural Resources, KKB/Dam Engineering Center, and the Directorate of OP Development.		

No	DESCRIPTION/SUGGESTIONS	FOLLOW-UP BY DAM INITIATOR/SUPERVISION CONSULTANT	RESPONSE TO THE CENTER OF DAM ENGINEERING STUDY
6	If minor improvements to the RTD document have been made, the consultant should carry out outreach. In carrying out outreach to the community, consultants should: a. You should first explain the Concept of Dam Safety in full in language that is easy for ordinary people to understand. - Regarding Pillar I, namely Structural Safety in the form of safety against structural failure, safety against hydraulic failure and safety against seepage failure, explain the design flood and design earthquakes used in design preparation; - Pillar II, namely Dam Operation, Maintenance and Monitoring, explains the monitoring carried out by UPB/OP officers; - Pillar III is emergency preparedness. Explain the need for dam managers to have emergency preparedness, among others other things include preparing RTD documents, RTD training, and socializing RTD to related agencies and related elements. b. When conducting outreach to the public, there is no need to convey detailed indications of emergency conditions, just convey danger warnings and evacuation routes and locations. c. Socialization to the public should use language that is easier to understand.	Socialization after minor repairs have been carried out will be recommended to be carried out by the dam manager taking into account the suggestions that have been given	Suggestions followed up.

No	DESCRIPTION/SUGGESTIONS	FOLLOW-UP BY DAM INITIATOR/SUPERVISION CONSULTANT	RESPONSE TO THE CENTER OF DAM ENGINEERING STUDY
	F.	FF. Conclusion of the Session	
1	The suggestions above and suggestions in the Minutes of Technical Discussion and previous Inspection Reports which are still relevant and have not been followed up, should be followed up immediately, the technical requirements documents should be revised and a follow-up report prepared to be submitted to the Engineering Office. Damto continue the discussion process	Suggestions will be followed up.	OK.
2	Technical requirements documents should be revised based on the suggestions above and suggestions from previous discussions that are still relevant.	-	OK.
3	The Technical Session of the Dam Safety Commission agreed that after the suggestions mentioned above were followed up, then the follow-up report and improvements to the technical requirements documents were received by the Dam Engineering Center, and the discussion would continue in the KKB Technical Discussion, before being recommended to the Minister of Public Works and Public Housing	-	OK.

No	DESCRIPTION/SUGGESTIONS	FOLLOW-UP BY DAM INITIATOR/SUPERVISION CONSULTANT	RESPONSE TO THE CENTER OF DAM ENGINEERING STUDY
	for issue Reservoir Initial Filling Permit.		

Minutes of Meeting

Date : **June 28, 2024**

Event : **Sepaku Semoi Dam Discussion**

Participants : **[Listed]**

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1. **Kunhwa's Focus on WPT**
   - The Kunhwa team is currently focusing on WPT (Water Pressure Test).
2. **Lack of Confirmation from Engineers**
   - There has been no confirmation from the DAM engineer and related engineers regarding the dam construction process.
3. **Data Provided by Kunhwa**
   - Kunhwa's data is still focused on WPT, even though the primary concerns are the dam's stability and safety.

Due to the language and information comprehension limitations during the discussion, the design is leaning towards Alternative 2, considering the time constraints and needs. Waiting for Kunhwa’s results is expected to be very time-consuming due to their extensive design and analysis processes. Therefore, immediate action is required to proceed with the dam construction process.

Adjournment:

- The meeting was adjourned in no time selected.

Minutes of Meeting

Date/Time : Tuesday, July 9, 2024 / 09.00 AM WIB onwards
Location : Sermo Room, 2nd Floor, Dam Engineering Center Building
Agenda : Discussion on Construction Implementation and Readiness for Initial Filling of Rukoh Dam Reservoir, Pidie Regency, Aceh Province

Hydromechanics

1. All preparations are ready for operation.
2. Some items are still in fabrication and are expected to arrive on-site this week.
3. Creating a gondola to facilitate operations is recommended, especially at the intake tower.
4. The drop intake installation has begun, and water is hoped to flow well to the penstock. The intake tower is expected to be completed by the second week of August.
5. The penstock will branch to emergency and irrigation channels, leading to raw water and PLMTH. Due to the lack of an investor, it is currently closed with a blind cover. A new part for the emergency flow is being delivered this week.
6. Lightning arresters—at least two units are recommended, considering the dam's length of 200m.
7. Proposal for gondola installation for the intake tower and V-notch.

Hydrology

1. Flood calculation results show a high runoff coefficient, raising concerns about the lack of infiltration calculation. This needs to be reviewed.
2. The rain gauge stations used are both upstream. The maximum rainfall data needs further scrutiny.
3. The rooting process can reduce the peak PMF flood due to the extensive area, resulting in a strong flood reduction. The spillway capacity should not be 1/3 of the inflow and needs checking against the latest SNI standards.
4. The water availability calculation from Kemala weir for Rukoh is inconsistent. The homogeneity of the Rukoh watershed should be considered, especially regarding downstream to upstream transformation.
5. Verification of discharge data from Kemala weir is needed due to its representation of dry years from 2007-2011, which seems irregular. The extensive watershed area needs accurate data.
6. The data used is from the 2009 design, which is outdated and should be updated every five years.
7. River capacity requires rechecking.
8. Calibration of Kemala weir data is necessary to ensure its annual factor C variability is accounted for, providing accurate flood data.

Operations & RTD

1. Water availability assessment through POW is not feasible without a built POW, necessitating a revised plan post-filling.
2. Data used needs calibration, and flood discharge must use up-to-date information.
3. There is no presentation of OP guidelines.
4. RTD will analyze floods from Q2-Q100.
5. Improvements based on the 2020 guidelines should now follow the latest June 2024 standards, including communication, flood maps, and other arrangements.
6. OP guidelines for operation and instrumentation monitoring are required.
7. A dedicated discussion for this section will be held.

Material and Instrumentation

1. Zones 1 and 2 core and filter materials testing are below the bare minimum, especially from independent labs. More samples are needed for stability calculations.
2. Zone 4 has no riprap test results yet.
3. Concrete average prices can be shown on minimum field test samples, which need rechecking.
4. Many instruments are not yet on site or installed, requiring calibration and data readings by the plenary session.
5. Additional OWs and V-notch are needed.
6. Instrumentation installation challenges in narrow upstream areas are being addressed as truck manoeuvring has improved.
7. Observation wells require additional points for better contour mapping.
8. The V-notch, submerged at 15 meters depth and with a 1.5m D box entrance via a regular ladder, poses safety risks during high water levels. Future data discontinuation is possible due to unsafe positioning.

Geology

1. Comprehensive geology data is available, but the reservoir geology map is missing and crucial.
2. MASW profile lacks SNI standards, including grading.
3. Landslide positions upstream of the intake need clear mapping and securing, highlighting the importance of instrumentation due to post-impounding landslide risks.
4. Local maps have inconsistent unit classifications.
5. Correction of alluvial and claystone boundaries is needed.
6. The regional geology map lacks a geological fault section and requires completion.
7. Formation and member corrections are unclear and need clarification.
8. Improvements in geological profile layout and grouting are necessary.
9. Grouting probabilistic graphs and Lugeon classification need clearer presentation for better grouting results.
10. Formulas for calculations must be included.
11. Plenary graphs should be compiled for ease of review.
12. Lugeon mate needs completion and correlation with grout hole maps.
13. Detailed Lugeon classification is required.
14. Tunnel grouting for intake and diversion has not been presented.
15. Once the Lugeon map is completed, detailed displays should be made to check holes.

Impounding Plan The initial impounding is scheduled for the end of August. The Stability Analysis follows.

Impounding Stages:

1. **Stage 1: Closing of Diversion Gate**
    - Maintenance flow outlet opened 100%.
    - Daily monitoring of dam behaviour begins.
    - Diversion plugging begins.
2. **Stage 2: Water maintained for 1 month at +79.00 m elevation for first dam behaviour observation.**
    - The bonneted gate and valve opened according to inflow.
    - Daily dam behaviour monitoring.
    - Maintenance flow opened 100%.
3. **Stage 3: Water raised to +83.00 m elevation (LWL). Maintained for 1 month for second dam behaviour observation.**
    - The bonneted gate and valve opened according to inflow.
    - Daily dam behavior monitoring.
    - Maintenance flow opened 100%.
4. **Stage 4: Reservoir filling to MAN at +122.00 m elevation.**
    - All gates closed 100%.
    - Daily dam behavior monitoring.
    - Maintenance flow opened 100%.
5. **Stage 5: Water maintained at MAN +122.00 m elevation (overflow).**
    - All gates closed 100%.
    - Monitoring according to OP guidelines.
    - Water release through valve per OP instructions.
    - Maintenance flow opened 100%.

Notes:

1. Detailed plugging to be presented in the plenary with animation.
2. Strong request to activate V-notch control immediately.
3. Impounding is confirmed for August or early September.
4. Pra pleno direncanakan akan di lakukan di akhir bulan juli

Minutes of Meeting
Sidang Pleno Komisi Keamanan Bendungan (KKB)
Cibeet Dam Design Approval and Construction Permit Discussion

Location : Kabupaten Bogor, Provinsi Jawa Barat
Date : Wednesday, July 10, 2024
Time : 09:00 WIB - Completion
Venue : R. Sermo, Balai Teknik Bendungan (via Zoom)

Attendees:

- Members of the Komisi Keamanan Bendungan (KKB)
- Representatives from the construction and design teams
- Geologists and hydrology experts

Agenda:

1. Discussion on RCC Foundation
2. Quarry Material Evaluation

Key Issues Discussed:

1. **Geology of Cibeet Dam:**
    - Identified weak areas in the geological data that require solutions.
2. **Material Availability:**
    - Random material availability from the inundation area is inadequate; additional material must be sourced externally.
    - RCC material will be sourced from outside the inundation area.
    - The need for clear geological mapping to prevent decision-making errors.
    - Uncertainty about material needs remains a major concern.
3. **Design and Material Testing:**
    - The design of the embankment dam and material selection require immediate full-scale testing.
    - Challenges in material procurement were noted.
    - Density confirmation is required during execution.
4. **Borrow Area for Embankment:**
    - Issues with the preparation of materials from the borrow area.
    - Unclear aggregate quality and quantity; further confirmation is needed.
    - The embankment dam design and material selection parameters still require verification.
5. **Testing and Additional Checks:**
    - Additional boring tests and other evaluations are necessary to finalize material testing.
    - Riprap design needs reevaluation.
    - The upstream joint must be defined.
    - Clear documentation of drainage connections at upstream and downstream joints.
    - Unclear connection between RCC and embankment dam.
6. **Instrumentation:**
    - Earth pressure cells have been installed at the RCC and embankment dam joint.

- Crack meters need to be procured.
- Foundation mapping will determine the placement of all instruments.

7. **Hydromechanical Equipment Procurement:**
   - Immediate attention is required for the procurement of hydromechanical equipment, as it may take up to one year.

Decisions Made:

- Conduct additional geological mapping and material testing to resolve uncertainties.
- Expedite the procurement process for necessary materials and hydromechanical equipment.
- Reevaluate and finalize the design details, particularly the riprap and drainage connections.

Action Items:

- **Geologists:** Conduct additional mapping and boring tests.
- **Design Team:** Reevaluate riprap design and finalize drainage connections.
- **Procurement Team:** Expedite procurement of crack meters and hydromechanical equipment.
- **Construction Team:** Confirm material density during execution and address procurement challenges.

Next Steps:

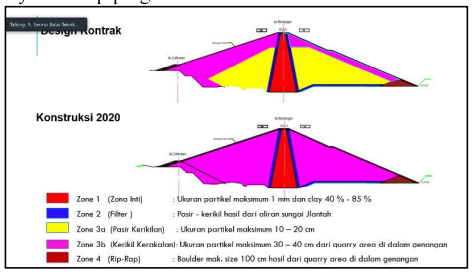
- Schedule follow-up meetings to monitor progress on action items.
- Continue collaboration between geologists, design, and procurement teams to ensure timely project completion.

Minutes of Meeting
Technical Meeting on Initial Filling of Jlantah Dam Reservoir

Date : Thursday, July 11, 2024
Time : 09:00 WIB - Finish
Venue : Conference Room, Dam Engineering Office

Main Issues:

- Some agricultural land has not yet been acquired, causing delays in work (especially for the bottom outlet).
- The embankment is still 36 meters short. The embankment material on the dam body still remains 36 meters. The total physical work has reached 85.27%. The initial plan is to impound the reservoir at the end of July or early August, but seeing the progress, it is likely to be delayed.
- There was a design change in the construction. During construction, the zone 3a parameter was tested, which has smaller parameters than the design, and then all of zone 3a was replaced with zone 3b, considering the availability of zone 3b is sufficient for use. By replacing zone 3a with a coarser material, there is a possibility that filter material will enter the random zone; if that happens, it is necessary to do a piping test.



- *Figure 1 comparison dam typical during design and construction*

Material Embankment and Instrumentation:

1. Many laboratory results are not yet well-managed.
2. There are still insufficient sample tests.
3. Test results and data presentations need to be completed.
4. Stability data is not available.
5. Potential data for the reservoir structure's stability is missing.
6. There is no quality control for embankment materials and concrete.
7. Zones 2 and 3b's compliance needs to be confirmed.
8. Many materials do not meet specifications.
9. The D-Wall design is unclear. The overlapping zone between the grouting and the diaphragm wall needs a method statement for the connection condition between the grouting and the D-wall. A pumping test conducted only at the diaphragm wall should also be conducted at the grouting location and explained in terms of geology, permeability value, and others.

10. Dam foundation improvement was carried out using two methods: grouting and diaphragm wall. At the design stage, no recommendation was made to use a diaphragm wall. When construction is done at the riverbed location, grouting is not effective because the grouting test has been carried out at a distance of 25 cm and has not shown good grouting effectiveness.

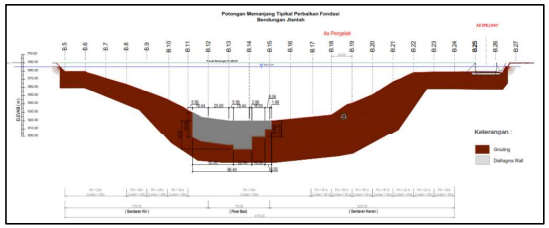


Figure 2 foundation improvement on dam foundation using diaphragm walls and grouting

11. In the pumping test, the test was not carried out under the same conditions because at the beginning of the pumping test, before the diaphragm was installed, dewatering was carried out, and after the diaphragm was installed, dewatering was not carried out. There is an effect of the D wall, but its effectiveness cannot be known.

Hydrology:

1. The low-flow model needs improvement and does not represent actual conditions due to the lack of calibration data. More efforts are needed to understand the flow conditions, especially during the dry season.
2. Flood calculations require corrections to soil type and average data.
3. For impounding, the impounding team must use the reviewed model to predict water level increases. This is currently unclear and requires synchronization between the hydrology and impounding teams. Operational team data is also needed.
4. Hydraulic safety data is lacking, especially regarding freeboard safety.
5. Updated hydrological rainfall data is available until 2022, indicating sufficient freeboard under PMF conditions.
6. The water level increase during impounding should use BMKG's 3-month forecast data, which needs to be integrated into the hydrology team's reviewed model.

Geology:

1. Numerous changes during execution require updating the justifications (justek).
2. Grouting effectiveness for foundation repairs, D-walls, and river deposits (2-2.5 meters) must be monitored, especially joint effectiveness.
3. The success of grouting needs better before-and-after reporting and monitoring.
4. The engineering geology cross-section shows that the CL class (yellow color) at the riverbed's location shows the same class, but there are different treatments. Technical geology should clarify the rock class again.

Operations & RTD:

1. RTD (Risk-To-Dam) involves three districts but hasn't reached the governor for technical consultation due to KAK's single-district scope.
2. RTD data clarity is lacking.
3. Many preparations are incomplete and require assistance.
4. The formats used are outdated (2020) and incomplete.
5. No presentations are available for OP (Operations Planning). POW (Plan of Work) is missing, necessitating a separate discussion.

Hydromechanical:

1. Most equipment is on-site, but the diversion gate, which should have arrived first, is not assembled. The diversion gate's hanger is also missing, causing pessimism for impounding by the end of July.
2. Maintenance flow for impounding will use HDPE pipes (d400) and galvanized pipes for plugging, whose availability is in question.
3. The intake tower is 94% complete (33m tall), but maintenance and operation currently rely on monkey ladders, which is concerning. A personal lift or gondola is necessary.
4. The intake tower will support the hoist drum and valve gate, which are not yet optimal. Current issues impede impounding by the end of July.
5. Downstream penstock pipes are in place, but raw water pipes are missing.
6. Hollow cone and outlet are available, but piping and branching are incomplete.
7. Each installation requires a minimum of three weeks, making end-of-July impounding infeasible.
8. No trash boom is available, and anchors are not yet made (submerged anchors required).
9. Electrical networks are incomplete and rely on construction work circuits. This will take time to install, especially since cables have not yet been procured.
10. The location of the irrigation valve chamber inside the valve room affects the building and vibration. Moving the transformer or valve chamber outside the valve room is recommended.

Final decision of meeting:
Impounding is impossible to do on the last of July, and the best possibility is around August.

Minutes of Meeting

Technical Discussion of the Dam Safety Commission (KKB)

Topic : Discussion on the Construction Implementation of Bagong Dam, Trenggalek Regency, East Java Province
Date : Monday, July 15, 2024
Time : 09:00 AM WIB – Finished
Venue : Meeting Room, Dam Engineering Center
Attendees : [List of Attendees]

Key Discussion Points:

1. **Limestone Data:**
   - We have not yet encountered hard soil in the current limestone data for the slope. The limestone was only found at a depth of 25 meters.
   - During field discussions, it was proposed that all colluviums be excavated and the dam foundation be made of rock (avoiding colluvial). In discussions with the Bintek team, it was recommended that coarse colluvial and fine colluvial be separated.
   - There is an alternative to raise the elevation in the coarse-graded colluvial unit.
   - The colluvial at the site broadly has two types: the upper part tends to have a fine gradation, and the lower part has a coarse gradation with coarse boulders with SPT values up to 30-50. However, it should be noted that even though it has a high SPT value, it is still part of the colluvial mass.
   - If the foundation is to be laid on coarse colluvial, then some in-situ tests need to be carried out on the weakest areas of the foundation. The current excavation has not yet reached the planned excavation limit (red line), so the test cannot be carried out then; when it reaches the excavation, the test will be carried out, and if the result is not achieved, the requirement for the foundation will continue until the rock foundation.
2. **Additional Drilling:**
   - To determine the boundary of the left abutment accurately, we need to perform additional drilling to confirm the limestone boundary.
3. **Pumping Test:**
   - A pumping test is recommended to complete the necessary data.
4. **Grouting Effectiveness:**
   - There are still questions regarding the effectiveness of the grouting process.
5. **Tentative Proposals:**
   - We can use tentative proposals until further data collection provides a solid basis for continued work. Meanwhile, we must maintain the current safety measures.
6. **Embankment Replacement:**
   - The embankment will be replaced with stone. We need to clarify the source of the stone.
7. **Quarry Quality and Quantity:**
   - The consultant needs to clarify the quarry material's quality and quantity.
8. **Data Collection Timeline:**
   - We will wait for 2 months to access the site and gather complete data. This will help us make informed decisions on the design for continued work.
9. **Parameter Collection:**
   - All necessary parameters need to be collected and analyzed.
10. **Next Meeting:**
    - The next meeting is scheduled for 2 months from now to review the gathered data and make further decisions.

11. Action Items:

- Conduct additional drilling to determine the limestone boundary.
- Perform a pumping test to complete data collection.
- Clarify the source, quality, and quantity of the stone for the embankment.
- Schedule site access and data collection within the next 2 months.
- Plan the next meeting for 2 months later to review progress and make further decisions.

MINUTES OF MEETING
TECHNICAL DISCUSSION
BENER DAM

Day / Date : Tuesday, 16th July 2024
Location : Bener Dam
Time : 13.00 WIB – Finished
Event : Technical Discussion of Embankment Preparation

GENERAL

The Bener Dam is planned to start embankment in late July or early August. Currently, excavation of the dam foundation is still in progress.

RECOMMENDATIONS

1. **Plint and Grouting:**
    - Must be completed before embankment begins.
    - Embankment must be carried out simultaneously even if different contractors are involved.
2. **Material Composition:**
    - Location 1B should have coarser material compared to 1A.
    - Fly ash should be used for Location 1A.
3. **Embankment Thickness & Material Gradation:**
    - Thickness should be adjusted to the maximum material size.
    - Gradation from 3A to 3B should be coarser.
    - Consider the tonnage used and the number of passes required.
    - For dams above 100 meters, a minimum tonnage of 15 tons should be used, with a dynamic load of 20 tons.
4. **Direct Shear Considerations:**
    - Direct shear should be at least 50 cm or a minimum of 30 cm.
    - Additional sigma3 should be applied to the tool, following pressure equal to the dam height.
    - Consideration of K3 is necessary due to high pressure levels.
5. **Modulus and Density:**
    - Modulus increases with higher density.
    - Relative density can be increased up to 87%.
    - Poisson's ratio should be more than 0.3.
6. **Stockpiling Method:**
    - Alternative 2 will be used as it results in lower pressure compared to Alternative 1.
7. **Instrumentation:**
    - At least 8 Observation Wells (OWs) should be installed:
        - 3 on the left abutment.
        - 3 on the right abutment.
        - 2 downstream.
    - If aquifers are present, piezometers should also be installed.
8. **Seepage Model Recalculation:**
    - Required due to the presence of aquifers reaching up to 2 meters during construction.

Action Required: Immediate action is necessary despite site difficulties.

MINUTES OF MEETING
TECHNICAL DISCUSSION
MARANGKAYU DAM

Day / Date : Wednesday, 17th July 2024
Location : Marangkayu Dam
Time : 08.00 WIB – Finished
Event : Preparation for Drilling on Dam Body

GENERAL

The initial filling of Marangkayu Dam is planned for September 2024.

DAM ISSUES & RECOMMENDATIONS

1. **Instrumentation Clarification:**
   - It should be clarified which instruments are still functional and which are not.
   - This will help determine necessary additions to support dam stability analysis.
2. **Piezometer Permeability Test:**
   - Some piezometers do not contain water; a permeability test (falling head) should be conducted.
   - If permeability reaches 10E-3, this indicates a dry embankment, which is dangerous due to potential cracking.
3. **Former Boreholes Handling:**
   - Boreholes should not be backfilled but should be used for instrument installation instead.
4. **Geological Considerations:**
   - Due to soft and sandy soil conditions, 2 piezometers should be installed at the foundation (one in soft soil, one in sandy soil).
   - OWs should penetrate the water layer that acts as an aquifer.
   - Recommended: 10 OWs (5 for soft soil, 5 for sandy soil).
5. **Sondir Test Confirmation:**
   - Sondir results show a high qc value.
   - These results should be cross-checked with drilling data.
6. **Conduit Water Flow & Settlement Issue:**
   - There is significant water flow in the conduit, indicating possible settlement/deformation.
   - A gap may have formed in the conduit connection due to the absence of a water stop during construction.
   - Measurements should be taken to confirm any shifts or settlements.

Action Required: Urgent measures must be taken despite site difficulties.

Minutes of Meeting

Topic : Discussion on Initial Filling of Reservoir and Operational Readiness of Sadawarna Dam
Time : Monday, July 22, 2024, 09:00 Jakarta
Participants : [List of attendees]

1. Hydrology, Hydraulic Structures, and Seepage

- **Landslide on the Wharf:** A 200-meter landslide, located 225 meters from the upstream peak and 145 meters to the base, was addressed by cut and fill method. Currently, it appears stable with the calculated data, and it is being managed with vegetation planting (trees).
- **Data Usage:** Avoid using immeasurable data for analysis. Provide visible recommendations in such cases.
- **Landslide Potential Calculation:** Calculations have been completed and can be used for future design submissions.
- **Faults at Upstream:** There are two faults. Basic analysis and rock test data are required to clarify if these faults are hazardous.
- **Riverbed Details:** At 1.5 meters beneath the hard rock, there is claystone. Excavation should be limited to the hard rock layer. Attach as-built drawings.
- **Claystone Mineral Testing:** Mineral-type testing has been requested and needs to be explained.
- **Seepage Management:** It is managed with a counterweight, and the V-notch is operational. V-notch 1-5 shows a total discharge of 4.8 liters.

2. Hydromechanical Equipment

- **Trash Boom:** Not yet installed at the early release gate. Materials should match the existing ones. Due to site constraints, the plan involves some structures on the upstream. Construction plans and methods need to be detailed. Another option is to install a trash rack, although this affects gate capacity and reduces the current discharge. Proposals should include these calculations.
- **Other Hydromechanical Equipment:** All other equipment is operating well.

3. Operation (OP)

- **Staff Analysis:** For 24-hour operations, work is divided into three 8-hour shifts over 25 days. This system is currently in place.
- **Job Description:** Detailed job descriptions and justifications for staffing needs are required to understand the necessity of the personnel. Include workload details.

4. RTD

- **Condition Updates:** Regular updates on alert levels (Standby, Alert, and Warning).
- **Maps:** Some maps have been completed.
- **Report Format:** Condition report format attachments have been completed.
- **Flood and Evacuation Maps:** These are still in progress, and large-scale maps are currently being used. This needs to be addressed.

- **Collapse Analysis:** The accuracy of maps needs to be within ±10 cm (update from the June 2024 guidelines).

Conclusion

1. Permit recommendations can be issued with minor notes.
2. Design calculations and completion timelines should be submitted to BTB immediately.
3. Follow-up results should also be reported to BTB promptly.

Minutes of Meeting
TECHNICAL DISCUSSION
MANIKIN DAM

Day / Date : Friday, 9th Aug 2024
Location : Manikin Dam
Time : 09.00 WIB – Finished
Event : Technical Discussion of Dam Design to ACCED

General

Manikin Dam will be converted to an asphalt core, which was previously a clay core dam. Consideration of emergency spillway and hydraulics conditions.

Discussion

- Based on the MASW test results, the dam foundation will be placed at a Vs = 500 value, meaning there is an additional 5 meters deep excavation in the core and filter. Initially, the foundation was planned at elv.+103 and will now be placed at elv.+93. A comparison matrix should be made between the initial and revised designs, along with an overlay of the SPT values.
- Swelling pressure must be retested considering the tunnel condition, which has experienced significant deformation. The highest swelling pressure value should be used for analysis.
- Mr. Wang: The stone ash mixture will use crushed river deposits, but since river deposits are relatively non-homogeneous, this makes parameter determination more difficult. Using limestone would be preferable. Additionally, river deposits generally contain a high amount of clay material, which should be minimized as much as possible.
- The quarry Takari, which will be used as a stone ash sample, has only one sample taken. Several more samples should be taken randomly from various locations.
- The safety factor at flood level is greater than at normal water level (flood conditions are safer than normal conditions), and the results should be rechecked.
- The grain size of the upper embankment material (Zone 5) should be made coarser to anticipate possible earthquake loads.
- Based on hydrological routing results:
    - Without additional spillways, overtopping is 1.13 m.
    - With additional spillways, overtopping is reduced to 0.1 m.
    - Alternatives include:
        - Raising the dam by approximately 2 m.
        - Raising the dam with a parapet combination.
        - Maintaining the additional spillway.
- All canals in the additional spillway should be made as full box culverts, with embankment added on top as a counterweight against swelling pressure.

- The additional spillway crest is at elevation +149 m, meaning it will function only during a Q1000 flood. Since Q1000 conditions are rare, consider designing the additional spillway for a Q100 flood instead.

MINUTES OF MEETING
TECHNICAL DISCUSSION
SEMANTOK DAM

Day / Date : Tuesday, 20th August 2024
Location : Balai Teknik Bendungan
Time : 09.00 WIB – Finished
Event : Technical Discussion for Dam Operation Permit

MECHANICAL & ELECTRICAL (ME)

1. **Hydromechanical Testing:**
   - The 3 and 5-ton overhead systems require testing under full load conditions.
   - **Action Required:** Conduct full load testing and document results.
2. **Valve and Discharge Regulator:**
   - The similar elevation levels pose a backflow risk. A fully opened valve could lead to water entering the chamber and overtopping, especially with ongoing civil works downstream.
   - The existing barrier in the hollow cone is ineffective in dispersing kinetic energy and needs reevaluation.
   - **Action Required:** Review valve operation strategy and assess barrier redesign.
3. **Inlet Issues:**
   - The lack of an intake gate, relying only on a butterfly valve, may cause operational challenges.
   - **Action Required:** Assess feasibility of adding an intake gate.
4. **Electrical:**
   - Lightning protection is incomplete; coverage should extend beyond the valve house to the dam crest.
   - **Action Required:** Extend lightning protection coverage.
5. **Early Warning System:**
   - The dam lacks an emergency siren, which must be installed promptly.
   - **Action Required:** Install emergency siren immediately.

HYDROLOGY

1. **Rain Data Adjustment:**
   - Satellite and rain gauge data from more than six stations need adjustments to ensure accuracy.
   - **Action Required:** Validate and calibrate rain data sources.
2. **Flood Calculation:**
   - The SES method curve number currently does not align with the expected 75-85 range, affecting flood peak estimations.

- **Action Required:** Recalculate curve number for accuracy.

3. **Grid NM Values:**
   - Hydraulic values should meet the 1-1.5 m²/hour standard.
   - **Action Required:** Verify and adjust hydraulic values.
4. **Low Flow Calibration:**
   - Three months of data is insufficient; a full year's dataset is needed for proper runoff coefficient calibration.
   - **Action Required:** Extend data collection to one year.
5. **POW & RTOW Data:**
   - Rainfall prediction data should be incorporated into POW and RTOW preparation.
   - **Action Required:** Integrate updated rainfall prediction data.

OPERATIONS & TECHNICAL DOCUMENTATION (OP & RTD)

1. **OP Guidelines:**
   - The existing evaluation report lacks recommendations and follow-up actions.
   - **Action Required:** Add recommendations and follow-up actions.
2. **Maintenance Program:**
   - A riprap maintenance program should be introduced, with an analysis of current quality.
   - **Action Required:** Develop and implement a riprap maintenance program.
3. **Dam Monitoring Report:**
   - Periodic reports must be submitted to the dam authority.
   - **Action Required:** Ensure timely submission of reports.
4. **RTOW & POW Synchronization:**
   - The planting season starts in November; data synchronization is needed.
   - **Action Required:** Synchronize RTOW & POW data.
5. **Annual OP Management Cycle:**
   - The cycle requires verification with UPB.
   - **Action Required:** Verify and finalize the management cycle.
6. **AKNOP (Annual Operation Costs):**
   - Wage allocations should be adjusted based on workload and expertise.
   - **Action Required:** Reevaluate wage allocations.
7. **OP Guidelines Review:**
   - Inspection and report format completeness should be verified and updated.
   - **Action Required:** Review and update OP guidelines.
8. **RTD Revisions:**
   - Minor RTD revisions need immediate implementation.
   - **Action Required:** Implement minor RTD revisions immediately.
9. **Downstream Residential Areas:**
   - Mitigation signs and sirens should be installed.
   - **Action Required:** Install required signs and sirens.
10. **Dam Operation Gate:**

- Clarification is needed on which gate will be used for operations.
- **Action Required:** Confirm and document gate usage.

11. **Flowchart Improvements:**

- The operational flowchart should be revised.
- **Action Required:** Update the operational flowchart.

12. **Flood Threat Information:**

- Data should include elevation factors affecting downstream flooding for evacuation planning.
- **Action Required:** Incorporate elevation factors into flood data.

DAM ISSUES

1. **Seepage at Downstream Toe:**
   - The seepage source is likely from a hill near the dam.
   - **Action Required:** Conduct further investigation and mitigation.
2. **Hollow Cone Valve Issue:**
   - Water splashing inside creates moisture, leading to corrosion of internal instruments.
   - **Action Required:** Implement corrosion prevention measures.
3. **Instrument Monitoring Time:**
   - The dam's length makes monitoring time-consuming.
   - **Action Required:** Optimize monitoring procedures.
4. **Riprap Condition:**
   - Brown-colored riprap indicates possible weathering; detailed mapping is required.
   - **Action Required:** Conduct riprap mapping and analysis.
5. **Weak Zone in Spillway Connection:**
   - The junction between the embankment and spillway bridge must be monitored.
   - **Action Required:** Perform regular structural assessments.
6. **Conduit and Water Seepage:**
   - The diversion conduit is a weak point. The connection with the D-wall/pile needs reevaluation.
   - **Action Required:** Reassess conduit connection integrity.

Closing Statement:
All parties are expected to follow up on the assigned action items within the agreed timeframe. The next review meeting will be scheduled to evaluate progress and address any outstanding issues.

Minutes of Meeting
Pre-Plenary Discussion – Jlantah Dam

Date : Thursday, 29 August 2024
Location : Balai Teknik Bendungan
Time : 09.00 WIB – Finished
Subject : Preparation for Impounding

1. Hydrology and Flood Risk Management

1.1 Importance of Hydrological Data for Impounding

- The impounding process requires a **detailed understanding of the hydrological conditions** to anticipate **flood events, water inflow rates, and potential safety risks**.
- **Historical data** indicates that **large floods have occurred in August and September** near the Jlantah Dam site.
- To mitigate risks, a **flood simulation model** must be included in the impounding plan to analyze **worst-case scenarios**.

1.2 Sedimentation and Reservoir Longevity

- The reservoir is **designed for a 50-year lifespan**, assuming **natural sedimentation rates**.
- However, **land-use changes** in the watershed may accelerate **sedimentation**, reducing the **reservoir's capacity** prematurely.
- The team must obtain **updated sedimentation data** using **topographical and land-use mapping** to identify **potential degradation in the watershed**.
- If sedimentation is projected to shorten the reservoir lifespan, **proactive dredging or sediment flushing** plans should be developed.

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2. Geotechnical Issues and Structural Stability

2.1 Hydrostatic Pressure and Seepage Control

- The **dam foundation** must be evaluated for **seepage risks**, as **hydrostatic pressure** may cause **water infiltration into the foundation**.
- The discussion emphasized the need to **include seepage protection measures**, such as **additional grouting and drainage improvements**.

2.2 Monitoring Systems for Seepage and Stability

- The primary seepage monitoring system uses **piezometers**, but it was recommended to also use **Observation Wells (OWs) on the downstream side**.
- Given the **dam height of 70 meters**, an **OW of at least 45 meters deep** should be installed to monitor **subsurface water movement and detect potential seepage zones**.

2.3 Soil Sample Analysis and Quality Control

- The **determination of soil cohesion (C) and internal friction angle (Pi)** was only conducted at **two pressure levels**, leading to a **high C value of 49 kPa**.
- To ensure accurate data, the **condition and quantity of soil samples reaching the laboratory must be verified**.
- **Current issue:** Out of **2 million cubic meters (m^3) of compacted material**, only **3 soil samples were taken**, whereas **15-20 samples** are required (standard: **1 sample per 120,000 m^3**).
- **Action required:** Collect additional samples to **meet quality control standards**.

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3. Hydraulic and Structural Components

3.1 Leakage Issues

- A **minor leakage (160 cc)** was detected at the **gate structure**.
- While this leakage is small, it **should not be present during impounding** as it may indicate **potential weaknesses in the structure**.
- **Recommendation:** Conduct **pre-impounding inspections** and ensure all **joints and grouting** are properly sealed.

3.2 Trash Boom and Debris Management

- The **intake structure lacks a trash boom**, which is critical to **prevent floating debris from blocking the intake gates**.
- The **anchor system for the trash boom is not yet installed**, which could delay impounding since anchors must be in place **before they are submerged**.
- **Action required:** Complete **anchor installation immediately** to prevent **operational disruptions**.

3.3 Stilling Basin (Kolam Olak) Design Concerns

- The **stilling basin (kolam olak) for penstock discharge** is located **inside the valve house**, which is **not ideal**.
- Normally, the **stilling basin should be outside** the valve house to **prevent structural impacts from turbulent water flow**.
- **Since this design is already implemented**, the **walls of the valve house must be monitored periodically for structural degradation**, especially **after one year of operation**.

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4. Emergency Action Plan (RTD) and Operational Readiness

4.1 RTD (Rencana Tindak Darurat) Finalization

- The **evacuation plan** is incomplete as it **lacks the Governor's approval**.
- There has been **no formal consultation with local authorities**, which is required for **legal and logistical coordination**.
- **Action required:** The RTD team must **synchronize with the supervision team** and **secure approval from the provincial government**.

4.2 Gate Operation and Emergency Procedures

- The **RTD must include detailed SOPs** for operating gates and valves under **normal and emergency conditions**.
- Currently, **early release procedures** are not justified based on **flood risk analysis**, but they are mentioned in **standard operation guidelines (RTOW)**.
- **Recommendation:** The RTD should clarify **when and how early releases should be performed** based on **hydrological forecasting**.

4.3 Instrumentation and Watershed Monitoring

- The dam's **monitoring system** should include **clear thresholds for safe and hazardous operating conditions**.
- **Visual inspections and satellite data** should be used to track **watershed conditions and potential conservation threats**.
- **A reservoir conservation strategy** should be developed, including **zoning maps and water quality monitoring plans**.

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5. Action Items and Next Steps

Action Item	Responsible Team	Deadline
Update flood simulation models and integrate historical flood data	Hydrology Team	Before 15 Sept 2024
Conduct additional sedimentation surveys and update watershed maps	Hydrology & Geotechnical Teams	Before 15 Sept 2024
Verify seepage risks and complete additional OW installation (45m depth)	Monitoring Team	Before impounding
Increase soil sample collection to meet quality control standards	Geotechnical Team	Before 10 Sept 2024
Seal existing leakage in the gate structure	Structural Team	Before 10 Sept 2024
Install trash boom anchors	Mechanical Team	Urgent
Conduct first-year structural monitoring for valve house walls	Structural Team	After 1 year
Secure Governor's approval for RTD and synchronize with local government	RTD Team	Before impounding
Finalize RTD documentation with complete gate operation and emergency SOPs	RTD Team	Before 15 Sept 2024
Ensure emergency generators are fully operational with proper cabling	Mechanical Team	Before impounding
Complete siren installation for the Early Warning System	Safety & Operations Team	Before impounding

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Conclusion

The **Pre-Plenary Discussion** addressed **critical aspects of Jlantah Dam's impounding process**, highlighting necessary actions in **hydrology, geotechnical stability, instrumentation, and emergency response planning**.

The **most urgent priorities** include:

1. **Finalizing flood simulations and sedimentation data updates.**
2. **Completing seepage monitoring installations.**
3. **Resolving leakage issues and installing required instrumentation.**
4. **Securing RTD approval and finalizing operational SOPs.**

If all these **corrective measures** are implemented before **20 September 2024**, the impounding process can proceed **safely and efficiently**.

Minutes of Meeting

Technical Discussion on Sidan Dam

Day/Date : Friday, August 30, 2024
Location : Balai Teknik Bendungan
Time : 09:00 WIB – Finished
Event : Technical Discussion for Impounding

General Overview

- The initial impounding of the reservoir is planned for around September 20, 2024.

Discussion Points

1. Dam Issues:

1. **Stress and Strain Graph Analysis:**
   - The modulus values should be derived from the smallest graph at the bottom, not the top, as used by the consultants.
2. **Field Density and Material Properties:**
   - Consultants reference field density for embankment zone 4 based on consistent values from three lab tests.
   - Samples representing material properties should exceed 50% of the total.
3. **Porosity Compliance (I-COLD Standard):**
   - Porosity should not exceed 3%. Conversion of void ratio to porosity must be verified in the field.
4. **Counterweight Material Testing:**
   - Counterweights to be constructed from excavation and riverbed material.
   - Pumice should not be used, and direct shear tests should accompany counterweight stockpiling.
5. **Filter Compaction and Shear Strength Tests:**
   - Filter value: 45 degrees. Initial tests used 70% relative density; field compaction reached 130%.
   - Shear strength tests should align with field conditions.
6. **Re-testing Dry and Wet Shields:**
   - Previous tests conducted three years ago need repetition due to potential shield damage.
   - Ceramic shields may be added if leaks are identified during testing.
   - Closure gates should be lowered 1 meter before plugging during diversion closure.
7. **Raw Water Sampling:**
   - Initial samples confirm suitability for raw water. Post-inundation monitoring per OP guidelines is required.
8. **Sedimentation Management:**
   - Current land use calculations must ensure a reservoir lifespan of 50 years.
   - Design intervention steps if calculations fall short.
9. **Tunnel Works:**
   - Tunnel work (diversion or otherwise) lacks technical drawings and reinforcement details.
10. **MASW Data Verification:**
    - MASW results need clarification and verification due to discrepancies in surface soil values and inverted images.
11. **Dental and D-Wall Work:**
    - **Dental Work:** Locations and technical justifications need explanation.
    - **D-Wall Work:**
      - Lack of detailed design explanation for D-wall installation and deeper grouting.
      - Potential for gaps/windows in water paths due to earthen shoulder materials.
12. **Volcanic Formation Sedimentation Risk:**
    - Sedimentation potential is high due to Quaternary volcanic formation.
    - Geomorphology and regional physiography mapping are necessary.
13. **Tunnel Spillway Cavitation:**
    - Spillway angle of 12 degrees reported without cavitation; further confirmation required.

Action Items:

1. Verify strain and stress graph data based on correct parameters.
2. Expand sample size for material property testing.
3. Conduct field porosity measurements and ensure compliance with I-COLD standards.
4. Reassess counterweight material use and include direct shear tests.
5. Align shear strength tests with actual field conditions.
6. Perform wet and dry tests on shields; prepare ceramic shields as contingency.
7. Monitor reservoir water post-inundation.
8. Recalculate sedimentation and propose interventions as needed.
9. Complete missing technical drawings and reinforcement plans for tunnels.
10. Verify and correct MASW data.
11. Provide technical justifications for dental and D-wall work.
12. Develop geomorphology maps for sedimentation analysis.
13. Confirm the absence of cavitation in the tunnel spillway.

Minutes of Meeting
Lausimeme Dam Discussion

Date : 05 September 2024
Objective : Impounding Readiness
Key Issue : Impounding Readiness and Related Matters

Pre-Plenary Discussion

Core Zone

1. **Topping:** Embankment topping has been completed.
2. **Chamber Installation:** 1 meter remains incomplete (1.4% of the total 70m), with completion targeted for 9 September.
3. **Riprap:** Ongoing and expected to finish by 14 September.
4. **Envelope Gradation:** Requires further refinement.
5. **Mineralogy:** Re-testing at five points revealed the presence of hallosites (21-22-30).
6. **UDS Sampling:** Conducted using the jack method with specialized tubes.
7. **UDS Data:** Poor data below indicates suboptimal conditions.
8. **High LL Results:** This could result in high water content and hallosites, leading to increased piezometer pressure, which may impact stability and cause deformation.
9. **Triaxial Testing:** Deemed unsuitable.
10. **Elastic Modulus:** Data is unavailable.
11. **Contours:** Necessary for stability checks, landslide surface identification, and pore water pressure evaluation.
12. **Deformation:** High water content and pressure reduce the modulus, resulting in settlement.

Filter Zone

1. **Specific Gravity (SG):** Initial values of 2.59 (clay: 2.65) were too low. Retesting returned a value of 2.66, indicating quartz presence.
2. **Sand Quality:** Volcanic sand with SG of 2.7 is considered good quality.
3. **Transition Zone:** SG increased from 2.58 to 2.77 after retesting.
4. **Void Ratio:** Sand values (30-32) are acceptable. Transition zone values (31-35) are slightly below ideal and should exceed the filter's value.

Random Stone Fill Zone

1. **Gradation:** 100% pass at 400; adjustments raised some results to 600.
2. **Graph Updates:** The gradation graph requires updates.
3. **UDS Sampling:** Five samples should be taken outside the core for every 20,000 core samples.
4. **Rockfill Compaction:** Regression tests were conducted on compacted and remolded samples for deviation analysis.
5. **Riprap Compliance:** Must meet contractual specifications.
6. **Design Adjustments:** Confirmed compliance with criteria.

Instrumentation

1. **Weak Zones:** Foundation improvements via grouting required for hard layers and UCL in the dam axis.
2. **Piezometers:** Three non-functional units identified. Orange piezometers recommended for sandy areas; blue ones for critical zones.
3. **OW Piezometers:** Deeper installations suggested for monitoring seepage at weak zones.
4. **Failed Grouting:** Additional drilling proposed in rockfill areas.

Geology and Geotechnical Foundation

1. **Weak Zones:** Piezometers must be installed prior to impounding, with staged release monitoring.
2. **Data Replacement:** Damaged piezometer readings need replacement.

Hydrology

1. **Water Level Forecast:** Not discussed.
2. **Impounding Preparation:** Predicted rainfall over the next three months indicates impounding will start on 1 October and conclude by 21 December.
3. **Inflow Control:** Initial 5m/day scheme deemed too high. Recommended inflow rate is 1m/day for better control.

Hydromechanical

1. **Valves and Outlets:** Additional valves and hollow jets are required for proper operation.
2. **Bottom Outlet:** Maintenance-ready with butterfly valve installed; air fan pending.
3. **Early Release Gate:** Operational, awaiting actuator installation.
4. **Generators and Lightning Rods:** Fully prepared.

Operation (OP) and Emergency Response (RTD)

1. **Emergency Termination:** Requires revision.
2. **Early Warning System:** Critical for flood control during impounding.
3. **RTD Training:** Must be conducted before operation.
4. **Technical Data and Forms:** Incomplete; further discussions needed.
5. **OP Organization:** Structure and inter-agency roles require clarification.

Action Items

1. Prioritize installation of additional piezometers and OW monitoring at weak zones.
2. Finalize hydromechanical equipment installations before water reaches the intake.
3. Conduct impounding cautiously, adhering to the recommended inflow rate of 1m/day.
4. Complete and revise OP and RTD plans before commencing operations.

Supplementary Notes

Settlement of Core Zone

- Core material comprises single material, predominantly above OMC.
- Reference: Wadaslintang Dam (1983-1987), constructed using single material under high water content conditions, compacted with 10cm overlays using D6 LGP bulldozers (as per Pedoman Pelaksanaan Konstruksi Bendungan Urugan, 2004).

Pyroclastics in the Reservoir Area

- Field investigations indicate hard, massive bedrock covered by 2-3 m thick residual soil.
- Landslide potential is minimal.
- Mitigation methods:
    1. Drainage arrangement
    2. Revegetation
    3. Excavation and slope-cutting
- **Action:** Provide an as-built drawing and map indicating the location of each mitigation effort.

Minutes of Meeting
Technical Discussion: Marangkayu Dam

Date : Friday, 6th September 2024
Location : Balai Teknis Bendungan
Time : 09.00 WIB – Finished
Event : Technical Discussion on Impounding

General Overview

Marangkayu Dam is facing land acquisition challenges due to overlapping land certificates. Consequently, impounding will only be carried out at elevation +107 to prevent inundation of petroleum wells, which would otherwise occur at the planned elevation (normal water level +110).

Discussion Points

Embankment Material and Pore Pressure

1. **Dry Embankment Material**: The dam has never undergone impounding, resulting in likely very dry embankment materials. This could lead to negative pore pressure.
2. **OMC Testing**: There is no existing construction data; therefore, Proctor testing is necessary to determine the Optimal Moisture Content (OMC) and assess negative pore pressure in the field.

Filter Material Contamination

1. **Clay Contamination**: At the sample filter location, significant clay content was observed, likely contaminating the samples.
2. **Sampling Procedure**: Detailed clarification of the sampling procedure is required to ensure accuracy.

Parameter Improvement

1. **Sample Representativeness**: Current samples do not sufficiently represent the dam's actual conditions. Parameter adjustments are needed.

Zone 5: Counterweight Issues

1. **Counterweight Location**: Zone 5, acting as a counterweight from disposal material, is situated downstream of the dam.
2. **Toe Drain Blockage**: This material may obstruct the toe drain, requiring a solution to ascertain phreatic conditions.

Geophysical Studies

1. **MASW Survey**: Multi-Channel Analysis of Surface Waves (MASW) is required and should follow the planned layout (Figure 2).

Observation Wells

1. **Additional OW**: Observation wells downstream of the dam are recommended to map groundwater contours (Figure 3).

Unsaturated Soil Mapping

1. **Closed Piezometer Use**: Mapping unsaturated soil conditions requires closed piezometers, such as vibrating wire piezometers.

Bridge Alignment

1. **Bridge Elevation Issue**: The current bridge for plugging is at elevation +108, whereas the flood elevation is +112.
2. **Alignment with Crest Dam**: The bridge should be aligned with the crest dam elevation to prevent submergence when the dam operates optimally. It is not recommended to use the bridge as a bottom outlet/emergency structure.

Action Items

1. **Perform Proctor Tests**: Establish OMC values and assess negative pore pressure conditions in the field.
2. **Clarify Sampling Procedures**: Develop a detailed procedure to avoid contamination during sampling, especially for filter materials.
3. **Update Parameters**: Revise dam parameters to better represent actual conditions.
4. **Resolve Toe Drain Issues**: Investigate and address potential blockages caused by Zone 5 counterweight material.
5. **Conduct MASW Surveys**: Complete geophysical surveys as per the recommended plan.
6. **Install Additional Observation Wells**: Add OW downstream to map groundwater contours.
7. **Use Vibrating Wire Piezometers**: Implement closed piezometers for unsaturated soil mapping.
8. **Align Bridge Elevation**: Adjust the bridge's elevation to match the crest dam and avoid plugging for emergency use.

Figures

1. **Typical Design of Marangkayu Dam**

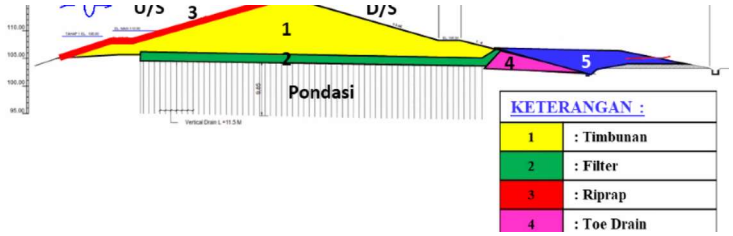


Figure 1 Tyical design of marangkayu dam

2. **MASW Location Recommendations**

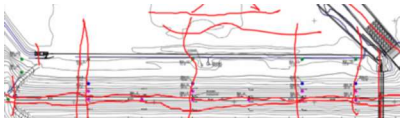
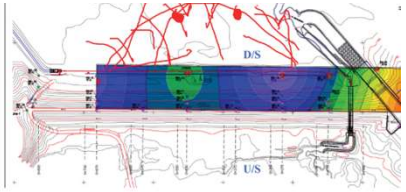


Figure 2 recommendation of MASW location

3. **Additional Observation Well Recommendations**



MINUTES OF THE TECHNICAL SESSION OF
THE DAM SAFETY COMMISSION
DISCUSSION OF MELAWI DAM DESIGN

Day/Date	:	Monday, September 09, 2024
Time	:	09.00 WIB – finished
Place	:	Sermo Dam Meeting Room, 2nd Floor, Balai Building Dam, Jl. Sapta Taruna Raya, PU Complex, Friday Market, Via video conference (Zoom)
Program	:	Discussion of Melawi Dam Design, Melawi Regency, Province West Kalimantan

I. The discussion was attended by→ (Attendance list attached)

II. Conclusion and Suggestions

A. General

The Melawi Dam is planned to be built on the Pinoh River, Nanga Kelawai Village, Sayan District, Melawi Regency, West Kalimantan Province. Geographically, the location of the dam is at coordinates 9o13'15.4" LS – 124o57'4.5" BT.

The Melawi Dam will use the dry dam concept with a vertical core zonal rockfill dam type. The dam height from the bottom of the foundation excavation is planned to be 68.00 m, the dam peak elevation is +83.00 meters above sea level, the peak length is 462.41 m, the peak width is 10.50 m, the upstream slope is 1:2.00, and the downstream slope is 1:2.40. The reservoir formed is planned to have a normal storage volume of 486.39 million m3. The benefits of the Melawi Dam are for flood control with a flood reduction of 6.20% (Q20) in Sintang Regency, West Kalimantan Province.

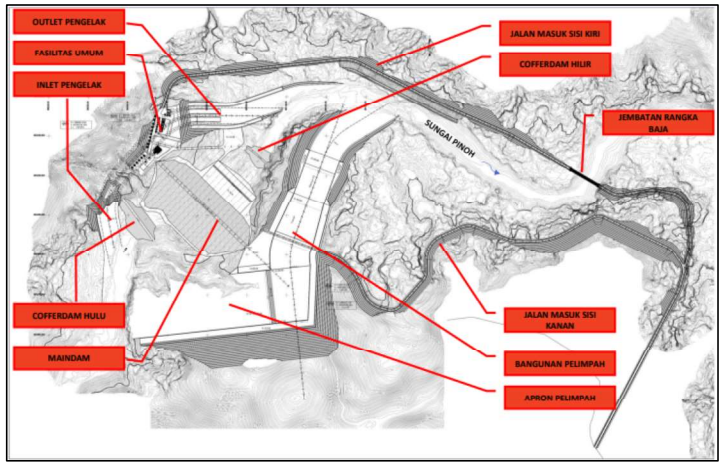


Figure 1. Layout of Melawi Dam

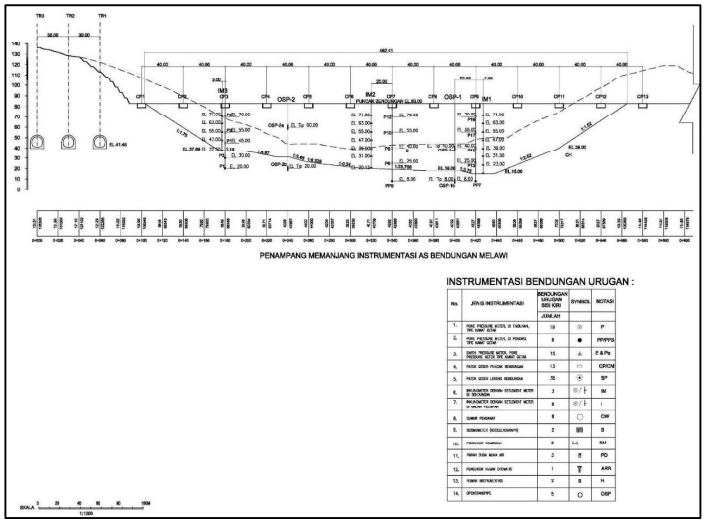


Figure 2. Longitudinal cross-section of Melawi Dam

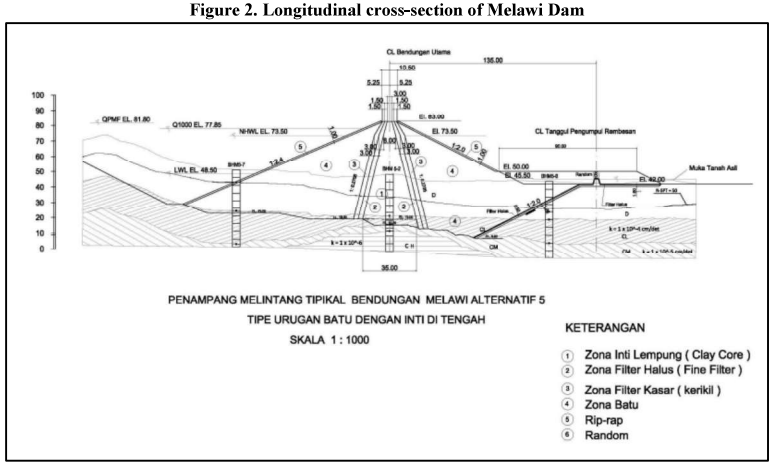


Figure 3. Cross-section of Melawi Dam

Initiator of Melawi Damis the Kalimantan I River Basin Center.The planning consultants for the Melawi Dam are PT. Indra Karya (Persero), PT. Inakko International Kosulindo, and PT. Sarana Bhuana Jaya KSO.

B. Administrative and Technical Requirements

In order to apply for design approval and construction permit for a dam, the dam initiator needs to complete the required administrative and technical documents and submit them to the Dam Engineering Center. Some of the documents that need to be completed include:

a. Letter of Application for Design Approval addressed to the Minister of Public Works, with copies to: Director General of Water Resources as Chair of the Dam Safety Commission, Director of Dams and Lakes, Director of Technical Development and Head of the Dam Engineering Center.
b. Identity of the Dam Builder.

C. Technical Data

1. It was stated that the Melawi Dam was planned as a dry dam that would reduce flooding by 6.20% (2,036.13 m3/sec) in Sintang.
   a. Should beexplained the flood reduction capacity of the Pinoh River.
   b. The technical data should explain the selection of dam type.
2. As stated in the technical data, the type of Melawi Dam is rock fill with a vertical core, while the dam type in the SNI is zonal rock fill with a vertical core. The technical data should be corrected in accordance with the SNI.
3. It was decided that the Melawi Dam would be a dry dam because it has smaller dimensions than a multipurpose dam.
   a. The reasons for determining the type of dam based on multi-criteria analysis should be conveyed, including the costs and benefits between dry dams and multipurpose dams, considering that the benefits of reducing flooding are quite small at 6.20% (Q20) with a reservoir capacity of 486.39 million m3.
   b. It was stated that the small flood reduction (Q20) was caused by the confluence of the Kapuas River upstream with a length of 1,143 km. The construction of the Melawi Dam is planned to be used to reduce a small portion of the flooding caused by the Kapuas River. A re-evaluation should be carried out considering the main purpose of the dam construction is to reduce flooding in Sintang Regency.
   c. Should beThe benefits of the dam for downstream areas are conveyed based on the flood reduction scheme that has been created and options if there are other additional benefits.

D. Dam Type

1. In determining the type of dam, the consultant only compares the cost of building a dry dam with a dam with multi-purpose benefits, referring to the same type of dam, namely zonal rockfill with clay core. Based on the cost comparison, a dry dam is then selected which is cheaper with the zonal rockfill type with clay core.
   The costs required for development are felt to be disproportionate to the benefits to be obtained.
   a. The type and benefits of the dam should be reviewed, with comprehensive consideration of the economic feasibility aspects (FIRR, EIRR, BCR, NPV) and techniques. Conduct studies for various alternatives, so that the best development alternative is obtained, and can be accounted for from the technical aspect as well as in the use of the state budget.
   b. Based onconsultant design, Melawi Dam needs to be equipped with 3 10 m diameter diversion tunnels. The cost of constructing this diversion is very large (almost half of the cost of constructing the dam). The consultant should examine alternative types, which can reduce or even eliminate the number of diversion tunnels, including:
      1). Typecomposite, a combination of concrete dam and earth embankment. The concrete dam section can be placed in the middle or on the edge where the foundation is relatively shallow. For diversion and spillway can be placed on the concrete dam section so as to reduce the cost of spillway and diversion construction.
      2). Alternative types of RCC or conventional concrete or LCVC (Low Cement Conventional Concrete) dams such as the Karebbe Dam can be considered.

      3). DebitThe Melawi River is relatively large and the reservoir capacity of the Malawi Dam is also very large. The benefits of the dam should be reviewed for several other benefits, including for hydropower.
      4). Dry dams are often unable to control small floods. The flood control capability of the Malawi Dam should be assessed at various flood recurrence periods starting from Q2th, Q5th, Q10th, Q25th, Q50th to Q100th.
2. Considering the geological aspects, time efficiency, and construction costs, the alternative location of the 5 Melawi Dams is recommended to be designed as a heavy-duty concrete dam or RCC (Roller Compacted Concrete). The table of construction price comparison between Rockfill dams and Concrete/RCC Dams is below:

Tabel 1. Perbandingan Harga konstruksi Bendungan Urugan batu dengan Bendungan Beton/RCC (Perencanaan bendungan Melawi, IK, 19 Sept. 2024.)

NO.	URAIAN PEKERJAAN	JUMLAH BIAYA BENDUNGAN URUGAN (Rp.)	JUMLAH BIAYA BENDUNGAN RCC (Rp.)
I	PEKERJAAN PERSIAPAN	15,374,804,300	16,442,831,150
II	PEKERJAAN JALAN & JEMBATAN	545,436,292,727	545,436,292,727
III	BANGUNAN PENGELAK	1,827,139,810,176	1,827,139,810,176
IV	BENDUNGAN UTAMA	1,056,954,320,672	977,936,368,931
V	BANGUNAN PELIMPAH	2,855,664,768,726	3,752,552,152,778
VI	PEKERJAAN HIDROMEKANIKAL & ELEKTRIKAL	207,715,351,000	207,715,351,000
VII	BANGUNAN FASILITAS BENDUNGAN DAN PENUNJANG OP	72,231,627,637	72,231,627,637
VIII	PENYELENGGARAAN SISTEM MANAJEMEN KESELAMATAN KONSTRUKSI (SMKK)	7,843,510,000	7,843,510,000
IX	PEKERJAAN AREA GENANGAN	474,171,773,460	474,171,773,460
	TOTAL BIAYA LANGSUNG	**7,062,532,258,698**	**7,881,469,717,860**
	Biaya Administrasi (5% dari Biaya Fisik)	**353,126,612,935**	**394,073,485,893**
	Biaya Jasa Konsultasi/Supervisi (5% dari Biaya Fisik)	**353,126,612,935**	**394,073,485,893**
	Biaya Tak Terduga (8% dari Biaya Fisik)	**565,002,580,696**	**630,517,577,429**
	Biaya Investigasi Tambahan (2% dari Biaya Fisik)	**141,250,645,174**	**157,629,394,357**
	TOTAL BIAYA TIDAK LANGSUNG	**1,412,506,451,740**	**1,576,293,943,572**
	BIAYA PROYEK DILUAR PPN	**8,475,038,710,438**	**9,457,763,661,431**
	PPN 11%	**932,254,258,148**	**1,040,354,002,757**
	TOTAL BIAYA PROYEK	**9,407,292,968,586**	**10,498,117,664,189**
	DIBULATKAN	**9,407,293,000,000**	**10,498,118,000,000**

It can be said that by "not making" the spillway (1.8T) and diversion tunnel (3.7T), it can be seen that the concrete/RCC dam can be reduced by IDR 5.5 T from a rough cost calculation (IK, 2024).

a. With the RCC type of heavy-duty concrete dam, the dam spillway can be placed in the dam body, thus saving construction costs because the excavation of foundation rocks is reduced and the length of the dam becomes shorter than the embankment type dam design.
b. Excavation for the bypass tunnel will be relatively non-existent if the dam is designed as a square or circular box culvert on a concrete or RCC dam body.
c. The RCC type of gravity concrete dam requires much less amount of rock material than the rockfill type of dam.
d. The implementation of concrete dam construction is not too hampered by the rainy season, unlike seasonal constraints on the filling of clay cores in embankment dams.
e. Quality control (QC) of concrete/RCC dams will be easier as it relies on controllable batching.
f. The amount of instrumentation used in RCC type dams is much less.

g. Based on the global calculation results presented, it can be seen that the price difference for gravity concrete/RCC dams is much lower than rockfill dams with soil cores. From table 1. above, it can be seen that the value of rockfill dams.

3. In addition to the heavy-duty concrete type or RCC (Roller Compacted Concrete), also consider the alternative design of the dam body using a composite type. The use of a composite type will have the advantage of reducing the diversion tunnel.
4. The concept of dry dams is very common in the form of gravity concrete/RCC dams both in Japan and the United States, because it is relatively easy to control, and because rapid draw down often occurs, concrete/RCC dams are relatively safe.
5. The dry dam concept at Melawi Dam will be quite good because there is a traditional water traffic route for the people of Kalimantan. In addition, the biota that usually live downstream and back can also play their role as usual without being disturbed.

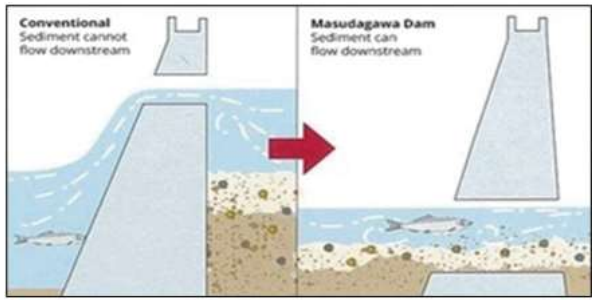


Figure 1. Sketch of Masudagawa Concrete Dry Dam (KNI-BB, 16-18 May 2017 Padang, YZ&AM)

6. The consultant needs to submit a "Grand Design for Flood Management in Sintang" which is a unified flood management for the "Melawi River and Sintang River" as well as the basic reasons for the construction of the Melawi Dam.

E. Geological and Geotechnical Investigations

1. Regional physiographic maps should be equipped with scale, wind direction, and source.
2. The regional geological map was revised taking into account the following suggestions:
   a. In addition to longitudinal cross-sections, regional geological maps should be equipped with cross-sections that cut the dam axis to determine the details of the distribution of rock formation layers below the surface of the dam location.
   b. The boundaries between rock formations at the dam location, the field geological map can be compared with the regional geological map.
3. In compiling the geological map of the Melawi Dam, the following matters need to be considered:
   a. In the description column, the coordinates of the dam location should be added.
   b. The location of the dam axis on the map should be enlarged so that it can be seen more clearly.
   c. The reservoir inundation lines should be made clearer and more defined so that they are easy to understand.
   d. Field mapping documentation should be included separately from the dam geological map.
   e. For as-built drawing purposes, it should be equipped with a validation sheet.

4. In compiling engineering geological maps, the following suggestions should be followed:
   a. The soft-clay rock unit (yellow in color) on the engineering geological map is included in rock class D according to the CRIEPI classification, 1992. The determination of rock classification needs to be improved considering the characteristics of the unit are loose, soil-like and do not show rock properties, therefore the unit should be categorized as residual soil (Rso).
   b. It was stated that the foundation of the Melawi Dam will rest on rock classes CH and C. In determining the rock class, it should be determined based on the dominant rock class. It is better for the dam to rest on only 1 (one) rock class.
5. The legend column in the Melawi Dam drilling point map should be revised to a description column, because it contains information about the symbols on the map. While in the seismic section, the division of seismic classes is also referred to as a legend, the word legend should be changed to "description".
6. The word Legend will relate to the scale of rock age, therefore the engineering geological cross-section of the Melawi Dam which is in the form of a rock mass strength class also contains the word legend which should be changed to "information" because it does not relate to rock age.
7. The geological longitudinal cross-section of the Melawi Dam alternative 5 should be repaired according to the following suggestions:
   a. In the geological longitudinal cross-section of the Melawi Dam alternative 5, the planned excavation line for the dam foundation should be depicted in a different color with a striking dotted line.
   b. The plan is that the deepest excavation of the dam foundation will be reduced to 30 m, considering the large amount of igneous rock material excavated, as well as the type of dam foundation rock which is composed of igneous rock, the dam design should be considered to be a type of heavy-duty concrete or Roller Compacted Concrete (RCC).
   c. By replacing the type of dam from rockfill to concrete/RCC, the length of the dam body will likely be reduced, because the foundation excavation does not need to follow a maximum gradient of 45°.

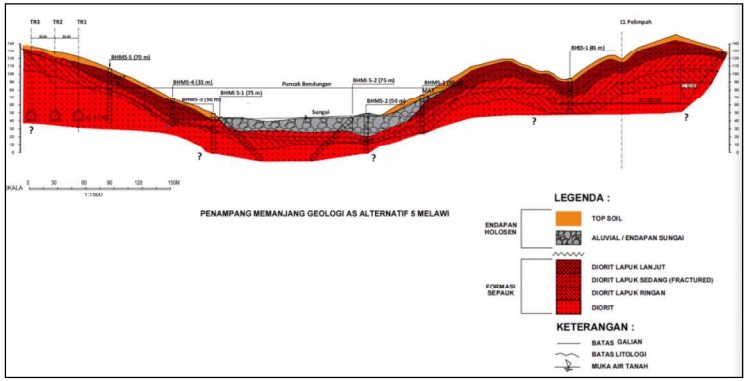


Figure 4. Longitudinal Geological Cross Section of Alternative Axis 5 of Melawai Dam

8. The longitudinal and transverse cross-sections of the Lugeon axle of the Melawi Dam need to be repaired:
   a. The longitudinal geological cross-section of the dam should cover an area of 2H + L + 2H (H = dam height, L = dam length). While the geological cross-section of the dam should cover an area of 4H upstream, and + 4H downstream of the dam, measured from the toe of the dam body slope.
   b. The cross-section title should be revised to become the longitudinal/transverse Lugeon cross-section of the Melawi Dam alternative 5.
   c. For as-built drawing purposes, it should be equipped with a validation sheet.
   d. Referring to the Lugeon cross-section that has been presented, the plan for the trial grouting work that has been carried out should be submitted to the Dam Engineering Center.
   e. In the preparation of the Lugeon cross-section, it should be ensured whether seepage occurs in the dam foundation, so that it is necessary to conduct a permeability test on the foundation rock (water pressure test) so that it can be known which part of the foundation allows water to pass through and so that the anti-seepage method that will be implemented later can be evaluated.
   f. Before dam construction, it is necessary to conduct grouting tests on the left and right support sections as well as the river bed section, in order to obtain the optimal grouting distance, the permitted grouting pressure and the optimum grouting cement mixture for the planned foundation rocks.
   g. Detailed geological structure mapping should be carried out on the dam footing to determine the condition of the foundation, whether there are minor faults, master joints, continuous fractures, weak zones, alteration areas, or jointed zones in the foundation rocks that will affect the Melawi Dam plan.
9. The depiction of the longitudinal cross-section of the Melawi Dam tunnel should be adjusted to the following suggestions:
   a. Since the planned dam tunnel is located in the CL rock class, thorough excavation should be carried out on the geotechnical unit to prevent cave-ins (collapses).
   b. The tunnel plan is quite long and some are open excavations so that the volume of the tunnel excavation is quite large. In addition to the inlet portal and outlet portal, the valley in the middle of the tunnel is an open excavation. Therefore, a slope protection design for the excavation and portal is needed so that the protection work will increase.
   c. Areas not reached by the drilling point in the cross-section should be marked with a question mark in the interpreted lithology unit.
10. Based on the longitudinal cross-section of the Melawi Dam spillway in Fig. 5, excavation of foundation rocks to a depth of 80-100 m will be carried out on the spillway crest and its transition. If the dam design is still planned with a vertical core rock fill zonal type, a plan for the location of the rock material disposal or efforts to utilize it should be submitted.

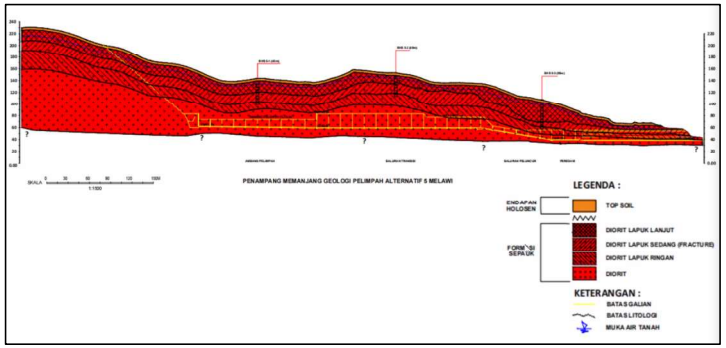


Figure 5. PMelawi Dam Spillway Extension

11. The Melawi Dam bypass system is planned to use 3 (three) tunnels with a diameter of 10 (ten) m located under the left abutment of the dam. In the construction of the tunnel, the consultant should submit a technical justification related to the selection of the location of the tunnel along with other alternatives based on geological conditions by mentioning the advantages and disadvantages of each alternative location of the planned tunnel.

F. Dam Foundation Repair

1. In grouting work, an engineering statement should be made, in the form of:
   a. *Lugeon map*which contains plotting of pilot holes, secondary holes, tertiary holes, quarter holes, and check holes in 1 (one) cross-section to see the progress of the grouting work, and at the top is equipped with a cross-section of the geological structure of the dam foundation.
   b. The capping concrete and filter zone area of the dam should be described in full with an engineering geological map whose depiction is carried out segment by sectionsegments with a map scale of 1:200.
2. Considering the deep excavation of the dam foundation and the relatively high groundwater level, the consultant has planned dewatering of the foundation excavation:
   a. A dewatering system layout drawing should be prepared showing the pipe and pump network for dewatering needs.
   b. In calculating the estimated water output, a permeability coefficient of 1x10-2 should be used because the pipe will be placed in an alluvial unit, so it is necessary to consider the depth and pump density aspects.
   c. For evaluation purposes, a pumping test should be carried out indewatering implementation.

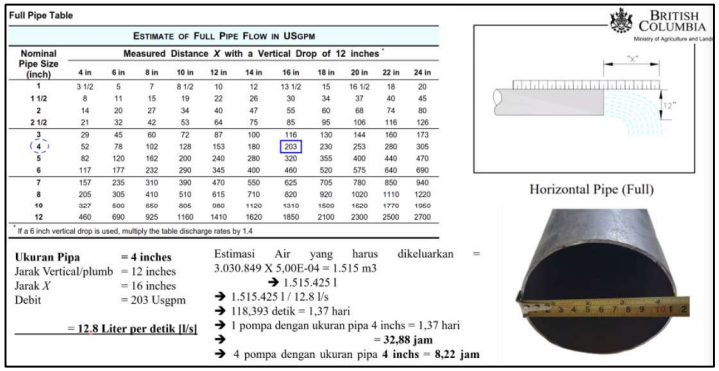


Figure 6. Dewatering Work Calculation

G. Construction Material Investigation

1. The material availability map should be improved,
   a. The map scale should be enlarged so that the area on the map can be seen clearly.
   b. At the quarry location, color information should be differentiated, for example: red for stone material, brown for soil material, and yellow for sand material.

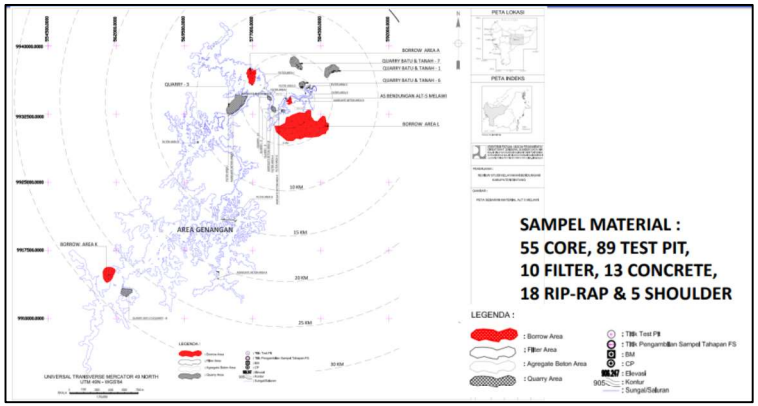


Figure 7. Map of Availability of Melawi Dam Materials

2. Consultantconveying the borrow area soil material testing table with the soil fraction passing the No.200 sieve is quite high when compared to the NWC (Natural Water Content), OMC (Optimum Moisture Content), IP (Plasticity Index) and LL (Liquid Limit). To confirm the fraction passing the No.200 sieve, a graph of the borrow area soil material gradation should be made.

Table 1. Borrow Area Soil Material Test Results (submitted without any markings)

Sumber Material (Borrow Area)	Jarak dari Bendungan	No. Contoh Tanah	Sifat		Pemadatan		95% γ_d maks pd OMC					Analisis Butiran		Konsistensi			
			Kadar Air Alami (NWC)	Berat Jenis	Kadar Air Maks (OMC)	Berat Isi Kering Maks	Berat Isi Kering	Berat Isi Basah	Angka Pori	Berat Isi Jenuh	Berat Isi Dlm Air	Derajad Kejenuhan	Diameter Maks	Lolos # 200	Batas Cair	Batas Plastis	Indeks Plastis	Klasifikasi
			w	G	wo	$\gamma_{d\,maks}$	γ_d	γ_{wet}	e	γ_{sat}	γ_{wb}	Sro			LL	PL	PI	
	(km)		(%)		(%)	(gr/cm³)	(gr/cm³)	(gr/cm³)		(gr/cm³)	(gr/cm³)	(%)	(mm)	(%)	(%)	(%)	(%)	
TPM 5-8	0	T44	28,75	2,801	24,9	1,604	1,524	1,903	0,838	1,980	0,980	83,21	25,4	62,30	62,58	28,22	34,36	CH
TPM 5-10		T46	26,12	2,735	23,0	1,59	1,511	1,858	0,810	1,958	1,958	77,61	38,1	28,46	55,36	25,30	30,06	CH
TP Q 1-1	4,8	T52	27,46	2,585	22,6	1,574	1,495	1,833	0,729	1,917	0,917	80,17	9,5	47,32	66,94	33,06	33,88	SM
TP Q 2-7		T68	25,65	2,711	23,4	1,593	1,513	1,867	0,792	1,955	0,955	80,15	4,8	87,95	54,20	25,58	28,62	CH
TP Q 2-9		T70	19,57	2,712	23,7	1,550	1,473	1,813	0,842	1,930	0,930	74,43	4,8	92,30	56,82	26,67	30,15	CH
TP Q 2-19		T80	23,84	2,774	18,8	1,725	1,639	1,947	0,692	2,048	1,048	75,30	19,1	83,29	42,51	25,52	16,98	CL
TP Q 2-20		T81	27,30	2,639	23,2	1,595	1,515	1,867	0,742	1,941	0,941	82,54	25,4	85,62	58,79	30,66	28,13	MH
Minimum				2,585	18,8	1,550	1,473	1,813	0,692									
Rata-Rata				2,708	22,7	1,604	1,524	1,870	0,778									
Maksimum				2,801	24,9	1,725	1,639	1,947	0,842									
Parameter Utk Desain								1,800										

3. The consultant provides a summary of the needs and availability of waterproof core materials.waterfor dam construction.
   a. The volume of material availability should be calculated based on the results of topographic measurement maps and accurate material investigations.
   b. In the material investigation, information should be collected regarding the status of borrow and quarry land and other required land, distance from the dam, facilitiesand transportation infrastructure, excavation methods, restoration methods after excavation is completed, etc.
   c. In each borrow area plan, sampling and laboratory testing need to be carried out to determine the physical and mechanical properties of the material. In this case, the number of samples taken should be more representative of the entire borrow area.

Table 2. Ratio of Impermeable Core Material

No	Kode Sampel / Tes Pit	Lokasi	Kedalaman (m)	Luas (m2)	Top Soil (m)	Tebal Material (m)	Volume Material(m3)	Jarak (km)
1	TPM 5-8 & TPM5-10	Galian Spillway	3	3.547,98	0,4	2,6	9.224,75	0
2	TPQ 2-7, TPQ 10, TPQ 20	Borrow Area L	3	1.470.426,53	0,4	2,03	2.984.965,86	1,8
4	TPQ 2-19	Borrow Area L	3	319.237,17	0,3	1,6	510.779,47	1,8
6	TPQ 1-1	Quarry Batu & Tanah 1	3	128.109,45	0,5	1,2	153.731,34	5
Total Volume							**3.658.701,42**	
						Efisiensi 50%	**1.499.143,27**	
						Kebutuhan	**390.852,35**	

4. Based onThe results of the Atterberg limit test showThere are several samples whose liquid limit value (LL) is > 70. It should beFor the core zone, materials with values of 15<IP<35% and LL<70% are used. This is to avoid the use of materials with expansive and dispersive potential or too high water content (containing halloysite minerals).

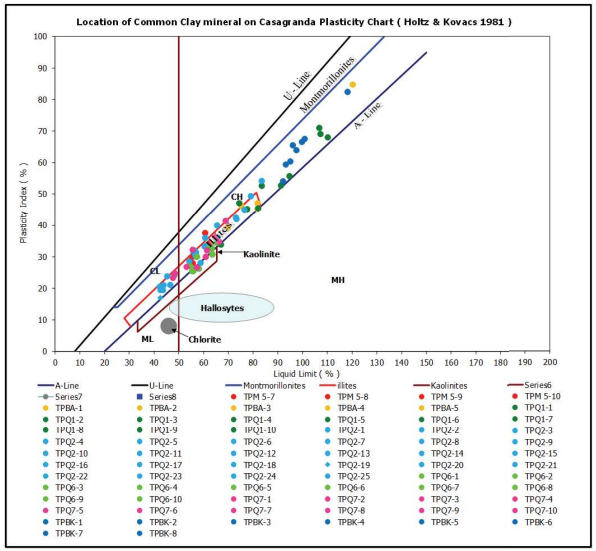


Figure 8 Plasticity Index Test Value

5. The consultant stated that out of 25 pit tests conducted, only 7 met the requirements, resulting in a total core zone material volume of 3.3 million m3 with an area of 1.3 million m2 and a material thickness of 2.4 m. The volume comes from the spillway abutment excavation, borrow area L, and rock and soil quarry 1.
   a. The consultant should explain in more detail the volume of each borrow area.
   b. The consultant stated that the pit test was conducted at a distance of 500 m. To increase accuracy, the consultant can complete the pit test with a hand drill at a minimum distance of 100-150 m.
   c. Consultants should ensure the borrower's exemption status,*yes*L to avoid difficulties in land availability during the construction period, becausein the area is a location that meets the requirements.

Table 3. Pit Test Results

No	Kode Sampel / Tag Pit	Lokasi	Kedalaman (m)	Luas (m2)	Top Soil (m)	Tebal Material (m)	Volume Material(m3)	Jarak (km)
1	TPM 5-8 & TPMS-10	Galian Spillway	3	3.547,98	0,4	2,6	9.224,75	0
2	TPQ 2-7, TPQ 10, TPQ 20	Borrow Area L	3	1.470.426,53	0,4	2,03	2.984.965,86	1,8
4	TPQ 2-19	Borrow Area L	3	319.237,17	0,3	1,6	510.779,47	1,8
6	TPQ 1-1	Quarry Batu & Tanah 1	3	128.109,45	0,5	1,2	153.731,34	5
Total Volume							**3.658.701,42**	

6. From the material that matches the pit test results, grain size tests have been carried out. Based on the gradation results, it can be seen thatThere are three graphs that show significant differences..
   a. The core material selected should have a consistent gradation curve and not showsignificant differences from other core material samples.
   b. Gradation graphs should also be presented for fine filter, transition, and rockfill materials.

   c. In the gradation graph image (Figure 9), it appears that the largest portion of the core material is silt and the clay content is almost non-existent. This is inconsistent with the results of the Atterberg limit test, so it needs to be reviewed again.

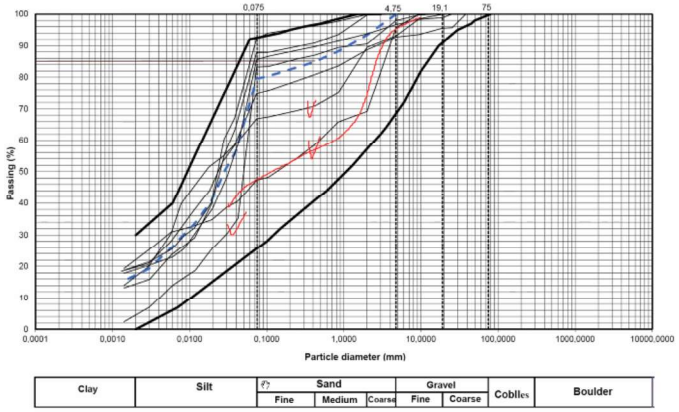


Figure 9. Grain Size Test Results Graph

7. The consultant submitted the results of physical and mechanical property tests which showed shear strength values that were too high for the CH material classification. Generally, shear strengthfor CH classification is 15o – 22o.
   a. Engineering properties testing (shear strength, consolidation, and permeability) should be carried out under wet side conditions, for example at a water content of +2% or +3% OMC.
   b. Check backthe application of pressure σ3 used in triaxial testing. The value of σ3 given in the test should be adjusted to the height of the dam to avoid the occurrence of dilatancy effects which result in shear strength values that are too high.
8. It is reported that the fine filter material, coarse filter material, and aggregate for concrete that will be used as construction material will be taken from the results of crushing rocks from the quarry. To fulfill the plan, the filter material and aggregate should be trial crushed and tested for samples to determine the parameters of physical and mechanical properties.
9. The consultant stated that the material used for rockfill is at a depth of 17 m below the overburden layer and has a rock compressive strength of 500 kg/cm2. However, based on the core drilling sample (in the core box) it shows a small RQD value (the sample has many fractures). The valueRQD can affect slake durability and rock strength. It should be re-checked the conformity between the drilling core sample and the physical and mechanical properties data (slake durability, compressive strength, soundness, relative density, etc.) of the test results that have been carried out.

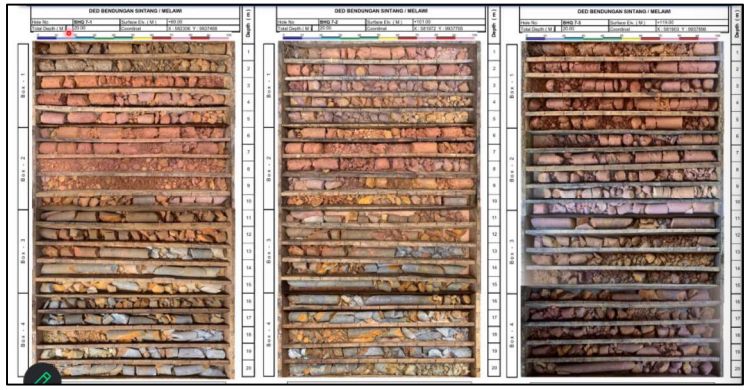


Figure 10. Core Box Quarry 7 Stone and Soil Material

10. To confirm the volume of rockfill availability in quarry 7 (seven) which has the largest volume, only investigations were conducted on 3 (three) drill points that were in line. The number of drill points should be re-evaluated, considering that the scope of quarry 7 (seven) is quite wide.
11. The gradation of the rockfill material to be achieved has been determined using a material gradation curve.
    a. Considering that the drilling core samples show that granodiorite has a small RQD value, it should be ensured whether the rockfill gradation design assumptions can be achieved.
    b. Based on the assumption of the rockfill gradation to be achieved, the drilling pattern that will be used during blasting should be planned at the same time.
12. Of the 18 (eighteen) rock samples tested for rockfill material, only 2 (two) samples (from TPQ 1-1 and TPQ 1-2) met the criteria of having a depth of > 20 m.
    a. Because not all materials in the quarry can be used for construction materials, excavation and extraction need to be selective.
    b. The rockfill test samples used should be increased again, considering that the dominant rockfill embankment volume is quite large.
    c. To avoid overburden excavation of approximately 17 meters (quite deep) and to utilize the excavation results, it is necessary to consider designing an alternative dam body using random rock material (if not using a gravity concrete dam type).
    d. If the embankment material still only uses rockfill material, the location and complete design of the disposal area as a place to dispose of waste material should also be planned.

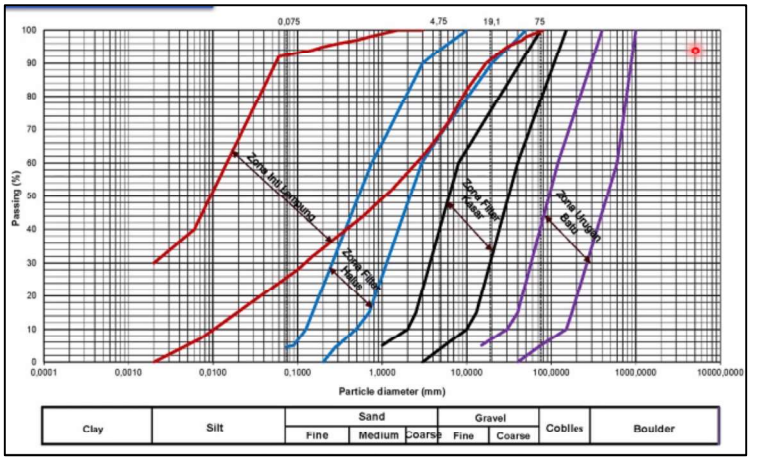


Figure 11. Design of Embankment Material Gradation

13. At each quarry and burrow location 1&7, to determine the depth of material availability, longitudinal and cross-sections of the quarry should be drawn, and it is necessary to conduct an analysis of the condition of the quarry area to calculate the need and selection of material availability.
14. The material investigation report should be accompanied by information regarding: the location of the borrow area and quarry, distance from the dam, excavation method, haul road and bridge infrastructure, land status (can it be cleared), and the possible need to restore the former material excavation area.
15. For the feasibility of material sources, a mining plan should be studied which describes an effective and efficient material mining construction method in accordance with technical data from drilling results and complete geotechnical parameters.

H. Hydrological Analysis

1. Based on the results of the Q2 flood reduction calculation, the volume and area of flood inundation after the dam is still quite large, this is because the flood reduction is still relatively small. The Consultant Team said that the condition of the watershed is still quite good, but there is a lot of sediment due to illegal miners, this can cause changes in river capacity. A study of flood events should be made every year and alternative handling of problems in each flood event should be made and submitted to the Dam Engineering Center.

Table 4. Area and Volume of Flood Inundation Q2 – Multipurpose

LOKASI BENDUNGAN	LUAS GENANGAN BANJIR				VOLUME GENANGAN BANJIR			
	EXSISTING (Ha)	SETELAH ADA BENDUNGAN (Ha)	REDUKSI (Ha)	REDUKSI (%)	EXSISTING (juta m3)	SETELAH ADA BENDUNGAN (juta m3)	REDUKSI (juta m3)	REDUKSI (%)
Melawi - 1	112,586.37	109,838.44	2,747.93	2.44	16,141.57	15,428.75	712.82	4.42
Melawi - 2	112,586.37	103,958.67	8,627.70	7.66	16,141.57	14,190.84	1950.73	12.09
Melawi - 3	112,586.37	111,436.17	1,150.20	1.02	16,141.57	15,771.36	370.21	2.29
Melawi - 4	112,586.37	101,344.01	11,242.36	9.99	16,141.57	13,635.16	2506.41	15.53
Melawi - 5	112,586.37	101,344.01	11,242.36	9.99	16,141.57	13,635.16	2506.41	15.53
Melawi - 6	112,586.37	106,351.90	6,234.47	5.54	16,141.57	14,707.12	1434.45	8.89
Sintang -1	112,586.37	110,351.08	2,235.29	1.99	16,141.57	15,535.35	606.22	3.76
Sintang - 2	112,586.37	104,073.08	8,513.29	7.56	16,141.57	14,213.93	1927.64	11.94

Table 5. Area and Volume of Flood Inundation Q2 – Dry Dam

LOKASI BENDUNGAN	LUAS GENANGAN BANJIR				VOLUME GENANGAN BANJIR			
	EXSISTING	SETELAH ADA BENDUNGAN	REDUKSI	REDUKSI	EXSISTING	SETELAH ADA BENDUNGAN	REDUKSI	REDUKSI
	(Ha)	(Ha)	(Ha)	(%)	(juta m3)	(juta m3)	(juta m3)	(%)
Melawi - 1	112,586.37	109,838.44	2,747.93	2.44	16,141.57	15,428.75	712.82	4.42
Melawi - 2	112,586.37	102,380.55	10,205.82	9.06	16,141.57	13,880.11	2,261.46	14.01
Melawi - 3	112,586.37	111,436.17	1,150.20	1.02	16,141.57	15,771.36	370.21	2.29
Melawi - 4	112,586.37	101,344.01	11,242.36	9.99	16,141.57	13,635.16	2,506.41	15.53
Melawi - 5	112,586.37	101,344.01	11,242.36	9.99	16,141.57	13,635.16	2,506.41	15.53
Melawi - 6	112,586.37	106,345.82	6,240.55	5.54	16,141.57	14,705.63	1,435.94	8.90
Sintang -1	112,586.37	111,328.59	1,257.78	1.12	16,141.57	15,747.43	394.14	2.44
Sintang - 2	112,586.37	105,265.40	7,320.97	6.50	16,141.57	14,449.48	1,692.09	10.48

2. The correction factors used for the Kapuas watershed are different from those used for the Melawi watershed. The reasons for these differences should be explained, because both watersheds have the same rainfall pattern.
3. In the Design Rainfall Analysis, the Consultant should pay attention to the following suggestions:
   a. The average planned rainfall for the Kapuas Hulu and Melawi watersheds should be conveyed.
   b. In the compilation of daily rainfallannual maximum (HHMT)should follow the point rainfall approach for each grid. The calculation of the planned rainfall for each sub-watershed can be calculated from the relevant planned rainfall grid multiplied by its weighting factor.
4. In the Kapuas Hulu River there is sa fairly large Sentarum Lake, so that in the analysis of the planned flood discharge model, the lake can be calculated as a reservoir. Also calculate the lake outflow to the Melawi Dam supplement, and seek more complete information about the existence of Batu Puja which acts as a natural spillway.
5. Calculation of Area Reduction Factors (ARF) takes into account the following matters:
   a. ARF function of watershed area:
      1) Melawi Dam Watershed;
      2) *Remaining Basin*(Melawi Watershed – Kapuas Confluence minus Melawi Dam Watershed); and
      3) Kapuas Hulu Watershed – Confluence with the Melawi River.
   b. Considering that the empirical ARF value is limited to watersheds with an area of less than 10,000 km2. For larger watersheds, ARF should be calculated using the empirical equation from PUSAIR rather than based on its graph. For very large areas such as Kapuas Hulu, it can be calculated from the design rainfall with a minimum length of 20 years.
6. It needs to be evaluated in more detail considering that there are several river confluences downstream of the Melawi Dam that have the potential to cause backwater, thus affecting flood conditions downstream of the dam and in Sintang.
7. Land use maps in the Melawi and Kapuas Hulu watersheds should be equipped with regional colors for land cover types in accordance with SNI 7628:2010 concerning Abbreviation of Land Cover Class Names and Color Coding on Land Use Maps.
8. Comparison of the design flood hydrograph (QPMF and annual Q1000 or Q1/2PMP) between the 2 (two) methods is the basis for selecting the initial abstraction. Figure 12 still does not represent the closeness between the two methods, so to change the initial content of Green and Ampt, the peaking coefficient value of the Snyder method can be adjusted. If this method cannot be achieved, it can be tried by changing the initial abstraction of the SCS.

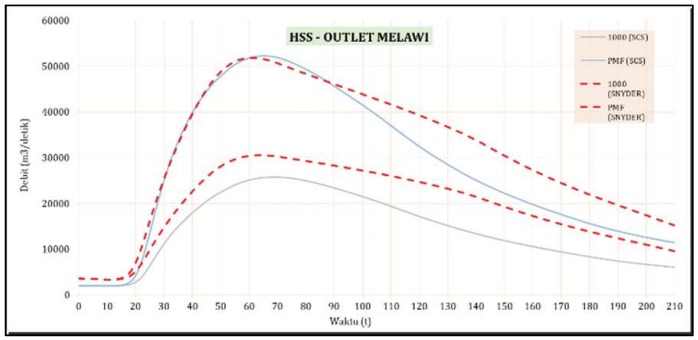


Figure 12. Flood Graph of Melawi Outlet Design

9. The Service Note from the Directorate of Technical Development, Directorate General of Water Resources regarding the flood conditions in August 2024 still cannot be used to calibrate the flood model parameters because the peak flood magnitude does not come from observations around the dam but from the HEC-RAS model from Putussibau to Sintang. The Consultant Team should be able to run the Model usingHEC-RAS modeling based on flood event data from September 29, 2021 – October 5, 2021.
10. Several alternatives for the Melawi Dam were presented. Related to the selection of the dam type between a dry dam and a multipurpose dam which is reviewed from the flood reduction perspective. Based on the recapitulation results of flood discharge reduction with dischargeQ2th,It is said that it will be more efficient if you use the dry dam type.

Table 6. Alternative Flood Routing Melawi

Kala Ulang	Qinflow m^3/det	Qoutflow m^3/det	El. Ambang m	EL. muka air m	Volume Tampungan juta m3	Hd m	EL. Puncak m	Tinggi Jagaan m	Debit Sintang m3/dt	Reduksi di Sintang %
Q1	593.78	432.68	73.50	55.00	31.69	0.00	83.00	28.00	8059.97	2.00
Q2	1177.34	**558.70**	**73.50**	**63.26**	**128.93**	**0.00**	**83.00**	**19.74**	**12924.86**	**4.79**
Q5	1811.42	625.07	73.50	68.46	260.31	0.00	83.00	14.54	20796.65	5.70
Q10	2251.30	655.96	73.50	71.07	359.65	0.00	83.00	11.93	26894.70	5.93
Q20	**2730.66**	**681.78**	**73.50**	**73.36**	**472.94**	**0.00**	**83.00**	**9.64**	**32847.98**	**6.24**
Q25	2887.19	821.84	73.50	73.87	502.40	0.37	83.00	9.13	35133.03	5.88
Q50	3410.15	1456.16	73.50	74.86	565.36	1.36	83.00	8.14	40943.92	4.77
Q100	3987.32	**2138.74**	**73.50**	**75.62**	**619.64**	**2.12**	**83.00**	**7.38**	**48357.74**	**3.82**
Q200	4618.65	2847.97	73.50	76.29	670.98	2.79	83.00	6.71	54771.73	3.23
Q1000	6389.98	4676.51	73.50	77.78	796.88	4.28	83.00	5.22	71338.42	2.40
QPMF	13026.53	10986.65	73.50	81.77	1200.49	8.27	83.00	1.23	164271.75	1.24

Elevasi Pelimpah	**: + 73,50 m**	**Reduksi di Sintang pada Q_{20} sebesar 6,24 %**	
Elevasi PMF	**: + 81,77 m**	**Reduksi di Melawi pada Q_{20} sebesar 17,38 %**	
Elevasi Puncak	**: + 83,00 m**	**Reduksi di Pinoh pada Q_{20}**	**sebesar 62,46 %**
Tinggi Jagaan	**: 1,23 m**		

   a. Flood reduction from each alternative dam should be shown specifically based on land cover area.
   b. The calculation of peak discharge in Sintang should not be the result of an algebraic summation between the flood peaks at the Kapuas Hulu outlet and the meeting point of the Melawi flood peak, but rather based on the summation of the two hydrographs which produces a different flood peak from the first approach.

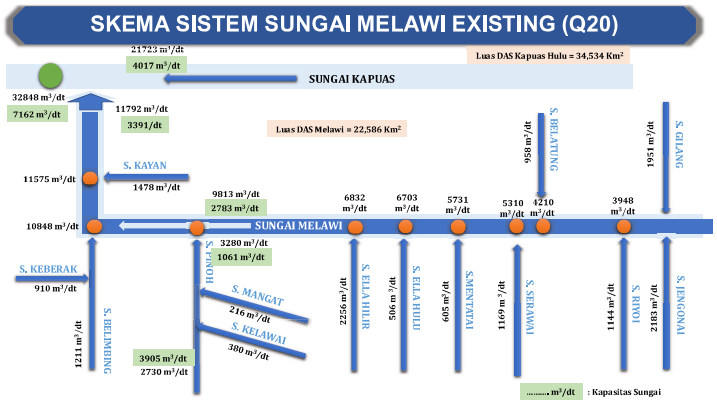


Figure 13. Existing Melawi River System Scheme (Q20)

c. A conclusion matrix should be made on the reduction of the magnitude of flooding in a certain recurrence period with the presence of Dry dams in Sintang, Melawi - Kapuas Confluence, Pinoh Confluence - Melawi River, and the downstream of Melawi Reservoir and its impact (area of inundation) on settlements or rice fields, complete with notes on settlements including Villages, Sub-districts, and Regencies or cities.

11. Melawi Dam is designed as a Dry dam so that the Consultant does not conduct further sedimentation analysis. When inundation occurs, alluvial fan deposits can occur, the Consultant should still calculate the sedimentation rate in the upstream area based on current land use, at least identify the type of material or sedimentation gradation that may pass through the Melawi Dam. The results of this identification can be considered in the design of the outlet channel lining whose durability depends on the material that will pass through.

I. Technical Analysis

In the Technical Meeting, no discussion of the Technical analysis was carried out, so the consultant had to...provide slope stability analysis calculations, seepage analysis and dam deformation analysis including foundation repairs and repair methods.

J. Instrumentation

1. To observe earthquake behavior in the dam, a seismograph will be installed.
   a. It should be ensured that the type of earthquake monitoring instrumentation to be installed is a seismograph or strong motion accelerograph.
   b. Considering that the dam height is 68 m from the planned base of the foundation excavation, consideration should be given to installing a Strong Motion Accelograph (SMA) instrument in the bedrock at 2 (two) embankment points.

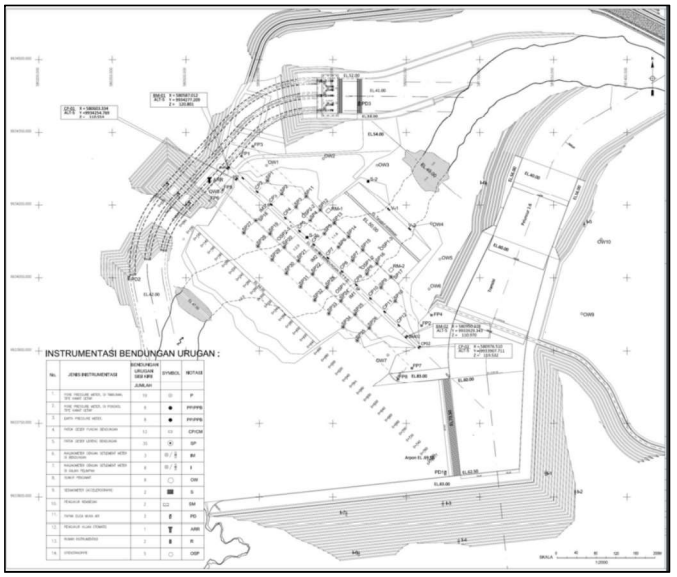


Figure 14. Melawi Dam Instrumentation Plan

2. It was stated that the downstream embankment would use rockfill material, and there was an option to use random rocks from the foundation excavation.
   a. The specifications of random stones that may be used should be provided in detail.
   b. Consider other alternatives if the material used is random soil, piezometer instrumentation should also be installed in the random soil zone, both upstream and downstream of the core zone.
   c. Installation of piezometers in foundation and embankment areas so that the installation design drawings can be detailed including the type of filter.
3. It is planned to install an earth pressure cell on the deepest foundation of the dam. Given the small potential for arching on the dam, the installation of an earth pressure cell on the Melawi dam should be reviewed.

K. Hydromechanical and Electrical Design

1. Reconsider the use of 3 units of diversion tunnels.
   Considering the tunnel diameter of 10 meters, reconsider the use of slide gates because of their large dimensions and weight of more than 100 tons.
2. It was stated that there is a trash rack on the bottom outlet building of the Melawi Dam using galvanized material.
   a. The quality of river water in Kalimantan contains high levels of acid, which has the potential to cause corrosion. Considering that the Melawi Dam was designed with a dry dam concept, the trash rack material should use stainless steel.
   b. The stainless steel material should not only be on the screen bar, but 1 (one) set with the frame.

c. Because there is a control valve at the bottom outlet, the distance of the trashrack grid should be reconsidered, so that the control valve is not disturbed by trash entering the penstock.

3. It was conveyed that the working floor of the intake house was at EL +103 and a ladder would be installed to go up to the working floor of the intake house.
   a. To make it easier during operation and maintenance, please reconsider that the working floor of the intake house is at an elevation of +83.
   b. If the intake house remains at an elevation of +103, consider providing road access in the form of a bridge so that operational vehicles can enter during operations or maintenance.

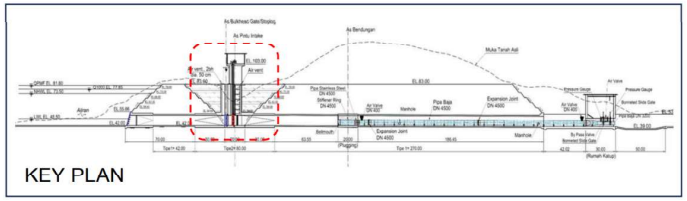


Figure 15. Melawi Dam Intake Tower

4. It was stated that there were only maintenance stairs in the intake house, to facilitate operations and maintenance as well as the safety of OP officers, the stair access should be replaced with a lift (gondola).

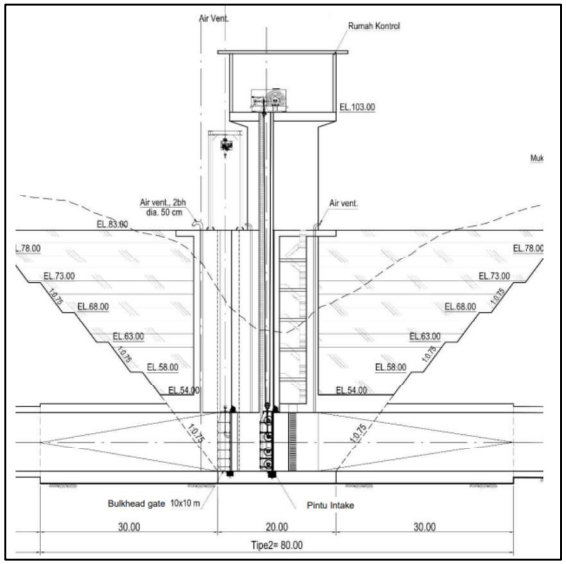


Figure 16. Intake House

5. It is stated that in the valve housing there are 2 (two) regulating valves in the form of bonneted slide gates, this type of valve has the potential to cause high vibrations, so the regulating valve should be replaced with a fixed cone valve type.

6. At the time of the presentation, the Consultant had not presented a discussion of the trash bomb work on the grounds that the work was in the realm of civil works. In general, the work*trash boom*become one work package with hydromechanical and electrical work, and anchors should have been designed to fasten the trash boom at the bottom of the reservoir.
7. The consultant should be able to record in detail and accurately how much electrical power load is needed in the field.
8. The consultant stated that there was a manhole with a diameter of 60 cm, but this diameter was too small to make it easier for officers to carry out operations and maintenance, so it needed to be enlarged to 80 cm.
9. To reduce the occurrence of water hammer around the branching area, reconsider changing the type of branchpipe downstream, from straight to bifurcation type.
10. The consultant stated that there are 3 (three) lightning rod points in the Melawi Dam area which protect all buildings and facilities of the Melawi Dam.
    a. Check again whether the 3 (three) lightning rod points have protected all buildings, facilities and instrumentation equipment at Melawi Dam.
    b. Check the height of the lightning rod to be installed to see if it can reach the areas to be protected.
    c. It was stated that the lightning rod design to be installed is 2 (two) different types, namely triangle and monopole, depending on the conditions.In the field, the ease and safety of maintenance of each type of lightning rod should be conveyed in detail.
    d. Plan the lightning rod grounding away from the instrumentation area, considering that the lightning rod functions to protect the installed instrumentation.
11. It was conveyed that the lighting in the dam area uses electricity from solar cells.
    a. Consider that solar cell powered lighting is not only in the main dam area, but can also be installed in other areas such as facility buildings and entrances as well as access for maintenance.
    b. To anticipate wild animals that can damage facilities and infrastructure in the dam area, open areas should be provided with protective fences. (occurs in several dams such as Jatibarang Dam and Sampean Baru Dam).
12. Recheck the plan to use a generator with a capacity of 2 x 200 KVA, whether it is sufficient for electrical energy at the location, it is attempted to supply the main power with electricity from PLN.
13. The consultant said that there are 3 (three) stocker lines with a fairly large diameter, so that it is easy to mobilize, consider changing the stocker to 4 (four) or 5 (five) lines so that the pipe diameter and door size can be reduced.
14. Consider equipping the Melawi Dam with an early warning system, as a means of communication to the surrounding community, in the event of an emergency at the dam.

L. Etc

1. The suggestions above and suggestions from previous discussions that are still relevant and have not been followed up on should be followed up immediately, design improvements made, a follow-up report made, and submitted to the Dam Engineering Center.
2. After the Technical Meeting's suggestions have been followed up and the follow-up report has been received and reviewed by the Dam Engineering Center, the discussion will be continued in the next Technical Discussion, it should be ensured that all experts can attend.

MINUTES OF TECHNICAL DISCUSSION OF THE DAM SAFETY COMMISSION DISCUSSION OF CONSTRUCTION IMPLEMENTATION IN THE FRAMEWORK OF CHANGING THE DESIGN OF THE BAGONG DAM, TRENGGALEK REGENCY, EAST JAVA PROVINCE

Day/Date	:	Tuesday, September 10, 2024
Time	:	09.00 WIB – Finish
Place	:	Sermo Room, Dam Hall Building, Jl. Sapta Taruna Raya Public Works Complex Friday Market,
Program	:	Discussion on the Implementation of Bagong Dam Construction, Trenggalek Regency, East Java Province

I. The discussion was attended by:→ (Attendance list attached)

II.Conclusion and Suggestions:

A. General

The Bagong Dam is being built on the Bagong River, Sumurup Village and Sengon Village, Bendungan District, Trenggalek Regency, East Java Province. The dam type is a zonal rockfill with a vertical core. The dam's height from the bottom of the deepest foundation excavation is 80 m, the elevation of the dam peak is +330 meters above sea level, the width of the dam peak is 12 m and the length of the dam peak is 667 m. The total reservoir volume is 17.40 million m3. The benefits of the Bagong Dam are to reduce the flood discharge of the Bagong River at a discharge of 203.92 m3/sec (Q25), the provision of raw water of 153 l/sec, and the provision of irrigation water for an area of 857 Ha, as well as a tourist destination.

The initiator of the construction of the Bagong Dam is the Brantas River Basin Center, with the following service providers:

1. Planning Consultant: PT. Mettana Engineering Consultant
2. Implementing Contractor:
   - Package I : KSO. PT. Brantas Abipraya (Persero) – PT. SAC Nusantara (main access road and dam construction work)
   - Package II : KSO. PT. PP (Persero) – PT. Jatiwangi (construction work of OP road, diversion building, spillway building, intake building, hydromechanical equipment and facility building)
3. Supervision Consultant: PT. Rayakonsult – PT. BSI – PT. CEC (KSO)

Bagong Dam has obtained two dam safety permits from the Minister of Public Works and Public Housing, namely Design Approval Number: SA.04.03-Mn/2327 and Construction Implementation Permit Number: SA.04.03-Mn/2328 dated December 6, 2019.

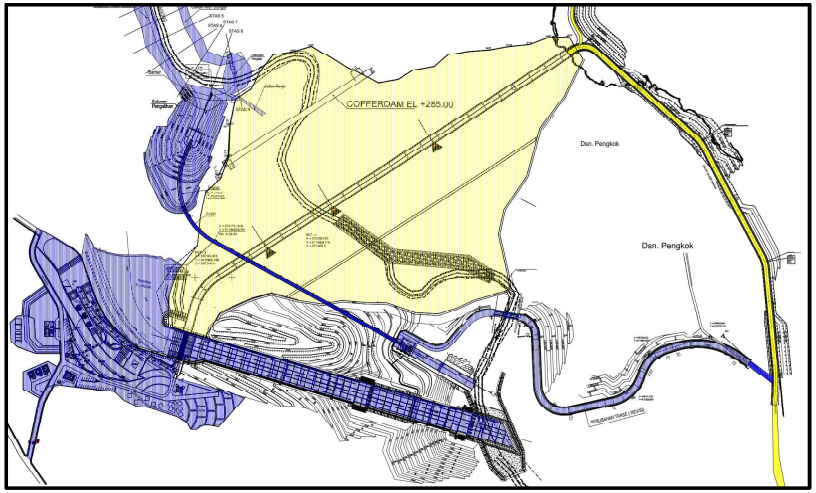


Figure 1. Layout Plan of Bagong Dam

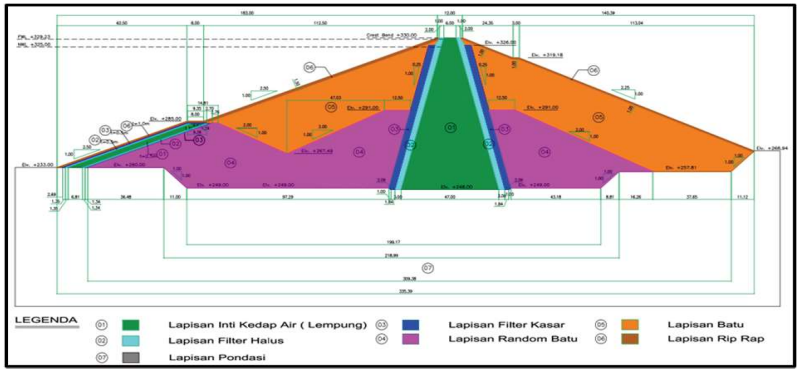


Figure 2. Cross-section of Bagong Dam Body

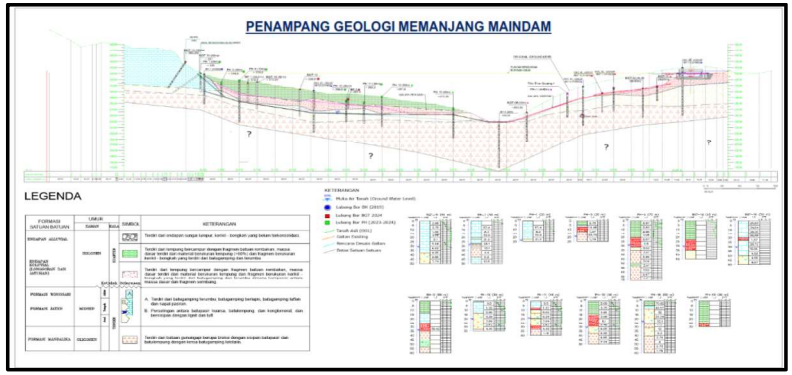


Figure 3. Longitudinal Geological Cross Section of Bagong Dam

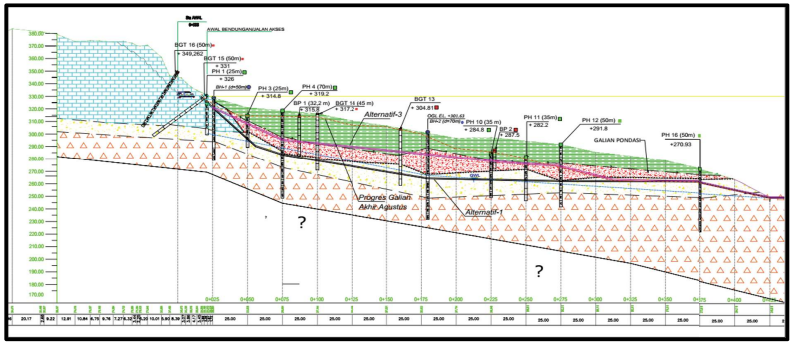


Figure 4. Longitudinal Geological Cross Section of the Left Abutment of Bagong Dam

During the implementation of dam construction, the geological conditions of the left abutment of the dam were found to be in the form of a colluvial layer that was much thicker than the design estimate, namely with the deepest layer ranging from 25-35 m from the original ground level (OGL) to reaching the hard rock layer, so it was necessary to make changes to the excavation design and repair the foundation.

On September 10, 2024, a Dam Safety Commission Technical Discussion was held to discuss changes to the design of the left abutment of the dam, which resulted in the suggestions and conclusions as described below.

B. Geology and Engineering Geology

1. As conveyed by the consultant on the engineering geological map of Bagong Dam, the left abutment is colluvial but on the map it appears to be rock class D. Rock class D and colluvial have different engineering properties. If the rock class is colluvial, it should be included in the Colluvial (Col) class in the engineering geological map depiction.

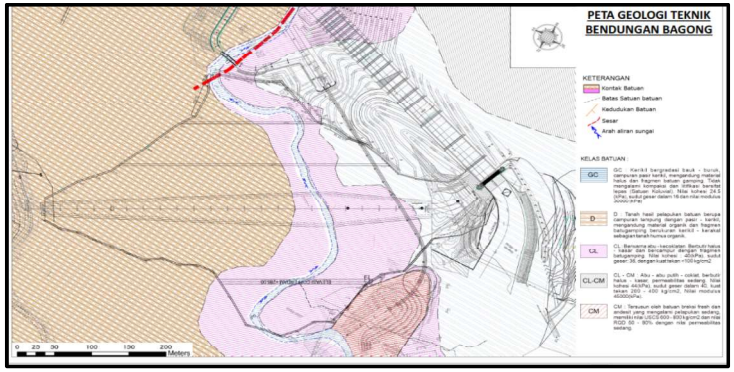


Figure 5. Engineering geological map of Bagong Dam

2. The excavation of the foundation slope is carried out with a slope of the excavation slope designed at 1:1.5 with the target of the core zone foundation reaching the top of the bedrock. The consultant should consider the following suggestions:

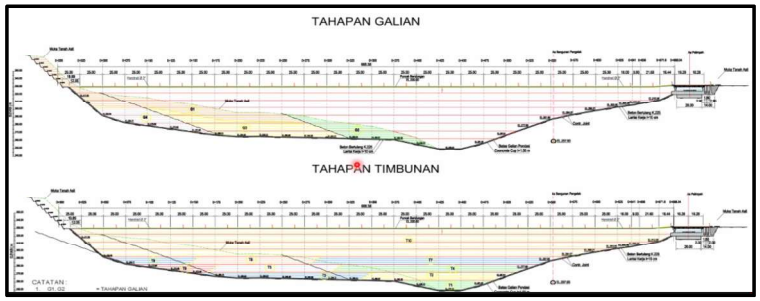


Figure 6. Excavation and Backfilling Method

   a. Because colluvial material has a low friction angle, when the colluvial has been excavated, it should be immediately backfilled to prevent landslides in the excavation area.
   b. If a potential landslide is found on the slope of the foundation excavation during excavation, mitigation measures should be taken immediately to anticipate the landslide.
   c. The flow plan for the deep excavation implementation method, including equipment resources, supplies, and risk management, should be re-assured regarding excavation readiness so that the backfilling is not hampered.
3. When the excavation of colluvial material located in the left abutment foundation of the dam is completed, the consultant recommends grouting to strengthen the foundation's bearing capacity. Consider strengthening the dam foundation with tube and manchette-type grouting.

4. It is reported that land has been cleared in the borrow area, but residents still live there. The consultant should be able to coordinate with the local government regarding the relocation of residents in the borrow area so that construction work can run smoothly.

C. Technical Analysis

1. Based on the excavation stability analysis results on the left support, it has a FK value > 1.20 and has met the required FK. However, in the MDE earthquake conditions that have not met the minimum FK, a permanent transfer analysis should be carried out so that the deformation amount does not exceed ½ of the guard height at the Flood Water Level (Makdisi-Seed, 1978).

D. Conclusion

1. Suggestions and input in technical discussions should be followed up immediately and then submitted to the Dam Engineering Center to be discussed with the Dam Safety Commission as soon as possible.
2. For alternative designs for excavation and foundation repair, whether already carried out or not, a matrix should be created that completely and clearly contains the problems, their handling, effectiveness, cost-benefit, and hazard mitigation, as well as the possibility of implementation with the remaining time available and the obstacles to dam safety.

Minutes of Meeting
PRA-PLENARY DISCUSSION
LAUSIMEME DAM

Day / Date : Thursday, 17th September 2024
Location : Lausimeme Dam
Time : 09.00 WIB – Finished
Event : Plenary Discussion of Impounding

General Information

- **Construction Progress**: 94.95% complete (embankment has reached the crest dam).
- **Land Acquisition**: 85% remaining to be resolved.

Discussion Points

1. **Instrumentation Monitoring During Impounding**
   - The current impounding plan lacks intervals to monitor instrumentation.
   - Water control post-plugging relies solely on the bottom outlet, where inflow and outflow capacities are similar.
2. **Weak Zone Instrumentation**
   - Additional instruments are being installed at weak zone locations.
   - Priority is given to areas outside the embankment for faster completion.
   - Monitoring instruments must be operational during impounding, as water levels rise by 3 meters/day.
3. **Landslide Risk Assessment**
   - Additional investigation was conducted at potential landslide zones.
   - Drilling results indicate relatively stable rock conditions.
4. **Impounding Date Submission**
   - After comparing potential dates, only one final impounding date will be proposed to KKB.
5. **Plan B for Impounding**
   - A backup plan (Plan B) for the impounding process must be developed.
6. **Detailed Plugging Plan**
   - The plugging plan requires further detailing, including complete data.
7. **Water Level and Related Data**
   - Rising water levels and other related data issues need to be clarified.
8. **BBWS Schedule**
   - The impounding schedule is pending confirmation from BBWS.
9. **Hoist Capacity Trial**
   - A trial must be conducted to verify the capacity of the hoist system.
10. **Wet Test Considerations**
    - Concerns were raised regarding the gate's ability to handle the current load during the wet test.
11. **Inauguration Postponement**
    - It was advised not to proceed with the inauguration planned for 20th September 2024.
12. **Hydrology Condition Update**

    - Hydrological data updates are required, including discharge rates and impounding conditions.
13. **Data Inconsistencies**
    - Several data inconsistencies need resolution to ensure accuracy.
14. **Weak Zone and Landslide Discussions**
    - Additional discussions are required for upstream/downstream weak zones and landslide risks.
15. **Completion of Hydromechanical Works**
    - Finalization of hydromechanical components is critical for impounding readiness.
16. **Overall Schedule Finalization**
    - The final overall project schedule is awaited for execution.

Action Items

- Develop a **Plan B** for the impounding process.
- Enhance and complete data for the **plugging plan**.
- Resolve issues with **water level data**.
- Await confirmation of the impounding schedule from **BBWS**.
- Conduct a **hoist capacity trial**.
- Reassess parameters for the **wet test**.
- Postpone the inauguration event scheduled for **20th September 2024**.
- Update hydrological data to support impounding preparation.
- Review and resolve **data inconsistencies**.
- Conduct discussions on **weak zones** and **landslide risks**.
- Complete all **hydromechanical works**.
- Finalize and confirm the **overall project schedule**.

Minutes of Meeting

PLENARY DISCUSSION
KEUREUTO DAM IMPOUNDING

Day / Date : Friday, 20th September 2024
Location : Balai Teknik Bendungan
Time : 09:00 WIB – Finished
Event : Plenary Discussion of Impounding

General

- The construction progress of Keureuto Dam has reached **96.0%**.

Discussion Points

1. **Data Integration**
    - Construction of the Keureuto Dam involves **two separate packages**, resulting in incomplete data recapitulation.
    - **Communicating with the directors or PPK** was suggested to obtain data from the completed package.
2. **Permeability Graph**
    - Some data in the permeability graph **do not meet specifications**.
    - Consultants should analyze and integrate all existing data to ensure **dam safety conclusions**.
3. **Sample Review**
    - Certain samples taken during construction **do not meet technical qualifications**.
    - A review is needed to determine:
        - **Number of non-qualifying samples**.
        - **Condition of surrounding materials**.
4. **Monitoring Equipment**
    - **Open Stand Pipe (OSP)** has been installed alongside the **Vibrating Wire Piezometer (VWP)**.
    - Graphs from both tools should be compared for enhanced control and validation.
5. **Multilayer Settlement**
    - The multilayer settlement graph shows a **downward trend** without any signs of leveling off.
    - Consultants are required to provide a detailed explanation of this phenomenon.
6. **Core Material Elasticity and Settlement**
    - The core material remains **elastic**, with **minimal differential settlement** observed.
    - However, the **chamber thickness** related to total settlement post-construction has not been calculated.
    - This figure must be determined **before impounding**.
7. **Inclinometer 3 Issue**
    - **Inclinometer 3** broke during installation, with the breakage likely near the foundation.

- This information should be documented in the report and included in **future inspections for up to 3 years**.

8. **Installation of Monitoring Instruments**
   - All **dam monitoring instruments** must be installed **before impounding**.
9. **Dam Stability Analysis**
   - A **stability analysis** using a model with impounded water must be prepared and presented.

Key Action Items

1. **Data Collection and Integration**
   - Ensure all data from both construction packages is compiled and reviewed.
2. **Safety and Permeability Analysis**
   - Conduct a thorough evaluation of permeability data to assess dam safety.
3. **Instrument Comparisons**
   - Compare OSP and VWP results for consistency and accuracy.
4. **Settlement and Chamber Thickness**
   - Calculate the total chamber thickness and settlement figures prior to impounding.
5. **Documentation for Inclinometer 3**
   - Record inclinometer issues in detail for use in future inspections.
6. **Final Instrumentation Installation**
   - Confirm that all instruments are operational before impounding begins.
7. **Present Stability Analysis**
   - Submit a comprehensive dam stability model with impounded water for review.

Minutes of Meeting
Pra-Plenary Discussion on Impounding Readiness for Rukoh Dam

Date : Tuesday, 24th September 2024
Location : Balai Teknik Bendungan (BTB)
Time : 09:00 WIB – Finished

General

1. **Main Dam Work Progress**:
   - Riprap work remains to be completed.
   - The embankment for the dam core still has approximately 9 meters to go.
   - Overall physical work completion stands at 92.59%.
2. **Inauguration**:
   - The inauguration date of the Rukoh Dam has not yet been set, but it is likely to occur before the end of October.

Discussion Points

1. **Spillway Capacity**:
   - It was discussed that the spillway should not be smaller than 1/3 of the inflow capacity (SNI) to ensure dam safety.
   - If the spillway is smaller than 1/3, further clarification is required to confirm that this condition will not endanger the dam.
2. **Drawing Error**:
   - The spillway location shows a drag fault, not a syncline as indicated in the drawings. This needs to be corrected.
3. **Spillway Condition**:
   - Based on discussions with KKB, the spillway is 1/3 smaller than the inflow capacity. However, it was concluded that this does not compromise the safety of the dam.
4. **Construction Material Samples**:
   - All material samples met the required construction specifications.
   - Conclusions on the material properties under existing conditions should be included for review by the dam management unit.
5. **Embankment Testing**:
   - For embankment samples, it is recommended to use the highest sigma 3 during testing.
   - This differs from natural soil testing where sigma 3 follows the sample depth.
6. **Dam Instrumentation**:
   - Three VWP devices are damaged, and Inclino 1 and SMA are not ready for the field.
   - These instruments are crucial for monitoring during impounding and need to be operational.
7. **Inclinometer Calibration**:
   - Calibration results for the inclinometer should be compared with the probe specifications.
   - If the comparison shows a significant difference, the probe should be replaced due to poor quality.
8. **Piezometer Issues**:

- A broken piezometer was found at PF-1 (foundation), and PE-1 and PE-2 in the embankment.
- If PF-3 data remains aligned, it can substitute for PF-1.
- For PE-1 and PE-2, replacement is not necessary if they still show the contour pattern accurately, given the difficulty of drilling in rockfill and embankment areas.

9. **Pore Water Pressure Image**:
   - The presented pore water pressure image shows incorrect contour patterns.
   - It is necessary to check and correct the contour accuracy before finalizing the report.

Action Items:

1. Correct the spillway drawing error and provide clarification on the spillway capacity.
2. Ensure the damaged instrumentation is repaired and ready for impounding.
3. Review and update material sample properties for dam management unit.
4. Verify the accuracy of the pore water pressure contours.

Minutes of Meeting
PRA PLENARY DISCUSSION
MENINTING DAM

Day / Date : Wednesday, 25th September 2024
Location : Balai Teknik Bendungan
Time : 09.00 WIB – Finished
Event : Pra-Plenary Discussion of Impounding

General Discussion:

1. **Physical Work Progress:**
   The total physical work of the Meninting Dam has reached 91.4%, leaving only the main dam and the diversion work. All other tasks have been completed.

Discussion Points:

1. **Trash Boom Anchor:** The trash boom anchor is installed on the slope. The strength of the anchor should be considered in relation to the slope's safety.
2. **Intake Location and Fan Pipe:** The fan pipe at the intake location does not extend outside. When the dam water level rises, the water inside the intake can also rise, potentially submerging the stairs inside the intake. To prevent this issue, the fan pipe must be extended outside.
3. **Intake Shaft Safety:** The Meninting Dam uses an intake shaft, which is relatively safe from uplift. Unlike free-standing intakes in other dams that experience deformation due to uplift, the intake shaft is stable.
4. **Seismograph Installation:** Only one seismograph is installed, making it impossible to determine the exact location of an earthquake. It is recommended that more seismographs be installed or that resources be reallocated to other instruments.
5. **Discontinuity Zone Between Breccia:** The location between laharic and volcanic breccia is a discontinuity zone. At least one OSP (Observation Slope Point) should be installed at both the upstream and downstream limits of the foundation and embankment. Additionally, in the upstream random section, only one piezometer is installed. Installing two piezometers to better measure pore pressure during drawdown, if possible, is recommended before impounding.
6. **Core Material Shortage (Zone 1):** There is a shortage of core material for Zone 1, with only 5,000 m^3 available, while 88,000 m^3 is still needed. To address this, material will be sourced from two locations outside the reservoir, but only one location (Murpeji) is currently usable.
7. **Murpeji and Mekarsari Locations:** The Murpeji location can provide the required core material. The Mekarsari location is still in process. Given that Murpeji's reserves are insufficient to meet the embankment requirements, it is essential to ensure that the Mekarsari location is cleared in time for impounding, which is scheduled for next month. Additionally, the results of material property tests should be presented to confirm the quality of the embankment.

Action Points:

- Evaluate and ensure the safety of the trash boom anchor against slope instability.
- Extend the fan pipe at the intake to prevent submerging the stairs inside the intake.
- Review the effectiveness of the single seismograph and consider reallocating resources.
- Install OSPs at the boundary of the discontinuity zone and additional piezometers in the upstream random section.
- Secure the necessary core material by utilizing the Murpeji location and ensure the Mekarsari location is cleared for material extraction.
- Present material properties testing results to ensure the quality of the embankment.

Meeting Adjourned:
The meeting concluded after all issues were discussed and action items were assigned for follow-up.

Minutes of Meeting
PRA PLENARY DISCUSSION
SIDAN DAM

Day / Date : Thursday, 26th September 2024
Location : Balai Teknik Bendungan
Time : 09.00 WIB – Finished
Event : Pra-plenary Discussion

General Discussion:

1. **Impounding Schedule:**
   The impounding is scheduled for October 2, 2024.
2. **Dam Embankment:**
   The embankment work is complete except for the concrete block riprap.
3. **Riprap Status:**
   The riprap is ready up to the main cover dam for impounding on October 2, 2024.
4. **Clearing Inundation:**
   Clearing the inundation is still ongoing due to the steep topography in the area.

Dam Issues:

1. **Closure Gate Opening Plan:**
   The consultant recommends not opening the closure gate manually during impounding. Instead, an electric hoist accessible from above should be used. There is no option to reopen the closure gate in emergency conditions, and the situation will mimic the emergency measures taken at Tamblang Dam. It is important to note that Tamblang is a rockfill dam, while Sidan is a different type of dam.
2. **Asphalt Core and Grouting Requirements:**
   The asphalt core should be 28 days old, and grouting should be 56 days before impounding.
3. **Random Zone Material Stability:**
   The material in the random zone has low cohesion, so Atterberg tests cannot be conducted. For stability analysis, it is recommended that this material be given a value of 0.
4. **Pore Water Pressure Analysis:**
   Piezometer readings indicate negative values, which only show the sensitivity of the measurement tool. The positive values represent pore water pressure, and the actual pressure lies between the negative and positive readings.
5. **Uplift Pressure and D-wall Depth:**
   Pressure analysis shows uplift occurring across a wide zone. Significant pressure is observed at the end of the D-wall, suggesting the D-wall may not be deep enough.
6. **Grouting Effectiveness**
   The grouting did not reach 2/3 of the height, and high lugeon materials dominated the area. Seepage around the D-wall is possible.
7. **Stability Analysis and Direct Shear Test:**
   Replacing the stability analysis parameters with Zone 3 parameters resulted in a Factor of Safety (FK) of less than 1.2. It is recommended to conduct a direct shear test is recommended.
8. **Material in Random Zone:**
   The random zone contains silt material that may still have a cohesion (C) value. To be more conservative, it is recommended to consider the worst-case scenario and add counterweights.
9. **Deformation in Shield Zone:**
10. Significant deformation is observed in the shield zone, as indicated by inclinometer readings. There is a possibility of pulling the asphalt concrete. It is necessary to reassess whether the asphalt concrete can withstand such deformation, particularly in the event of an earthquake.
11. **Ineffective D-wall/Grouting and Uplift Risk:**

There are indications of ineffective D-wall/grouting, which could lead to potential uplift.

Action Points:

- Finalize the impounding preparation, especially regarding riprap and clearing the inundation area.
- Reassess the closure gate opening plan and implement the recommended electric hoist.
- Ensure that the asphalt core and grouting are given enough time to cure before impounding.
- Conduct further analysis of the random zone material, especially its stability.
- Address the D-wall and grouting effectiveness, ensuring proper depth and seepage control.
- Conduct a direct shear test to ensure the stability of the dam.
- Monitor deformation in the shield zone and reassess the capability of asphalt concrete under seismic conditions.

Meeting Adjourned:
The meeting concluded after all points were discussed and action items were noted for follow-up.

Minutes of Meeting
PRA PLENO DISCUSSION
TAMBLANG DAM

Day / Date : Friday, 27th September 2024
Location : Balai Teknik Bendungan
Time : 08.30 WIB – Finished
Event : Technical Discussion of Impounding

General Discussion:

1. **Initial Impounding Leak:** During the initial impounding, a leak occurred at the abutment and v-notch, with a flow rate of 1.1 m^3/s. This was subsequently addressed by adding a D-wall and performing manchette grouting.
2. **Previous Discussion on Seepage Sources:** Three hypotheses were discussed regarding the source of seepage:
    - Originating from the left and right backrests, where the left backrest has an old cave.
    - Damage to the core of the dam body.
    - Originating from the foundation-plinth-asphalt connection.

Dam Issues:

1. **Piezometer Observation:** During the first impounding, the piezometer installed in the foundation showed good results. In the central section of the dam, the piezometer embankment locations were close together, indicating a relationship between them.
2. **Inclinometer Observation:** The inclinometer revealed significant deformation for a rockfill-type dam. The concern raised was whether the asphalt core could withstand the deformation caused by the rockfill. Further investigation is needed to determine whether the inclinometer readings began at elevation 168-171, where seepage was observed.
3. **Comparison Requirement:** To ensure the accuracy of findings, it was suggested to conduct an 'apple-to-apple' comparison, ensuring equal comparison of all aspects before and after the comparison.
4. **Flood Event and Leak Visibility:** In March 2024, after the D-wall and grouting addition, there was a flood reaching elevation +175 (above the seepage location at 168-171). Visually, no leaks were observed on the left and right sides of the dam, but seepage was still present in the dam body.
5. **Reservoir Water Level Rise Test:** It is recommended to conduct a test by raising the water level in the reservoir to identify specific locations of seepage and to measure the amount of discharge.

Action Points:

- Monitor and evaluate the effectiveness of the D-wall and grouting.
- Conduct a reservoir water level rise test to identify seepage points and discharge rates.

- Continue to assess the dam body's integrity, especially concerning the asphalt core and the potential effects of rockfill deformation.
- Ensure thorough comparisons before and after impounding and deformation assessments.

Meeting Adjourned:
The meeting concluded after all points were discussed, with follow-up actions assigned.

Minutes of Meeting
TECHNICAL DISCUSSION
CONSTRUCTION OF BUDONG BUDONG DAM

Day / Date : Friday, 4th October 2024
Location : Balai Teknik Bendungan
Time : 09.00 WIB – Finished
Event : Construction of Budong Budong Dam

General Discussion:

1. **Foundation Alluvium:** The foundation of the Budong Budong Dam consists of thick alluvium. There are plans to excavate some of the alluvium, but due to potential issues during grouting, the core, and filter will be excavated until reaching bedrock, while the shoulder will leave the alluvium in place.

Issues:

1. **Design and Alluvial Compaction:** The existing design, which places filters and cores on bedrock foundations, is satisfactory. However, at locations where alluvial remains, compaction should be conducted first before embankment work begins.
2. **Liquefaction Concerns:** It is essential to ensure that liquefaction does not occur in areas with alluvial foundations.
3. **Upstream Cofferdam Concerns:** The core layer is placed on bedrock in the upstream cofferdam. Careful attention must be paid to the backfilling process, as it may be difficult due to the alluvial conditions, which allow water to pass and contain large boulders.
4. **Right Backrest Slope:** The slope condition of the right backrest matches the slope of the embankment. Cutting overburden in this area could lead to potential landslides.
5. **Alluvial Parameters for Safety:** Alluvial parameters must be confirmed to ensure the safety of the dam, and stability conditions need to be assessed to confirm their safety.
6. **Alluvial Conditions Confirmation:** The alluvial conditions must be confirmed before proceeding with any engineering design. Large boulders could present obstacles during construction, potentially delaying the project.
7. **Water Obstacles During Excavation:** Water issues are a significant obstacle during excavation. Water sources, conditions, and groundwater contours must be described and confirmed beforehand to ensure appropriate handling measures are in place.

Action Points:

- Confirm alluvial conditions and ensure proper compaction before proceeding with embankment work.
- Address liquefaction risks at alluvial foundation sites.
- Review backfilling strategies for upstream cofferdam, considering the presence of large boulders and water-permeable alluvial material.
- Monitor the stability of the right backrest slope and assess potential risks of landslides if overburden is cut.

- Confirm alluvial parameters to ensure dam safety and stability.
- Address water-related challenges during excavation by confirming water conditions and contours in advance.

Meeting Adjourned: The meeting concluded after all points were discussed, with follow-up actions assigned.

Minutes of Meeting
PLENARY DISCUSSION
JLANTAH DAM

Day / Date : Monday, 7th October 2024
Location : Balai Teknik Bendungan
Time : 09.00 WIB – Finished
Event : Plenary Impounding

General Discussion:

1. **Project Progress:** The total work has reached 92%, with 11 meters remaining to reach the planned height of the dam. Impounding cannot proceed until the dam body is completed, as all materials for the dam body are located upstream in the reservoir area.

Dam Issues:

1. **Observation Wells:** Observation wells that were recommended to be installed should be completed and installed before impounding.
2. **SMA Installation:** SMA (Structural Monitoring and Assessment) is not yet installed in the field. It should be installed and functioning properly by the time impounding takes place.
3. **OW Standard Compliance:** The OW (Observation Well) standard should be aligned with the design requirements following ICOLD (International Commission on Large Dams).
4. **Concerns Over Leakage:** Potential leakage between two different types of pipe connections is a concern. To mitigate this risk, it is recommended that the same type of material be used for both connections.
5. **Absence of Bottom Outlet:** Since the Jlantah Dam's design does not include a bottom outlet, measures should be taken to anticipate the need for rapid water lowering in emergency situations.
6. **Irrigation Network Discrepancy:** There is a discrepancy regarding the use of the irrigation network. A review should be conducted to determine when the irrigation network will be completed and how it will be utilized.

Action Points:

- Install observation wells before proceeding with impounding.
- Ensure that SMA is installed and functioning properly by the time impounding occurs.
- Align OW standards with ICOLD guidelines.
- Use the same material for pipe connections to avoid leakage.
- Develop anticipatory measures for rapid water lowering, as there is no bottom outlet.
- Review and confirm the status of the irrigation network and its intended use.

Meeting Adjourned: The meeting concluded after addressing all discussed issues, and follow-up actions were assigned.

Minutes of Meeting
PLENARY DISCUSSION
RUKOH DAM

Day / Date : Tuesday, 8th October 2024
Location : Balai Teknik Bendungan
Time : 09.00 WIB – Finished
Event : Plenary Impounding

General Discussion:

Project Progress: The total physical work completed at Rukoh Dam has reached 93.3%. For the main dam, in general, all zones are finished (only lacking finishing touches). The riprap zone is about 46% complete.

Dam Issues:

1. **Land Acquisition:** One obstacle is land acquisition. Some inundation areas are still pending land release, but it is expected to be completed by October as it only awaits payment.
2. **Intake Bridge Support:** The location of the intake bridge does not have support. The strength of the building structure, including its performance under seismic conditions, should be clarified.
3. **Geophysical Testing:** Geophysical testing is interpretive and may reveal discrepancies with the actual conditions. It is recommended that geophysical test results not be used as the sole reference but be cross-checked with drilling results.
4. **Data Discrepancies:** If any data discrepancies are found, it is necessary to analyze why this happened before concluding that the data is wrong or inaccurate.
5. **Instrumentation Installation:** The installation of damaged instrumentation (piezometer) should be completed before impounding, as carrying out this task after impounding may result in greater risks.
6. **Additional Piezometer Near Spillway:** An additional piezometer is to be installed on the right backrest near the spillway. The consultant should clearly explain the reasons and benefits for adding a piezometer in this location.
7. **Water Supplementation from Tiro Weir:** The Rukoh Dam will be supplemented by water from the Tiro weir. Since the Tiro weir also has downstream flow requirements, it should be ensured in calculations that the water entering the Rukoh Dam is the remaining water from the Tiro weir, to prevent any complaints from the community regarding water usage.

Action Points:

- Complete land acquisition by October and ensure payment is processed.
- Clarify the structural strength of the intake bridge, especially regarding earthquake conditions.
- Cross-check geophysical test results with drilling data.
- Analyze and investigate discrepancies in data before drawing conclusions.
- Complete the installation of damaged instrumentation (piezometer) before impounding.
- Provide an explanation for the installation of additional piezometers near the spillway.
- Ensure calculations for water supplementation from the Tiro weir take into account its downstream needs.

Meeting Adjourned: The meeting concluded with all key issues addressed, and follow-up actions assigned.

Minutes of Meeting
PLENARY DISCUSSION
SIDAN DAM

Day / Date: Wednesday, 9th October 2024
Location: Balai Teknik Bendungan
Time: 09.00 WIB – Finished
Event: Plenary Discussion

General Discussion:

Project Progress: The construction of the Sidan Dam has reached 92.6% of the total physical work, and for the main dam, the crest has been reached. Only the final layer of asphalt remains to be completed.

Dam Issues:

1. **Hydrological and Topographical Conditions:** The hydrological and topographical conditions cannot be changed, and it is unavoidable that mitigation measures must be prepared if an undesirable event occurs. The consultant explained that one plan is not to conduct full plugging at the intake elevation initially. Plugging will be carried out gradually until the dam is declared safe.
2. **Cohesion of Material in Zone 4 (Random Zone):** Additional test results for the cohesion of materials in Zone 4 (random zone) have shown that all samples possess cohesion values. The consultant has selected the smallest cohesion value from these results for stability analysis.
3. **Potential Uplift and Horizontal Drain Analysis:** There is potential for uplift at the Sidan Dam because the grouting depth does not reach 2/3 of the dam height. The consultant mentioned that a horizontal drain is in place to release pressure. However, the consultant should also analyze the potential clogging of this horizontal drain and explore ways to reduce the risk of clogging.
4. **Specification for Asphalt Concrete:** The consultant reported that there is no definite standard for bounding material in asphalt concrete. As there is no fixed standard, the consultant should create a separate specification, including drawings and photos, to serve as a manual for asphalt concrete.
5. **Handling of Asphalt Disposal:** During the implementation of asphalt concrete, temporary asphalt disposal is being collected in the project area. The disposal of asphalt should be properly managed and handled to avoid any environmental or operational issues.

Action Points:

- Prepare mitigation measures for potential hydrological and topographical issues and ensure gradual plugging until the dam is safe.
- Use the smallest cohesion value for stability analysis and continue monitoring the material behavior in Zone 4.
- Conduct a detailed analysis of the horizontal drain's potential for clogging and implement measures to prevent it.
- Develop a specification for asphalt concrete, complete with drawings and photos, to create a manual.
- Manage and handle the disposal of asphalt to ensure it does not cause any environmental or project-related issues.

Meeting Adjourned: The meeting concluded with a summary of action points and responsibilities assigned to the consultant.

Minutes of Meeting
TECHNICAL DISCUSSION
WAY APU DAM

Day / Date : Friday, 18th October 2024
Location : Balai Teknik Bendungan
Time : 09.00 WIB – Finished
Event : Discussion of Impounding

General Discussion:

- The current progress of the Way Apu Dam work is focused on excavation at the dam foundation. Due to the presence of highly porous alluvial river deposits, dewatering has become an issue. The consultant plans to reduce excavation, but the foundation seat remains on sufficient rock (elevation +32 m), which is adequate for the dam core and filter materials.

Discussion Points:

1. **Foundation Modulus from PMT Test:** The PMT test shows that the rock quality is good, with the modulus reaching 10,000. Therefore, the foundation at the location (elevation +32 m) is considered sufficient, but a visual inspection is necessary.
2. **Elastic Modulus of Foundation:** The consultant concluded that the foundation's elastic modulus is 144 MPa. The client requested that the consultant explain the origin of this value.
3. **Ripper Test Proposal:** To assess the foundation material further, a ripper test using the D8 machine was proposed.
4. **Flow Barrier Construction:**
    - The upstream part of the flow barrier will utilize a clay liner.
    - The downstream part will use a secant pile.
5. **Long-Term Assessment of Foundation Condition:** A study should be prepared to evaluate the long-term potential conditions of the foundation, as there may be a risk of weakening over time.
6. **Dam Stability Analysis:** The analysis for dam stability was noted to be unusual and should be reviewed and re-examined to ensure accuracy.

Action Points:

- The consultant needs to provide a detailed explanation of the origin of the 144 MPa elastic modulus value.
- The proposed ripper test with the D8 machine should be planned and conducted.
- Further monitoring and visual inspection of the foundation at elevation +32 m are necessary.
- Prepare an assessment of the long-term stability of the foundation to address potential weakening.
- The dam stability analysis should be re-examined and revised as necessary.

Meeting Adjourned: The meeting concluded with assignments for further analysis and clarification on certain aspects of the project.

Minutes of Meeting
Technical DISCUSSION
MARANGKAYU DAM

Day / Date : Monday, 21st October 2024
Location : Balai Teknik Bendungan
Time : 09.00 WIB – Finished
Event : Pra-Plenary Discussion of Impounding

General Discussion:

- The impounding of Marangkayu Dam is planned for **November 12, 2024**.

Discussion Points:

1. **Correction of Geological Cross-Section:**
    - The geological cross-section needs to be corrected, as the selected geological boundaries follow the end of drilling and may not accurately reflect the actual conditions.
2. **Clarification on PVD:**
    - The explanation of the Prefabricated Vertical Drains (PVD) should be clarified, especially regarding the effects before and after their installation. The consultant has not yet provided an explanation on the percentage of settlement that has occurred post-installation.
3. **Vibrating Wire Anomaly:**
    - The vibrating wire installed in 2019 is showing anomalous values. It should be rechecked and studied. It is important to ensure that a baseline is established before and after impounding to track any significant changes.
4. **Settlement Measurement:**
    - As there is no specialized tool to measure settlement, it is recommended that settlement be measured using the existing shear stakes (monument) that are available.
5. **Phreatic Levels and Simulations:**
    - Given the high phreatic values from OSP readings, simulations should be conducted at high water levels, at least at the normal water level (MAN), to better understand the impact.
6. **Gate Operation Method:**
    - It is advised to use a single method for gate operations. The team should reconsider the advantages and disadvantages of using either HMS or high crush, but ultimately, they should decide on one method to avoid confusion and inconsistency.
7. **Pielscale and Sediment Sampling:**
    - Pielscale and sediment samples should be taken from the same location to ensure consistency and accuracy in the data.

Action Points:

- Re-correct the geological cross-section with accurate boundaries.
- Clarify the PVD explanation and provide details on the percentage of settlement.
- Recheck the vibrating wire data and establish a baseline before and after impounding.
- Continue settlement measurements using shear stakes.
- Conduct simulations at high water levels (MAN) for more accurate results.
- Decide on one method for gate operation (either HMS or high crash) and standardize its usage.
- Ensure that pielscale and sediment samples are taken from the same location.

Meeting Adjourned: The meeting concluded with assigned actions and clarifications to be addressed before the impounding event on November 12, 2024.

Minutes of Meeting
Technical DISCUSSION
KUWIL KAWANGKOAN DAM

Day / Date: Wednesday, 30th October 2024
Location: Balai Teknik Bendungan
Time: 09.00 WIB – Finished
Event: Technical Discussion of Impounding

General Discussion:

- The impounding for **Kuwil Kawangkoan Dam** is scheduled for **November 12, 2024**.

Discussion Points:

1. **Wood Log Debris and Trash Boom:**
   - If wood log debris continues to enter the reservoir, it will still damage the trash boom once it is repaired. If a lock boom is added, it should be directed to the doorless waste.
2. **Protection on Downstream Slope:**
   - The detailed drawings for protection on the dam's downstream slope, in the form of grass thickets, need to be re-examined to ensure consistency with the actual conditions in the field.
3. **Backwater Effects and Weakening at Downstream Toe:**
   - Due to backwater at the downstream toe of the dam, there is a potential weakening plane that could affect the dam's safety. A plan of action should be developed to address this, and drainage should possibly be considered before entering the V-notch.
4. **Seepage in Diversion Tunnel:**
   - There is significant seepage at the construction joints in the diversion tunnel. A drainage channel and sump pit are planned to mitigate this issue.
5. **Aquifer Discrepancy:**
   - The drawings and the actual conditions of the aquifer are inconsistent. If no data is available, the aquifer location must be redrawn and a question mark added.
6. **Piezometer (FP-6) Sudden Increase:**
   - A sudden increase in the piezometer (FP-6) foundation readings was observed. These readings need to be correlated with other instrumentation data. The relief well's capacity to release water should be determined, and pressure levels before and after its installation should be assessed to check if the piezometer can accurately read the changes.
7. **Groundwater Table Contours:**
   - Contours of the groundwater table around the dam need to be drawn for better monitoring.
8. **Inclinometer Data Discrepancy:**
   - Two inclinometers are installed in the dam body. The inclinometer in the core shows downstream deformation, while the embankment inclinometer shows upstream deformation. The data collection process should be reviewed, and the deformation should be rechecked to see if it is still within tolerable limits.
9. **Multilayer Settlement:**

    - The bottom plate in the multilayer settlement is experiencing the highest settlement. This needs to be rechecked for accuracy.
10. **Sedimentation Potential:**
    - There is a significant potential for sedimentation, as the surrounding environment consists of young volcanic deposits.
11. **Hydrological Data and Flood Control:**
    - The hydrological data used should include additional data from the Ponsea station, as the last 10 years of data have been taken from there. Based on the current data, the dam's reservoir function focuses more on flood control, but the inflow can only handle up to a Q2 flood.

Action Points:

- Re-examine the detailed drawings of the downstream slope protection and ensure consistency with field conditions.
- Develop a plan of action to address the potential weakening plane due to backwater at the downstream toe.
- Install a drainage channel and sum pit to address seepage in the diversion tunnel.
- Redraw the aquifer location and add a question mark where data is unavailable.
- Correlate the piezometer data with other instrumentation and assess the relief well's capacity to release water.
- Draw the contours of the groundwater table around the dam.
- Review the inclinometer data and ensure the deformation is within tolerable limits.
- Recheck the multilayer settlement readings, particularly the bottom plate.
- Assess the sedimentation potential in the area surrounding the dam.
- Incorporate additional hydrological data from Ponsea and consider its impact on the dam's flood control capacity.

Meeting Adjourned: The meeting concluded with assigned actions to be completed before the scheduled impounding on **November 12, 2024**.