Environmental and Social Impact Assessment Report (ESIA) – Appendices 11-14

Project Number: 50330-001
February 2018

INO: Rantau Dedap Geothermal Power Project (Phase 2)

Prepared by PT Supreme Energy Rantau Dedap (PT SERD) for Asian Development Bank

PT SERD GEOTHERMAL PLANT BIODIVERSITY ACTION PLAN - V6-16Jan'18

S/N	Phase	Task	Aspect, Potential Impact /Issue	Required Mitigation	Responsible Person For Ensuring Action Implementation	Means Of Verification That Commitment Has Been Met	Monitoring / Inspection / Spot Check Parameters				KPIs
							Timing And Frequency Of Monitoring	Parameters	Location	Reporting Requirements	
1	Pre-Construction	General Planning & Management	All Environmental Aspects	Designate a Site Support Manager (SSM) with responsibility for implementation of the BAP, including oversight corrective action and BAP implementation auditing.	BOD (Board of Directors)	Appointment of Site Support Manager (SSM) that will supervise SHE activities at site prior to commence any work. SSM also acts as Geothermal Technical Head (KTPB) who is responsible for SHE management as regulatory requirement for geothermal operation.	Not applicable	Not applicable	Not applicable	Not applicable	SSM has been appointed in May 2017
2	Pre-Construction	General Planning & Management	All Environmental Aspects	Implement adaptive management measures to review and change (if and where necessary) mitigation measures. All parties involved in the construction and operation phases, (e.g. PT SERD, Contractors and Specialists) have a role to play in suggesting modifications to the EMP. However, overall responsibility for the Management of Change to the BAP will rest with PT SERD's SSM. In addition, the PT SERD SSM shall carry out the Management of Change to the BAP in consultation with the relevant stakeholders. The steps for managing change to the BAP are: 1. Identify and describe unanticipated impacts, ineffective mitigation or changes in the Project construction or operation that require updates to the BAP. 2. Suggest mitigation to manage the identified issues with the Corporate SHE Manager. Concerns/issues could, for example, be highlighted on an ongoing basis through stakeholder engagements with PT SERD or during routine fauna & flora monitoring surveys. 3. Review and update the BAP.	SSM (Site Support Manager), Construction Manager, and Corporate SHE Manager	Records of change management actions undertaken against each incident	Ongoing throughout construction and operation	Required mitigation outlined within this BAP	Required locations as outlined within this BAP	Minutes of any meetings conducted during construction and operation in relation to BAP implementation and corrective actions	Each Management of Change process to be addressed within 4 weeks of incident.
3	Pre-Construction	General Planning & Management	Fauna Mortality	Develop protocols for the management of injured wildlife, which will include: 1. Process of communication to forestry officers of injured wildlife. 2. Recording procedures for injured wildlife/ investigations. 3. Identification of management of change measures necessary to reduce the risk of future events.	Corporate SHE Manager	Corporate SHE Manager to ensure development of protocols	Not applicable	Not applicable	Not applicable	Not applicable	Each injured wildlife encounter to be resolved and closed within 3 days.
4	Pre-Construction	Incident Reporting	Fauna Mortality	Establish an incident reporting mechanism, including database (map, record), to record injured or killed wildlife.	Construction Phase: SSM Operation Phase: Field Manager	Establishment of an incident reporting reponse system and a database to record the number and type of injured/killed wildlife.	Not applicable	Not applicable	Not applicable	Not applicable	All wildlife injuries/mortality attributed to Project actions over Project lifespan is recorded.
5	Pre-Construction	Wildlife Crossing	Connectivity	PT SERD to identify wildlife crossing locations to identify higher risk crossing points along access roads for which targeted mitigation should be implemented. Ensure that there is no direct lighting of wildlife crossings.	Construction Phase: SSM Operation Phase: Field Manager	i) Corporate SHE Manager to ensure that study to identify the needs for temporary crossing is conducted. ii) If temporary crossing is needed, ensure it will be developed and that no light is directed onto the crossing. iii) Wildlife camera trap data / photo records to be collected and analysed monthly	Once during construction Wildlife camera traps will be used on a continuous basis within 1 year of crossing establishment.	Not applicable Wildlife camera trap data / photo records	Across locations identified for wildlife crossings. Deploy camera traps at at landing points and along the length of the wildlife crossing	Fauna monitoring reports Fauna monitoring reports	Identification of locations that need wildlife crossing along access road in 1st semester 2018. if the CH crossing is needed, the crossing will be designed and developed within 1 months after the identification. Use of wildlife crossing by any one of identified CH species triggers within 1 year of crossing establishment.
6	Pre-Construction	Clearance	Connectivity	Assess the need for the installation of artificial crossing (crossing bridge) for endangered arboreal mammals crossing in the Project area, with input from experts on the most appropriate design of arboreal crossing that takes into consideration technical and safety requirements. This requirement is to be confirmed prior to the construction of of site access roads to Wellpads L, M, N and X and injection brine pipeline route.	Corporate SHE Manager, SSM, and Construction Manager	Stakeholder minutes of meeting	Not applicable	Not applicable	Not applicable	Not applicable	See KPI for #3 above. Additional fauna (and flora) study is conducted prior to the construction of new roads to Wellpads L, M, N and X and injection brine pipeline route. Install artificial crossing by end of construction period (if required).
7	Pre-Construction	Clearance	Disturbance & Displacement of Wildlife	Conduct biodiversity surveys for mammal species and flora species of conservation value (including orchids) before construction of new wellpads. Findings are to be communicated with the site team and appropriate actions taken where necessary to minimise impacts.	Corporate SHE Manager Biodiversity experts	Survey reports	At least 2 weeks prior to clearance	Presence/absence, abundance, ecological observations, sex, maturity	At proposed sites for new wellpads	Survey report	Zero injured or dead wildlife attributed to land clearance.
8	Pre-Construction	Clearance	Disturbance & Displacement of Wildlife	Prior to the start of construction at each Project component, ensure that wildlife is shepherded from the Project area into adjacent refuge areas, and that temporary fencing/hoarding is erected around construction areas (if required) to limit access to fauna. Identified wildlife refuge areas during pre-construction and construction activities include: 1. Adjacent Protected Forest areas. Upon detection of any dead or injured animal, SSM and Construction Manager shall be notified and the action suspected to have caused the injury to be suspended. The SSM shall arrange suitably qualified persons to attend to the animal as soon as practicable. An incident should be logged via an incident reporting mechanism. Construction activities shall also proceed with greater caution in the event that any target terrestrial fauna (CH species triggers, in particular large mammals) are encountered within the construction site. Construction staff shall notify the SSM and Construction Manager.	SSM and Construction Manager Contractor	i) Visual inspections of hoarding erection ii) Wildlife shepherding surveys	Daily following erection of fencing/hoardings for each work package Survey in conjunction with shepherding activities Throughout construction and/ or operation (if possible)	Erected fencing/hoardings (as required) 1. Species requiring relocation within the Project component area. 2. Habitat features such as hollow trees, dens, nests and roosts. 3. Record all habitat features observed using a GPS. Large terrestrial CH trigger species such as Malayan Tapir	Work package boundaries Work package area to be cleared Refuge areas	Daily SHE Inspection Reports Wildlife shepherding records	Zero injured or dead wildlife attributed to land clearance.
9	Pre-Construction	Clearance	Disturbance & Displacement of Wildlife	All proposed clearance areas will be marked in the field prior to any vegetation being cleared. The marking can use spray paint or marking tape. A briefing is to occur with personnel to outlined the area proposed for clearing. An inspection is to occur following clearing to determine if clearing has been limited to the identified clearance area. Any clearing outside of the marked area is to be reported to the SSM and Construction Manager.	SSM and Construction Manager Contractor	Clearance briefing attendance records Inspection of cleared areas	During clearance activities	Areas marked for clearance	Work package area to be cleared	Daily SHE Inspection Reports	100% of clearance occurs within marked cleared area.
10	Pre-Construction	Clearance	Disturbance & Displacement of Wildlife	Prior to wildlife shepherding activities, undertake a briefing with all involved personnel so they are aware of their roles and responsibilities; measures to deal with injured wildlife; occupational health and safety requirements; and requirements regarding the prohibition of hunting/catching/taking of fauna and flora. This will include incident reporting measures to relevant forestry authorities and stakeholders, and the reporting of any individual suspected or caught with fauna and flora to the relevant authority. Random inspections of personnel arriving and leaving the Project area can be considered. Refresher training is to occur with new employees.	SSM, Construction Manager	Clearance briefing attendance records	Prior to clearance activities	Number of persons briefed and particulars	Not applicable	6-monthly EMP Implementation Reports	100% of contractors, workers and staff involved in land clearance briefed.
11	Pre-Construction	Clearance	Restoration	Establish a site nursery to cultivate native species on site for use in forest restoration activities. Native seed stock and saplings can be obtained from within the Project area and/or from similar habitat and/or from other nurseries.	SSM	Confirm the presence of site nursery Maintain an inventory of native species cultivated at the nursery.	Establishment of nursery Inventory to be established from inception of site nursery. It should be updated every time a new individual is added and a "stocktake" conducted bi-monthly.	Inventory to include date of arrival of individual to nursery, general location where individual was derived from. Location data can range from spatial coordinates to broader descriptions (eg near Village X or an area with similar habitat) depending on available resources for curation.	Designated nursery area Inventory can be maintained in a spreadsheet format.	6-monthly EMP Implementation Reports	Establishment of 1 on-site nursery prior to clearance phase.
12	Pre-Construction	Biodiversity Offset Planning	Biodiversity Offset	Approximately 67.13 ha of forested areas (from 124.5ha total acquired land) will be permanently cleared for the Project footprint. Offset area will be selected based on IFC PS and ADB requirement. A comprehensive biodiversity offset design, with habitat and species offsets in the suitable areas to be designed.	Corporate SHE Manager Experts	Biodiversity offset plan and commencement of offset project	Not applicable	Not applicable	Not applicable	Not applicable	Offset plan prepared within the construction period and discussion with related parties such as NGO, University, Forestry Agency or Forestry Research Agency in 1st semester of 2018.
13	Pre-Construction	Water management	Water extraction and flows	Prior to water extraction feasibility assessment should be undertaken that considers suitability of the specific extraction site as well as volume to be extracted. Extraction rates may need to be altered depending on seasonal conditions and flow rates in order to maintain sufficient base flow and reliant ecosystems; Monitoring of aquatic habitats will be undertaken throughout water extraction period to identify if extraction rates are too great to maintain ecosystem functioning. This may require input from a specialist; A management plan will be developed and implemented specific to the aquatic environment and the extraction; The extraction pipe will be suitably designed to avoid drawing fish into the pipe leading to mortality.	Corporate SHE Manager Experts	Determine the extraction rates according to seasonal conditions and	To be determined following further assessment	To be determined following further assessment	To be determined following further assessment	To be determined following further assessment	Water extraction system is designed to prevent ingress of aquatic species to the water pipe. Other measure is to be determined following further assessment on actual water abstraction rate and river condition.
14	Construction	Clearance	Restoration	Collect native flora seed before land clearance. These seedlings to be cultivated and propagated in a nursery and maintained until 2020 when forest restoration activities commence at the site.	SSM	Confirm the presence of site nursery Maintain an inventory of native species cultivated at the nursery.	During clearance seed collection activities	Inventory to include date of arrival of individual to nursery, general location where individual was derived from. Location data can range from spatial coordinates to broader descriptions (eg near Village X or an area with similar habitat) depending on available resources for curation.	Designated nursery area Inventory can be maintained in a spreadsheet format.	6-monthly EMP Implementation Reports	Establishment of 1 on-site nursery prior to clearance phase.
15	Construction	Awareness Training	Disturbance & Displacement of Wildlife	Local community engagement will be carried out with villages in the Project catchment to (i) raise awareness of the conservation value of the Protection Forest's ecological function; (ii) encourage local people not to hunt threatened and protected species in the forest, or clear areas by logging; and This engagement programme will be developed by PT SERD, in consultation with, the local government, Forestry Agency, and customary leaders. Communities will be engaged formally once a year to communicate and consult on developments within the Project relevant to them. These meetings are to be formally minuted.	Corporate SHE Manager, SSM, and Corporate External Relations Manager	Minutes of meetings	Yearly	Not applicable	Not applicable	Not applicable	Meetings to be held for community members in villages around project area. All minutes of meetings to be documented.
16	Construction	Transportation	Fauna Mortality	Undertake daily monitoring of PT SERD access roads to secure them from poaching activity.	SSM, Field Security Supervisor, Field Relations, and Corporate External Relations Manager	Monitoring records	Daily	Signs of poaching activity	PT SERD access roads	To report to relevant authorities, including police department if necessary, and lodge an incident internally	Zero incidents of illegal poaching or tree felling by Company staff.

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17	Construction Operation	Transportation	Fauna Mortality	Company drivers to receive internal defensive driving training that includes commentary driving. Drivers are required to pass PT SERD's driving test and obtain a company driving license before being authorised to drive on site.	SSM, SHE Supervisor, and Contractors	Log of personnel who have undertaken the driving test and documentation of registered drivers within PT SERD	Prior to commencement of construction works	Company drivers receiving training on defensive driving	All company drivers	Log of personnel who have successfully completed training	100% of all company drivers to possess PT SERD driving test license
18	Construction Operation	Transportation	Fauna Mortality	Security and/or SHE staff to conduct speed checks for vehicles using a radar speed gun. Non-compliance with the speed limit will be reported to the Site Support Manager and appropriate disciplinary procedures undertaken in accordance with PT SERD policy.	SSM, Security Supervisor, SHE Supervisor, and Contractors	Record of date of spot check occurrence and evidence of maintained speed log	Monthly spot checks	Speed of vehicle	Any point within the access road where speed limits are in place	Speed logs	Zero speeding incidents recorded.
19	Construction Operation	Lighting	Disturbance & Displacement of Wildlife	The following design elements for lighting within the Project area will be implemented: Lighting will be directed away from vegetated areas and habitats. Upward and directional lighting will be avoided. Lighting into unintended areas will be avoided. Where lighting is required to be installed for safety and security purposes, regulatory requirements or best practice for wildlife-friendly lighting design will be followed. During construction, lights will not be used outside of construction hours. During operations, general lighting usage will be consistent with the operating hours of each Project component. Outside of operating hours, low lux level and downcast lighting will be needed along pathways and roads at levels sufficient for safety reasons. Reduce the duration of nocturnal lighting sources by using a timer or movement based sensor system to turn off lights. Where permanent lights are employed, ensure that darker passages between lights exist for sensitive fauna to pass. Automatic dimming to reduce lighting intensity will also be considered. Avoid using lumination that has a high UV component to reduce impacts on insects. Avoid using broad spectrum lights. Installation of light fittings to reduce nocturnal light impacts on habitats in vegetated areas and habitats outside project area that are close to these night light sources.	SSM, Construction Manager, and Field Manager	Light monitoring	At night, monthly during construction and operations	Light intensity (lux)	Vegetated areas and habitats that are close to these night light sources	Light monitoring records	100% compliance - no light spillage/ directed into forest
20	Construction Operation	General Planning & Management	Disturbance & Displacement of Wildlife	No night works that can disturb wildlife to be undertaken during construction or operation unless under exceptional circumstances (not inclusive of drilling activities at wellpads and powerplant activities).	SSM, Construction Manager, and Field Manager	Indication in construction schedule	Not applicable	Not applicable	Not applicable	Not applicable	100% compliance - no disruptive night works undertaken at night.
21	Construction Operation	Fauna & Flora Surveys	Monitoring	Conduct regular monitoring of flora and fauna in Project areas. The surveys will be undertaken by experts with assistance (including guides) from local villages. The information collected is to be used as a basis for habitat and population management. the monitoring will include weekly patrols of areas surrounding the project site and the Mt Patah Protection Forest. The patrols will be conducted to focus on illegal clearing, signs of hunting and poaching (snares, cartridges) and tracks. Inspections are also to occur at local markets to determine if any species are being caught and traded illegally. If activities are identified, appopriate authorities will be informed of the illegal activity.	Corporate SHE Manager	Updated species database of the Project area	Surveying, reporting and mapping to be undertaken (i) before construction; (ii) every 3 years after operations commence; and thereafter	Flora (seedlings, saplings, trees), mammals, birds, reptiles & amphibians, fish Flora: Presence of protected species, pioneer species, invasive species Fauna: Presence, abundance and distribution of species of conservation significance, endemic species	Project area using transects and vegetation plots where baseline surveys have been carried out.	Survey report	Not applicable
22	Construction Operation	Awareness Training	Disturbance & Displacement of Wildlife	All construction personnel and PT SERD staff will undertake biodiversity awareness induction training prior to commencement of construction to raise their awareness of the: (i) ecological sensitivity of the site, importance of forest habitats, protected and threatened plants and animals within the Project area; (ii) proper protocols to adopt when wildlife is encountered; (iii) need to be cautious when operating machinery to avoid injury/mortality to fauna; and (iv) PT SERD's no-tolerance policy on poaching that encompasses both direct and indirect involvement. This is applicable to both staff and contractors. All workers and visitors to be educated to ensure that all work places are kept clean and waste is not left in open areas. All workers will be prohibited from feeding animals.	SSM, Construction Manager, Field Manager, and Corporate SHE Manager	Training Records	Prior to commencement of works and for all new workers Refresher training every year	Number of workers trained	Not applicable	Training records maintained	Zero incidents of hunting/poaching and wildlife injury/ mortality by PT SERD contractors and staff.
23	Construction Operation	Awareness Training	Disturbance & Displacement of Wildlife	Put up and maintain information posters and literature in the PT SERD site office to increase awareness of ecological issues affecting the Project and ecological function of protection forest in terms of both habitat provision and hydrology.	SSM, Construction Manager, Field Manager, and Corporate SHE Manager	Placement of posters and literature in the site office	Not applicable	Not applicable	Not applicable	Not applicable	Refresh posters and literature in site office a minimum of once a year.
24	Construction Operation	Incident Reporting	Disturbance & Displacement of Wildlife	Compliance with PT SERD environmental protection policy will be managed and monitored by the SSM. This will include a procedure for reporting incidents by site staff. A recording and evaluation system will be established and reviewed on a monthly basis. Corrective measures will be taken where necessary including appropriate actions against infringements.	SSM, Construction Manager, Field Manager, and Corporate SHE Manager	Monitoring reports and records	Not applicable	Not applicable	Not applicable	Not applicable	100 % compliance with PT SERD environmental protection policy. 100 % of incidents reviewed by SHE team every month and corrective measures implemented within 2 weeks of review.
25	Construction	Fauna & Flora Surveys	Fauna Mortality	Regular monitoring of construction areas for signs of potential wildlife conflict, illegal logging and poaching. Frequency of monitoring to increase if signs of these have been identified	SSM	Monitoring reports and records	Monthly, intensity to increaseor decrease based on findings	Signs of wildlife conflict, illegal logging, poaching (e.g. new trails and roads into forest, dead wildlife)	Within Project area	Monitoring report	100% of all signs of potential wildlife conflict, illegal logging and poaching to be communicated to local forestry officers and relevant authorities within 3 days.
26	Construction	Awareness Training	Disturbance & Displacement of Wildlife	Workers to be trained in noise-reduction behaviours such as reducing the drop height of materials, and turning off equipment and vehicle engines when not in use.	SSM, SHE Supervisor, Construction Manager. Contractor and Field Manager	Training records	Not applicable	Presence of noisy behaviours	All worksite areas	Inspection report	100% of workers trained in noise-reduction behaviours.
27	Operation	Wildlife Crossing	Monitoring	An appropriate monitoring and maintenance programme will be introduced to ensure that the constructed crossing points/ arboreal crossing bridge is retained in good functional condition. Inspections will take place at no less than 6 month intervals. NGOs, ecologists and arboreal mammal experts to be engaged when undertaking this action.	SSM, Construction Manager, Field Manager.	Inspection records	Inspections to occur at six monthly intervals or less.	Bridge condition, vegetation structure at wildlife crossing points, signs of wildlife usage	At crossing points/ arboreal crossing bridges	Inspection record	Not applicable
28	Operation	Fauna & Flora Surveys	Monitoring	Data from camera trap surveys, transects and community monitoring to be used to measure long term population changes and trends for key species (such as the Sumatran Tiger, Malayan Tapir, Dhole, Pangolin and endemic birds). PT SERD will liaise with local authorities and experts to provide any relevant ecological monitoring data to integrate in the long term monitoring and with the other surrounding developments. Information on change/trends on species populations can be obtained by monitoring threats (e.g., snares, gun cartridges, hunter camps, etc.) detected during regular patrols/surveys	SSM and Corporate SHE Manager	Review of long term monitoring records	Every 3 years and intensity to change based on findings	Ecological monitoring data for key species, including CH trigger species	Project Area	Monitoring Records and Minutes of Meetings	Continued utilisation of Project area by CH trigger species over Project construction and operation.
29	Post-Construction Operation	Habitat Rehabilitation	Restoration	Consultation will be undertaken with relevant stakeholders in order to determine the composition and type of planting to be achieved. Implementation will then be undertaken by PT SERD and if needed assistance will be sought from experts.	Corporate SHE Manager Experts	Minutes of meeting	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
30	Post-Construction Operation	Habitat Rehabilitation	Restoration	A community based forest restoration project may be developed to engage local communities to participate in forest restoration activities activities, such as weeding, replanting, maintenance and seedling propagation.	Corporate SHE Manager	Implementation of the community based forest restoration project	To be established within 6 months of commencement of Project operation and reviewed on a 12 monthly basis	Number of community members engaged	Within Project area and/or within Project vicinity (subject to permission from Forestry / land owner)	Annual Implementation Report	50% of restoration workforce employed from local communities.
31	All Phases	General Planning & Management	Fauna Mortality	Install warning signs targeted at poachers and illegal loggers at the border of the buffer and interior of Gunung Patah Protection Forest. Conduct joint patrols with local authorities, Forestry and conservation agency.	SSM and Security Supervisor	Installation of warning signs and attendance at joint patrols	Not applicable	Not applicable	Not applicable	Not applicable	Conduct a minimum of 2 joint patrols every year.
32	All Phases	General Planning & Management	Fauna Mortality	Establish a communication system with the local forestry office and report to authorities immediately any signs of illegal hunting and deforestation, wildlife conflict and forest fires within the Protected Forest Area. Furnish this report with photographic documentation where possible and the date and time of observation. Incident also to be recorded via PT SERD's incident reporting mechanism.	SSM, Security Supervisor, and Field Relations Supervisor	Establishment of a communication system with reporting parameters	Not applicable	Not applicable	Not applicable	Not applicable	Each incident to be submitted to local forestry office within 3 days.
33	All Phases	Fauna & Flora Surveys	Monitoring / Engagement	Set up a habitat mapping database following the pre-construction monitoring work to store all biodiversity monitoring data. From this database: (i) Prepare habitat maps for the project site using aerial imagery obtained via satellite or drone. (ii) As part of the evaluation of management action, analyse results of field surveys, biodiversity monitoring, and opportunistic sightings to understand more detailed and specific distribution of species. The database is to be shared between PT SERD, related parties, and ecologists. It is to be updated annually or when major findings from surveys call for updates.	Corporate SHE Manager	Establishment of database	Not applicable	Not applicable	Not applicable	Not applicable	Database to be established within 1 year of construction commencement.
34	All Phases	Transportation	Fauna Mortality	Control access road users by constructing security gates to restrict access of vehicles. Security gates are to be manned by at least 1 security officer 24 hours per day who will record the particulars (name, address, village, vehicle registration number, personal identification number) of all vehicles who are allowed into the access road. As per PT SERD's security management system, an ID badge to be issued to visitors upon arrival and returned upon departure; company staff should already possess a Company ID Badge that must be displayed upon arrival. Visitors must also be accompanied by a company representative at all times. The security officers should be trained to identify behaviour associated with poachers and vehicle searches. The security gate should be equipped with 24 hour CCTV cameras. For people that have cleared and are utilising areas within the project concession, security to investigate if clearance is conducted in a legal manner. If yes, these individuals to be issued with a label (distinguished from staff), that grants them continued access into the site.	SSM and Security Supervisor	Proof of well-maintained access log Training records of security officers	Not applicable	Not applicable	Not applicable	Not applicable	Zero unregistered vehicles within PT SERD premises
35	All Phases	Transportation	Vegetation Clearance	Conduct regular patrols of the project area to identify encroachment and burning/land clearing by residents. Patrols to be undertaken by PT SERD with involvement of the police and government staff, if needed. Where it is identified that local people have entered and undertaken illegal logging or poaching, work with local authorities to report and investigate the breach.	SSM, Security Supervisor, Field Relations, and Corporate External Relations Manager	Log of the results of regular patrols	During construction and operation	Regular patrols undertaken	Along the Project Area boundary and adjacent land	To report to relevant authorities, including police department if necessary, and lodge an incident internally	Zero incursion into Project Area.
36	All Phases	Transportation	Vegetation Clearance	Conduct regular drone flights at least every year to monitor clearance of vegetation within the project area. Where clearing activity is identified , it is to be investigated and infomration passed to local police and forestry department officials.	SSM and Corporate SHE Manager	Assessment of vegetation clearance within the project boundary	During construction and operation	Drone flight every 6 months	500m of the project footprint and/or within Project catchment area	To report to relevant authorities, including police department if necessary, and lodge an incident internally	Updated aerial map every year. Report all new clearance of vegetation within the project area.

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37	Pre-Construction	Fauna & Flora Surveys	Invasive Species	Undertake surveys to identify locations where invasive species are particularly abundant and maintain an inventory. Where necessary, work with specialists to develop a plan to prevent invasive species introduction and/or proliferation due to Project activities.	SSM and Corporate SHE Manager	Survey report and inventory development	Prior to construction of access road from Wellpad F to WP-F	Species, abundance, GPS location	Around worksite areas, in particular area where restoration is targeted to occur	Survey report	Map of invasive species aggregations prior to construction of access road to WP-L,M,N and X and injection brine pipeline route.
38	All Phases	General Planning & Management	Vegetation Clearance	Education of local people and restriction of clearing by local residents within the Project Area.	SSM and Corporate SHE Manager	Meeting records, including details such as village visited, number of people trained	Not applicable	Not applicable	Not applicable	Not applicable	Reduction in clearing incidents by local people 5 years from commencement of operation.
39	All Phases	General Planning & Management	Ecosystem Services	Conduct interviews with local people regarding their ecosystem service use within the Project Area and AoI.	SSM and Corporate SHE Manager	Meeting records	Not applicable	Not applicable	Not applicable	Not applicable	List of ecosystem services used by local residents, utilisation profile according to each village
40	All Phases	General Planning & Management	Vegetation Clearance	Monitor land clearing by local people. If land available for cultivation is reduced and impacts recorded to livelihoods, measures are to be assessed and undertaken to include alternatives.	SSM and Corporate SHE Manager	MoU Implementation Report	Monthly spot checks	Locations of land cleared Area of land cleared Individuals/ village responsible	Within Project Area	MoU Implementation Report	Reduction in clearing incidents by local people 5 years from commencement of operation.

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1	All Phases	General Planning & Management	Rafflesia bengkuluensis	• Surveys are to occur along the transmission line, roads, brine pipelines and within well pads to identify individuals prior to clearing activities. If possible, individuals should be avoided and translocated. • Cultivation of individuals are to be trailed in the company nursery • Replanting of individuals are to occur within the forested Project area • Monitoring of individuals identified within the project area and retained is to occur on an annual basis.	Corporate SHE Manager Biodiversity experts	Application of measures	Every 3 years and intensity to change based on findings	Ecological monitoring data for key species, including CH trigger species	Project Area	Monitoring Records and Minutes of Meetings	Continued utilisation of Project area by CH trigger species over Project construction and operation.
2	All Phases	General Planning & Management	Vanda foetida	• Surveys are to occur along the transmission line, roads, brine pipelines and within well pads to identify individuals prior to clearing activities. If possible, individuals should be avoided and translocated. • Cultivation of individuals are to be trailed in the company nursery • Replanting of individuals are to occur within the forested Project area • Monitoring of individuals identified within the project area and retained is to occur on an annual basis. • Access control and anti-poaching measures are to be applied to the Project area	Corporate SHE Manager Biodiversity experts	Application of measures	Every 3 years and intensity to change based on findings	Ecological monitoring data for key species, including CH trigger species	Project Area	Monitoring Records and Minutes of Meetings	Continued utilisation of Project area by CH trigger species over Project construction and operation.
3	All Phases	General Planning & Management	Manis javanica Malayan pangolin	• Anti-hunting and poaching measures are to be employed within the Project Area, including 24 hour access restrictions, regular patrols and inspections. • Hunting and poaching by SERD Employees is to be strictly prohibited. • Education programs are to be undertaken with the local community to discourage hunting and poaching for Sunda Pangolin. • Regular monitoring of the species population is to occur within the Project Area.	Corporate SHE Manager Biodiversity experts	Application of measures	Every 3 years and intensity to change based on findings	Ecological monitoring data for key species, including CH trigger species	Project Area	Monitoring Records and Minutes of Meetings	Continued utilisation of Project area by CH trigger species over Project construction and operation.
4	All Phases	General Planning & Management	Maxomys inflatus Broad-nosed Sumatran maxomys	• Anti-hunting and poaching measures are to be employed within the Project Area, including 24 hour access restrictions, regular patrols and inspections. • Hunting and poaching by SERD Employees is to be strictly prohibited. • Education programs are to be undertaken with the local community to discourage hunting and poaching for Borad-nosed Sumatran Maxomys. • Regular monitoring of the species population is to occur within the Project Area.	Corporate SHE Manager Biodiversity experts	Application of measures	Every 3 years and intensity to change based on findings	Ecological monitoring data for key species, including CH trigger species	Project Area	Monitoring Records and Minutes of Meetings	Continued utilisation of Project area by CH trigger species over Project construction and operation.
5	All Phases	General Planning & Management	Panthera tigris sumatrae Sumatran tiger	• Anti-hunting and poaching measures are to be employed within the Project Area, including 24 hour access restrictions, regular patrols and inspections. • Hunting and poaching by SERD Employees is to be strictly prohibited. • Regular monitoring of the species population is to occur within the Project Area.	Corporate SHE Manager Biodiversity experts	Application of measures	Every 3 years and intensity to change based on findings	Ecological monitoring data for key species, including CH trigger species	Project Area	Monitoring Records and Minutes of Meetings	Continued utilisation of Project area by CH trigger species over Project construction and operation.
6	All Phases	General Planning & Management	Presbytis melalophos Sumatran surili	• Measures for canopy connectivity are to be provided throughout the Project Area. • Anti-hunting and poaching measures are to be employed within the Project Area, including 24 hour access restrictions, regular patrols and inspections. • Hunting and poaching by SERD Employees is to be strictly prohibited. • Regular monitoring of the species population is to occur within the Project Area.	Corporate SHE Manager Biodiversity experts	Application of measures	Every 3 years and intensity to change based on findings	Ecological monitoring data for key species, including CH trigger species	Project Area	Monitoring Records and Minutes of Meetings	Continued utilisation of Project area by CH trigger species over Project construction and operation.
7	All Phases	General Planning & Management	Symphalangus syndactylus Siamang	• Measures for canopy connectivity are to be provided throughout the Project Area. • Anti-hunting and poaching measures are to be employed within the Project Area, including 24 hour access restrictions, regular patrols and inspections. • Hunting and poaching by SERD Employees is to be strictly prohibited. • Regular monitoring of the species population is to occur within the Project Area.	Corporate SHE Manager Biodiversity experts	Application of measures	Every 3 years and intensity to change based on findings	Ecological monitoring data for key species, including CH trigger species	Project Area	Monitoring Records and Minutes of Meetings	Continued utilisation of Project area by CH trigger species over Project construction and operation.
8	All Phases	General Planning & Management	Tapirus indicus Malayan tapir	• Speed limits to maximum of 40 km/hr for construction vehicles will be enforced to minimise potential for fauna strike. • Anti-hunting and poaching measures are to be employed within the Project Area, including 24 hour access restrictions, regular patrols and inspections. • Hunting and poaching by SERD Employees is to be strictly prohibited. • Regular monitoring of the species population is to occur within the Project Area.	Corporate SHE Manager Biodiversity experts	Application of measures	Every 3 years and intensity to change based on findings	Ecological monitoring data for key species, including CH trigger species	Project Area	Monitoring Records and Minutes of Meetings	Continued utilisation of Project area by CH trigger species over Project construction and operation.
9	All Phases	General Planning & Management	Rhacophorus bifasciatus	• For areas in direct runoff path to a watercourse, sediment and erosion control devices will be installed and maintained until vegetation replanting can occur to stabilise disturbed soil surfaces • Regular monitoring of the species population is to occur within the Project Area.	Corporate SHE Manager Biodiversity experts	Application of measures	Every 3 years and intensity to change based on findings	Ecological monitoring data for key species, including CH trigger species	Project Area	Monitoring Records and Minutes of Meetings	Continued utilisation of Project area by CH trigger species over Project construction and operation.

Action items:

SN	Item	Responsibility	Additional Parties	Date to be completed	Frequency
1	Appoint a Site Support Manager to supervise SHE aspects at site	BOD	Not Applicable	December 2016	1 Time
2	Implement adaptive management measure	SSM	Not Applicable	March 2017	1 Time, Monthly monitoring
3	Develop protocols for the management of injured wildlife	Corporate SHE Manager	Not Applicable	March 2017	1 Time, Monthly monitoring
4	Establish an incident reporting mechanism	Corporate SHE Manager	Not Applicable	March 2017	1 Time, Monthly monitoring
5	Identification of Wildlife Crossing Points	PT SERD SHE Manager	NGOs, MoF	May 2017	1 Time, Monthly monitoring
6	Assess the need for the installation of artificial crossing for endangered arboreal mammals	Corporate SHE Manager	experts	July 2017	1 Time
7	Conduct a flora and fauna survey prior to construction of wellpad	Corporate SHE Manager	experts	February 2017	1 Time
8	Wildlife shepherding activities	SSM	Contractors	March 2017	1 Time
9	Ensure clearing has been limited to the identified area	Construction Manager	Contractors	March 2017	1 Time
10	Brief all involved personnel on wildlife shepherding activities	SSM, Construction Manager	Contractors	March 2017	1 Time
11	Establish a site nursery	SSM	Not Applicable	March 2017	1 Time
12	Develop a comprehensive Offsite Biodiversity Offset Design	Corporate SHE Manager	experts	end of 2019	1 Time
13	Conduct a water extraction pre-feasiblity assessment	Corporate SHE Manager	experts	end of 2019	1 Time
14	Collect native flora seed before land clearance	SSM	experts	March 2017	1 Time
15	Local community engagement to raise awareness of the conservation value of KSNP forest	SSM	experts	March 2017	Yearly
16	Undertake daily monitoring of PT SERD access roads to secure them from poaching activity	SSM	Not Applicable	March 2017	Daily
17	Company drivers to receive internal defensive driving training	SSM	Contractors	March 2017	Yearly
18	Conduct speed check	SSM	Not Applicable	March 2017	Monthly
19	Lighting management	Construction Manager	Contractors	March 2017	Monthly
20	Ensure night works will not disturb wildlife	Construction Manager	Contractors	March 2017	Daily
21	Conduct regular monitoring of flora and fauna in Project areas	Corporate SHE Manager	experts	March 2017	Every 3 years
22	All construction personnel and PT SERD staff will undertake biodiversity awareness training	Construction Manager	Contractors	March 2017	1 Time
23	Put up and maintain information posters and literature on ecological awareness	SSM	Not Applicable	March 2017	Every 6 months
24	Monitor compliance with PT SERD environmental protection policy	SSM	Not Applicable	March 2017	Monthly
25	Monitor construction areas for signs of potential wildlife conflict, illegal logging and poaching	SSM	Not Applicable	March 2017	Monthly
26	Workers to be trained in noise-reduction behaviours	SSM	Contractors	March 2017	1 Time
27	Crossing points/ arboreal crossing bridge is retained in good functional condition	Construction Manager	Not Applicable		Every 6 months
28	Measure long term population changes and trends for key species	Corporate SHE Manager	experts	end of 2019	Every 3 years
29	Consultation relevant stakeholders to determine the composition and type of planting to be achieved	Corporate SHE Manager	experts	end of 2019	1 Time
30	Develop a community based forest restoration project	Corporate SHE Manager	experts, local communities	end of construction	Yearly
31	Install warning signs regarding hunting and poaching at the border of the buffer area of the Protection Forest.	SSM	KSNP	March 2017	1 Time
32	Establish a communication system with the local forestry office and report illegal hunting / logging.	SSM	Forestry Office, Police	March 2017	Each incident
33	Develop and update habitat mapping database	Corporate SHE Manager	experts	March 2017	Yearly
34	Construct security gates to restrict access of vehicle	SSM	Not Applicable	March 2017	1 Time
35	Conduct regular patrols of the project boundary	SSM	Not Applicable	March 2017	Monthly
36	Conduct regular drone flight	Corporate SHE Manager	Not Applicable	March 2017	Yearly
37	Conduct invasive species survey of WP-L,M,N and X and injection brine pipeline route.	Corporate SHE Manager	experts	March 2017	Every 3 years
38	Educate local people and restrict clearing by local people	SSM, Corporate SHE Manager	Not Applicable	Ongoing	Yearly
39	Interviews with local people on their ecosystem service use within Project Area and AoI	SSM, Corporate SHE Manager	Not Applicable	Nov-17	1 Time
40	Monitor land clearing and assess feasibility of providing alternative income	SSM, Corporate SHE Manager	Not Applicable	Nov-17	1 Time

Estimated Budget (2016 USD Values) Year 1

S/N	Task	Rate ($USD Per Annum)	Consultant Requirement	Consultant Cost	Capital Equipment	Capital Equipment Cost	Estimated FTE	Labour Cost	Total
1	Appoint a Site Support Manager to supervise SHE aspects at site	7034.56			Office support	$ 1,000.00	1	$ 7,034.56	**$ 8,034.56**
2	Implement adaptive management measure	7034.56					0.0192	$ 135.28	**$ 135.28**
3	Develop protocols for the management of injured wildlife	7034.56					0.0385	$ 270.56	**$ 270.56**
4	Establish an incident reporting mechanism	7034.56					0.0192	$ 135.28	**$ 135.28**
5	Identification of Wildlife Crossing Points	7034.56					0.0577	$ 405.84	**$ 405.84**
6	Assess the need for the installation of artificial crossing for endangered arboreal mammals	7034.56	Biodiversity survey for arboreal crossing	$ 5,000.00			0.1538	$ 1,082.24	**$ 6,082.24**
7	Conduct a flora and fauna survey prior to construction of wellpad	7034.56	Biodiversity survey for mammal and flora species prior to new wellpad construction	$ 12,500.00			0.0769	$ 541.12	**$ 13,041.12**
8	Wildlife shepherding activities	7034.56					0.0192	$ 135.28	**$ 135.28**
9	Ensure clearing has been limited to the identified area	7034.56					0.0192	$ 135.28	**$ 135.28**
10	Brief all involved personnel on wildlife shepherding activities	7034.56					0.0192	$ 135.28	**$ 135.28**
11	Establish a site nursery	7034.56			Nursery	$ 5,000.00	1	$ 7,034.56	**$ 12,034.56**
12	Develop a comprehensive Offsite Biodiversity Offset Design	7034.56	Biodiversity Offset Plan	$ 20,000.00			0	$ -	**$ 20,000.00**
13	Conduct a water extractioon prefeasibility assessment	7034.56	Water extraction assessment	$15,000				$ -	**$ 15,000.00**
14	Collect native flora seed before land clearance	7034.56	Seed collection	$ 1,000.00			0.0769	$ 541.12	**$ 1,541.12**
15	Local community engagement to raise awareness of the conservation value of KSNP forest	7034.56	Local community	$ 10,000.00	OHP	$ 2,000.00	0.0577	$ 405.84	**$ 12,405.84**
16	Undertake daily monitoring of PT SERD access roads to secure them from poaching activity	7034.56					0.0769	$ 541.12	**$ 541.12**
17	Company drivers to receive internal defensive driving training	7034.56					0.0577	$ 405.84	**$ 405.84**
18	Conduct speed check	7034.56			Radar Speed Gun	$ 2,000.00	0.0769	$ 541.12	**$ 2,541.12**
19	Lighting management	7034.56					0.0769	$ 541.12	**$ 541.12**
20	Ensure night works will not disturb wildlife	7034.56					0	$ -	**$ -**
21	Conduct regular monitoring of flora and fauna in Project areas	7034.56	Yearly flora and fauna monitoring cost (2016 : USD27k by Greencap and USD7.5k/year)	$ 34,500.00	Camera Traps	$ 5,000.00	0	$ -	**$ 39,500.00**
22	All construction personnel and PT SERD staff will undertake biodiversity awareness training	7034.56					0.0769	$ 541.12	**$ 541.12**
23	Put up and maintain information posters and literature on ecological awareness	7034.56			Posters and literature	$ 2,000.00	0.0192	$ 135.28	**$ 2,135.28**
24	Monitor compliance with PT SERD environmental protection policy	7034.56					0.0192	$ 135.28	**$ 135.28**
25	Monitor construction areas for signs of potential wildlife conflict, illegal logging and poaching	7034.56					0.0192	$ 135.28	**$ 135.28**
26	Workers to be trained in noise-reduction behaviours	7034.56					0.0577	$ 405.84	**$ 405.84**
27	Crossing points/ arboreal crossing bridge is retained in good functional condition	7034.56					0.0192	$ 135.28	**$ 135.28**
28	Measure long term population changes and trends for key species	7034.56			Camera Traps	$ 5,000.00	0.0192	$ 135.28	**$ 5,135.28**
29	Consultation relevant stakeholders to determine the composition and type of planting to be achieved	7034.56	Stakeholders	$ 5,000.00			0.0192	$ 135.28	**$ 5,135.28**
30	Develop a community based forest restoration project	7034.56	Community forest restoration project	$ 10,000.00			0.0192	$ 135.28	**$ 10,135.28**
31	Install warning signs regarding hunting and poaching at the border of the buffer area of the Protection Fores	7034.56			Signs to discourage poachi	$ 2,500.00	0.0577	$ 405.84	**$ 2,905.84**
32	Establish a communication system with the local forestry office and report illegal hunting / logging.	7034.56	See # 34				0.0192	$ 135.28	**$ 135.28**
33	Develop and update habitat mapping database	7034.56					0.0192	$ 135.28	**$ 135.28**
34	Construct security gates to restrict access of vehicle	7034.56			Gates, Office, CCTV	$ 45,000.00	0.0192	$ 135.28	**$ 45,135.28**
35	Conduct regular patrols of the project boundary	7034.56	Join patrol with police and government officials (along with #31)	$ 15,000.00			0.0577	$ 405.84	**$ 15,405.84**
36	Conduct regular drone flight	7034.56	UAV survey by consultant (2016)	$ 15,000.00	Drone	$ 6,000.00	0.0192	$ 135.28	**$ 21,135.28**
37	Conduct invasive species survey of WP-L,M,N and X and injection brine pipeline route.	7034.56					0.0192	$ 135.28	**$ 135.28**
38	Educate local people and restrict clearing by local people	7034.56					0.0192	$ 135.28	**$ 135.28**

DAILY INSPECTION REPORT

Project:	**Inspected by:**
Inspection No:	
Date:	
Time:	

PART A: GENERAL INFORMATION

Weather:	Sunny	Fine	Cloudy	Rainy
Temperature:		°C		
Humidity:	High	Moderate	Low	
Wind:	Strong	Breeze	Light	Calm

PART B: DAILY INSPECTION CHECKLIST

Tick where applicable

		Yes	No	Follow-Up	Not Applicable	Photo ID/ Remarks
	Section 1: Site Clearance Activities					
1.01	Have fencing/hoarding been erected around construction areas according to wildlife shepherding strategy?					
1.02	Are there holes in the fencing/hoarding where wildlife may enter?					
1.03	Has the contractor checked the weather forecast and no storm events are forecasted to occur for the day?					
2.04	Has the area to be cleared been inspected by a wildlife expert?					
2.05	Has a briefing been carried out prior to clearance involving all personnel so that each individual is aware of his/her role, measures to deal with injured wildlife, occupational health and safety requirements and PT SERD's environmental policy?					
2.06	Have areas to be cleared been clearly marked in the field?					
2.07	Has clearing occurred outside of the demarcated areas?					
	Section 2: Hunting & Poaching					
2.01	Are there any signs of poaching, illegal logging, wildlife conflict along access roads (eg. Dead animals, new undesignated trails created, unregistered stationary vehicles)?					
	Section 3: Waste Management					
3.01	Is licensed waste collector engaged for waste collection and disposal					
3.02	Has there been illegal disposal of construction waste? (if yes, specify location)					
3.03	Is recycling being carried out?					
3.04	Is waste disposed of in allocated waste bins and areas?					
3.05	Are the waste bins overflowing?					
	Section 4: Water Pollution Prevention					
4.01	Does every drilling team and well pad have a spill management and containment kit?					
4.02	Are there any leaks from tanks used to store drilling fluids and cuttings?					
4.03	Are there any signs of oil leakage or spillage along transportation routes?					
4.04	Are there any signs of oil leakage or spillage at worksites?					

PART C: REPORTING

Overall Comments

Corrective Actions and Responsibilities

PART D: PHOTOLOG

Photolog

Item Number & Description	Site Photo	Recommended Measures, Follow-up Actions	Comments by Contractor	Closed Out/ Signed off
E.g. *Item 2.01 - A patch of forest by the side of the access road was observed to have been logged.*				

INSPECTION TEMPLATE

Project: Inspected by:
Inspection No:
Date:
Time:

PART A: GENERAL INFORMATION

Weather:	Sunny	Fine	Cloudy	Rainy
Temperature:		°C		
Humidity:	High	Moderate	Low	
Wind:	Strong	Breeze	Light	Calm

PART B: EMMP INSPECTION CHECKLIST

Please tick where applicable

		Yes	No	Follow-Up	Not Applicable	Remarks/ Details of Item
	Section 1: General Planning & Management					
1.01	Is there a designated point of contact for PT SERD in the local forestry department?					
1.02	Has an incident reporting mechanism with a GIS database been developed?					
1.03	Have investigations been undertaken for these incidents, and have corrective measures been identified or implemented?					
1.04	Have experts been engaged with respect to wildlife crossings and biodiversity surveys?					
1.05	Do all company drivers have a PT SERD approved license?					
	Section 2: Land Clearance					
2.01	Is there an injured animal protocol in place?					
2.02	Has there been any dead or injured wildlife found during land clearance?					
2.03	Has a site nursery been established?					
2.04	Are native species being cultivated at the site nursery?					
2.05	Are there mulch or erosion control blankets at cleared sloped areas?					
2.06	Is vegetation being transported out of the Project via a covered vehicle?					
	Section 3: Stakeholder Engagement					
3.01	Has a biodiversity offset plan been developed?					
3.02	Has this plan been agreed with with all stakeholders?					
	Have stakeholders been consulted on restoration activities?					
3.03	When was the last formal community engagement event?					Date:
3.04	Were all affected villagers and interested stakeholders identified during the baseline phase invited to the event?					
3.05	Are meeting minutes being uploaded to a public domain?					
3.06	Are they uploaded within 2 weeks of each meeting?					
3.07	Is a grievance mechanism in place?					
3.08	Has any grievances been aired?					
3.09	Is there any past/ongoing community based programme? If so, please specify.					
	Section 4: Wildlife Crossings					
4.01	Are wildlife crossing installations well maintained?					
4.04	Is there a monitoring and maintenance programme to ensure wildlife crossings continue to be ecologically functional?					
	Section 5: Transportation					
3.01	Have speed checks been conducted by security and SHE staff?					
	Section 6: Lighting					
6.01	Is lighting directed away from vegetated areas and habitats?					

6.02	(Construction Phase) Are lights being used outside of construction hours? (Operation Phase) Is general lighting usage consistent with the operating hours of each Project component?	
6.03	Is there a timer or movement-based sensor system for nocturnal lights?	
6.04	Are there darker passages between permanent lights for fauna to pass?	
6.05	Have broad spectrum lights been used?	
6.07	Apart from drilling activities at wellpads and powerplant activities, have other forms of work been undertaken at night?	
7.04	Are there any signs of oil leakage or spillage at worksites?	
7.05	Have all workers been trained in noise-reduction behaviours?	
	Section 8: Monitoring	
8.01	Have all staff been trained in appropriate responses for unplanned events such as well blowouts and pipeline failures?	
8.02	Are there any signs of oil leakage or spillage along transportation routes?	
8.03	Are there any signs of oil leakage or spillage at worksites?	
8.04	Has the working area encroached onto adjacent forest?	
8.05	Has there been an increase in the number and extent of temporary access routes? If yes, specify reasons.	
8.06	Is the level of noise in forest habitat within 20 m of well pads less than 50 dBA?	
8.07	Are all vehicles on access roads registered with the security office?	
8.08	Have there been any wildlife incidents with the power plant and associated facilities (transmission line route)?	
8.09	Is data from biodiversity surveys and monitoring available to researchers, universities, NGOs and forestry officers on a public domain?	
8.1	Has a survey of invasive species been undertaken and an inventory generated?	
	Section 9: Restoration	
9.01	Is a specialist on-board to provide guidance on forest restoration activities?	
9.02	Is up to 50% of the restoration workforce made up of individuals from local communities?	
9.03	Has any CH trigger species been recorded using the restored forest area?	
	Section 10: Hunting & Poaching	
10.01	Have warning signs been installed at the border of the buffer area of KNSP?	
10.02	When was the last joint patrol between PT SERD and local authorities?	Date:
10.03	When was the last patrol of the project boundary?	Date:
10.04	When was the last drone flight to monitor clearance of vegetation within 1 km of all access roads?	Date:

PART C: REPORTING

Overall Comments

Corrective Actions and Responsibilities

WILDLIFE SHEPHERDING PROTOCOL

Team

SERD will assemble a team comprising ecologists, veterinarians, local wildlife experts, wildlife handlers and hoarding Contractors to carry out the wildlife shepherding activities. In addition, there is the possibility of involving volunteers from nature groups in this effort. All personnel involved will be briefed on the details of this plan and their respective roles before field activities begin. Personnel will also be equipped with mobile communication devices on the field to ensure that lines of communication are maintained during field activities and that the appropriate persons (e.g. veterinarians, wildlife handlers) are able to respond to exigencies in a timely manner.

General Approach

The general approach to wildlife shepherding that will be undertaken is a combination of the following activities, which may be scheduled during daylight hours only (i.e. 8am to 6pm):
i) installation of hoarding, which will function as a drift fence to guide target terrestrial fauna in the intended direction of movement and as a barrier to prevent wildlife displacement onto adjacent roads;
ii) systematic pattern of walking through the site, starting from the area furthest from and then gradually moving towards the identified refuge area, in order to shepherd wildlife in an intended direction of movement towards adjacent refuge habitats, and;
iii) in conjunction with (ii), the site will be carefully surveyed to check for the presence of target fauna species and any active dens.

In order for the above-described approach to be effective, it is recommended that activities (ii) and (iii) be carried out repeatedly over a course of up to three weeks for a site no larger than twenty hectares. At the end of this duration, the site has to be inspected by an ecologist to ensure that no target fauna and active dens remain. Thereafter, gaps in the hoarding shall be closed as soon as practicable so as to prevent target terrestrial fauna from returning to the site.

In the event that any target fauna are encountered during this process, the following actions which have been developed with the consideration of reducing stress to fauna while ensuring the effectiveness of the shepherding exercise shall be taken:

Category A Fauna

i) Fauna from Category A: Category A comprises highly mobile fauna for which a passive shepherding approach is expected to be effective. Therefore, when fauna from Category A are encountered, personnel should remain in place to allow fauna to move on their own accord. Generation of mild human noise disturbance (e.g. talking loudly) may be used to encourage fauna movement. However, no attempt should be made to capture or handle these species, unless the animal is visiblyinjured in which case experienced wildlife handlers will carefully capture the animal for immediate veterinary attention. If any individual fauna does not move on its own after sufficient time (i.e. up to one hour) has passed, the area where the individual is located should be GPS-marked and left overnight to provide additional opportunity for the individual to
move on its own accord. Personnel shall return to the GPS-marked location on the following day to inspect the area. This process will be repeated until the individual has moved.

Category B Fauna

ii) Fauna from Category B: Category B comprises fauna for which a passive shepherding approach is expected to be unsafe and/or ineffective in guiding the individual fauna to move in an intended direction. Therefore, a capture-and-release approach will be needed to ensure safe relocation of these fauna from the site prior to construction. In the event that fauna from Category B are encountered, experienced wildlife handlers will carefully capture the animal for subsequent assessment and microchipping (where safe and possible) by a veterinarian. Where sensitive fauna (i.e. Sunda Pangolin) and venomous snakes from Category B are concerned, their capture shall only be carried out by designated wildlife handlers who have been trained in the appropriate handling techniques.

Arboreal and Aerial Species

As stated, the above-described approach will apply to target terrestrial fauna. In addition, it is envisaged that arboreal and aerial species shall generally be able to continue utilizing remnant habitats on the site during construction, and will not be excluded by the installed hoarding. These actions are as follows:

i) An ecologist shall inspect the tree for the presence of fauna, inhabited tree hollows, and nests.

ii) In the event that the presence of arboreal mammals and herpetofauna, birds and/or bats are detected on the tree, tree felling or transplanting must be postponed until the animal has left the tree on its own accord.

iii) In the event that an inhabited tree hollow is identified, tree felling or transplanting must be postponed until the animal has left the hollow on its own accord and the entrance to the hollow has been sealed to prevent re-entry.

iv) Tree felling or transplanting shall not occur during the prime breeding season for local avifauna, i.e. the months from approximately mid- March to July annually. In any case, if active nests are detected on the tree, nests shall be left undisturbed until nesting activities have been completed (i.e. the young have left the nest). In addition, inactive nests shall be removed to minimize the possibility of a new nesting attempt. Tree felling or transplanting shall occur only when no active nests are present on the tree.

v) Notwithstanding the aforementioned actions, after tree felling has occurred, an ecologist shall thoroughly search the fallen tree for any injured or trapped fauna that may have gone undetected. In the event that injured or trapped fauna are found, immediate veterinary attention shall be administered.

Fauna Crossing Installation

Background

Arboreal fauna located within the SERD Concession include Sumatran surili *Presbytis melalophos* , Siamang *Symphalangus syndactylus* and Smoky flying squirrel *Pteromyscus pulverulentus.* These species predominately live in the canopy of forests and rarely decend to the ground. The construction of roads and well pads as part of the SERD project will fragment forest cover within the Project area and reduce the ability of the fauna to move freely within the canopy. A series of canopy connectivity features are proposed to improve connectivity within the Project Area.

Biology

The target species all have differing maximum leaping distances based on their physical morphology. The Siamang has a maximum leaping distance of 9 metres; the Sumatran Surili may leap up to 5 metres. The Smoky Flying Squirrel may glide much greater distances (up to 25 metres).

Fauna Crossing Requirements

The SERD Project has a total road length of 42.5km with an additional 10km to be constructed. The length of road with Natural Habitat is approximately 18km.

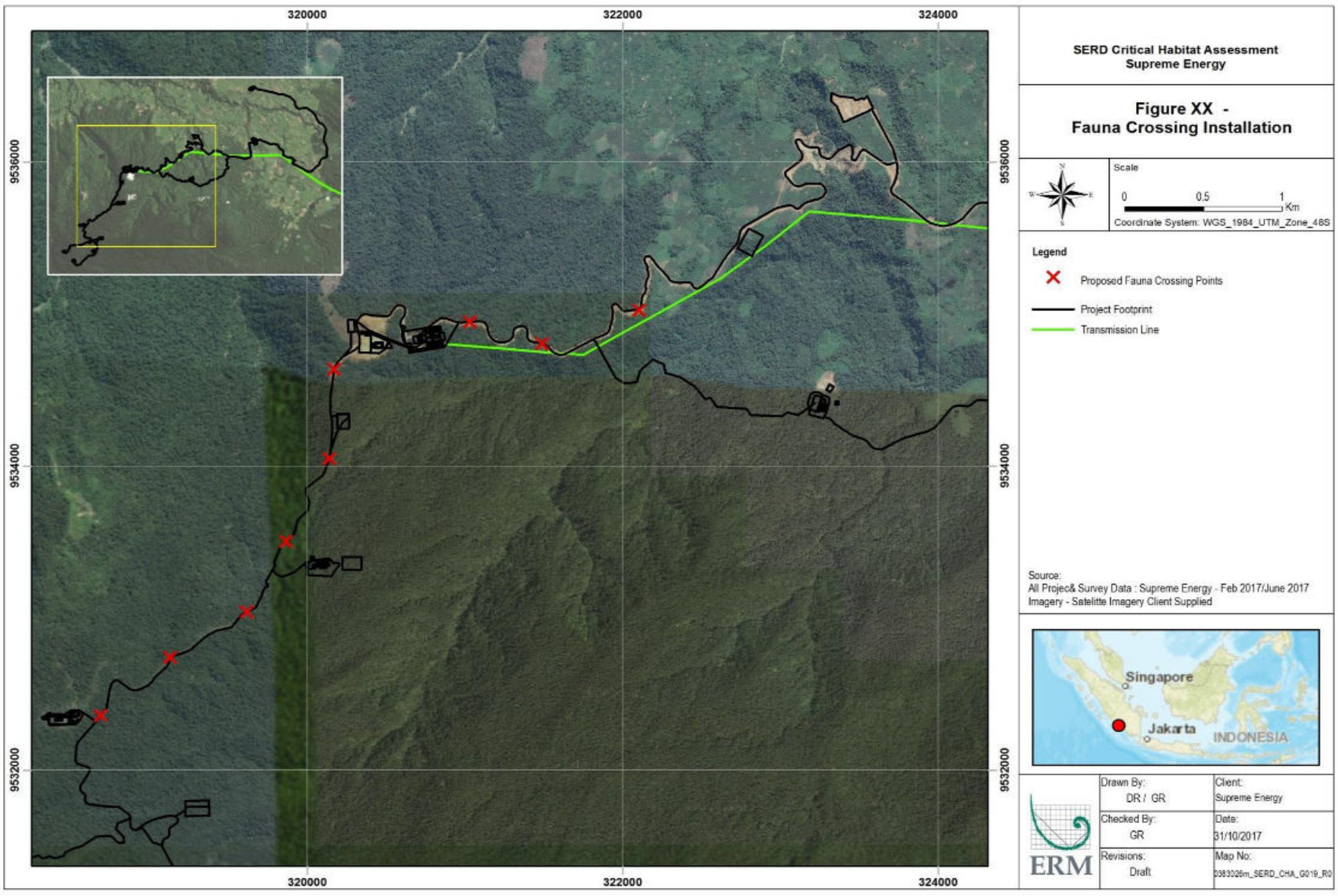
Fauna crossings are to be placed at the narrowest section of the road at a minimum spacing of 1 crossing per km. Field survey is to occur to identify the optimum location for the crossing. Fauna crossings are to be placed following sufficient information received that the locations are being used for wild life crossing. Approximate locations are shown in Figure 1. The following criteria are to be applied when identifying the crossing location:

- Crossing to be placed between two large trees located on adjacent sides of the road;
- Minimum height above ground level is to be 5 metres with a maximum height of 7 metres;
- Straight sections of road are preferred so fauna can observe oncoing vehicles;
- Maximum span of the road is to be 20 metres;
- Ropes are to be securely fastened around the trunk of the trees using natural forks to reduce chances of gravity fall; and

Monitoring

Fauna crossings are to be monitored using a camera trap for 1 month following installation. Use of the structure is to be recorded, including species, time of day and direction of travel. The monitoring is to be extended for 3 months if no records are detected.

Further assessment is to occur within 6 months of installation if no records are detected.



Invasive Species Management Plan

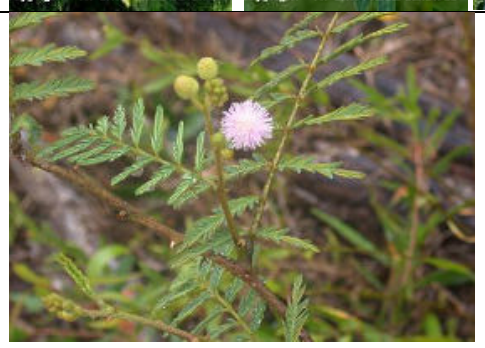
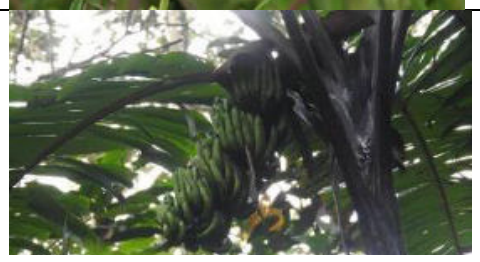
Procedures for the Eradication of Invasive Species

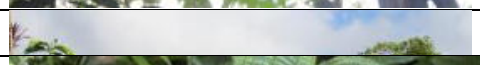
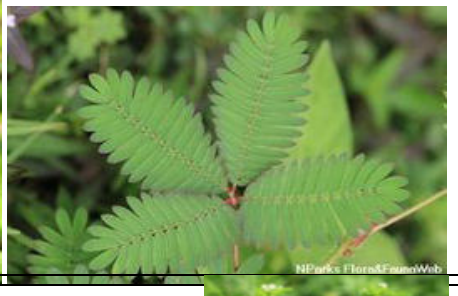
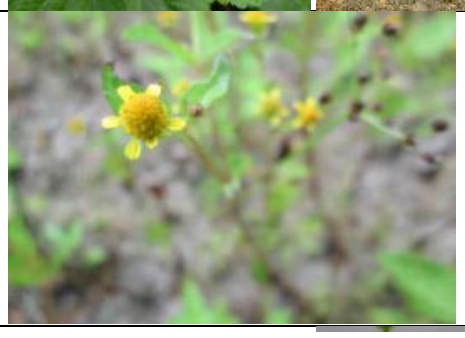
1) Use herbicides where appropriate to control invasive species within the Project Area in accordance with the safe use and label directions of the herbicides.
2) At areas where herbicides are not recommended for use (eg. Near drinking waterbodies), manual weeding or removal should be considered.
3) Where required, reforestation experts or ecologists from NGOs can be engaged to provide advice on eradication activities.

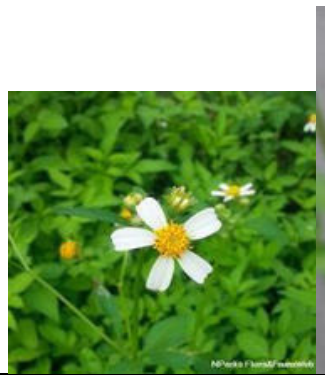
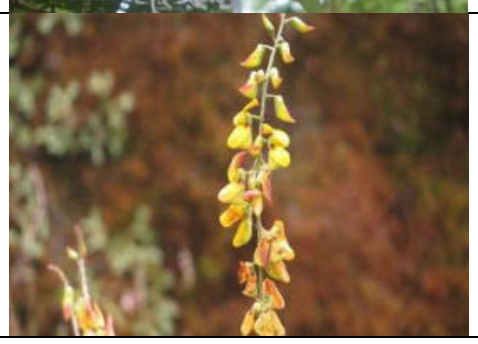
Procedures to Prevent the Transmission of Invasive Species

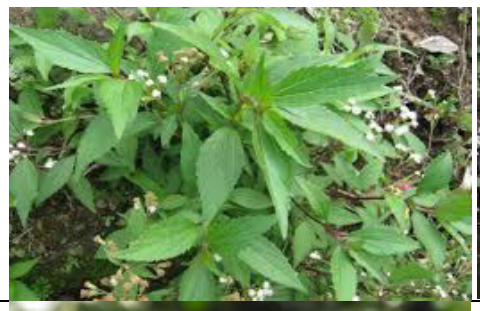
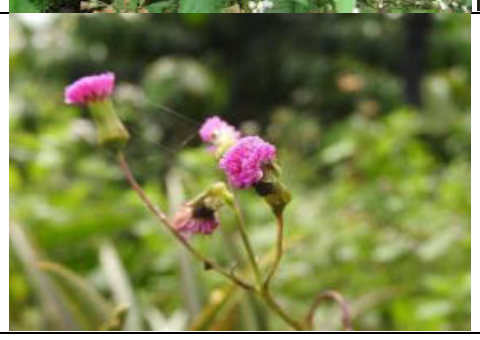
1) Wheel wash bays to be installed at the guardhouse at to remove dirt and plant material from vehicle wheels prior to entering and leaving the Project Area.
2) Conduct monitoring of invasive species on an annual basis. Data for the following monitoring parameters should be collected:
a. Locations of patches of high density/concentration of invasive species
b. Rough extent of patch size for the abovementioned areas
c. Number of invasive species recorded from surveys
d. Ecological interactions: utilisation of invasive species by native fauna
Spatial data should be maintained on a biodiversity database.
3) Conduct a comparison of year-on-year invasive species monitoring findings to assess if invasive species are proliferating within the project area.
4) If species are found to be proliferating, control using herbicides or manual weeding. Investigate to understand paths of transmission and if it is feasible for the Project to adopt further control measures.
5) Areas where invasive species have been removed must be rehabilitated to prevent the re-establishment of these species as many of them are weedy species that re-colonise bare ground quickly. Actions that can be undertaken include:
a. Removal of soil layer where seed bank or rhizomes is mostly contained, to remove all presence of invasive species propagative parts;
b. Replace soil with soil that has been excavated from another part of the project area OR treat soil with herbicide or do manual weeding;
c. During the wet season, plant native seedlings (obtained from site nursery) into soil, adopting an intensive and high density planting pattern;
d. Fertilise the planted saplings with generic fertilizer
e. Lay mulching (dead plant matter) around the saplings to reduce desiccation and weed growth
f. Continue hand weeding regularly
g. Monitoring regeneration of patch
Where required, reforestation experts or ecologists from NGOs can be engaged to provide advice on reforestation activities.

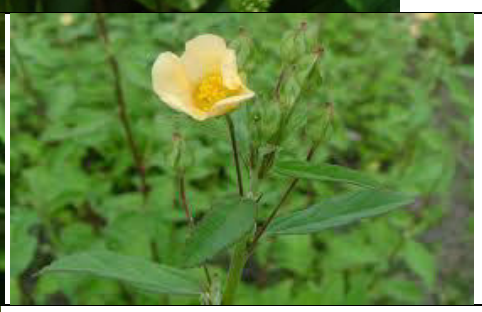
Invasive Species Identified at SEML

No	Species/Common Name	Photo
	GSID (2015)	
1	*Imperata cylindrica* Cogon grass	 
2	*Leucaena leucocephala* Horse/wild tamarind	   
3	*Mimosa pigra* Catclaw mimosa	
4	*Austroeupatorium inulifolium*	
5	*Musa acuminata*	

		
6	*Pteris tripartita*	
7	*Clidemia hirta*	 
8	*Lantana camara*	
9	*Melastoma malabathricum*	 
10	*Crassocephalum crepidioides*	
11	*Ludwigia peruviana*	
12	*Mimosa pudica*	 
13	*Ageratum conyzoides*	  
14	*Acmella paniculata*	

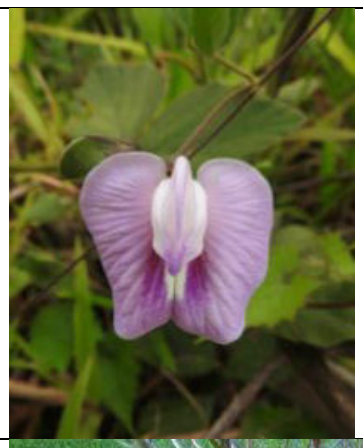
15	*Bidens pilosa*	 
16	*Piper aduncum*	
17	*Passiflora lingularis*	
18	*Crotalaria pallida*	
19	*Mimosa diplotricha*	
20	*Stachytarpheta indica*	  
21	*Ricinus communis*	  
22	*Passiflora edulis*	
23	*Ageratina riparia*	 

		 
24	*Emilia sonchifolia*	

25	*Mikania micrantha*	 
26	*Sida rhombifolia*	 
27	*Gliricidia sepium*	

28	*Spermacoce alata*	
29	*Ruellia tuberosa*	 

30	*Solanum chrysotrichum*	 
31	*Clibadium surinamense*	

		
32	*Senna bicapsularis*	
33	*Centrosema pubescens*	
34	*Pennisetum purpureum*	 
35	*Saccharum spontanum*	

CLEANING INVASIVE ALIEN PLAN ACTIVITY

Work plan

1. The workers will be drop off at location and they will walk looking for invasive alien than revoked or taking out the plants
2. Taking out the invasive alien and buried the plants for compos
3. Small plants or dificult to taking out will be spraying with herbicide

TIME ACTIVITY PLAN

LOCATION	ESTIMATE WIDE AREA		INVASIVE ALIEN TARGET (SEE PICTURE)	OCTOBER				NOVEMBER					DECEMBER				JANUARY				
				W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13	W14	W15	W16	W17	
Well Pad B area upper terace	18,800	m^2	B,C,G,J,M																		*Team 1*
Well Pad B area lower terace	8,500	m^2	B,C,G,J,M																		*Team 1*
Explosive bunker area	35,200	m^2	B,C,G,J,M																		*Team 1 -2*
Shortcut - east side	10,400	m^2	E,F,G,I,J,L,M,N																		*Team 1*
Shortcut - west side	12,800	m^2	E,F,G,I,J,L,M,N																		*Team 2*
Jl. Gajah - Pump#3 area	6,570	m^2	A,B,C,D,G,H,M,N																		*Team 1*
Jl. Elang - Pump#4 area	18,820	m^2	A,B,C,D,G,H,M,N																		*Team 2*
Well Pad E area	28,700	m^2	A,C,H,F,M																		*Team 1 -2*
Jl. Cendrawasih	3,850	m^2	B,C,G,H,I,K,M																		*Team 1*
Well Pad C area	22,500	m^2	A, B, C, D,K																		*Team 1 -2*
Jl. Ibis	14,960	m^2	B,C,G,J,K,M																		*Team 1*
Well Pad I area lower terace	15,800	m^2	C,D,I,K,N																		*Team 1 -2*
Well Pad I area upper terace	7,900	m^2	C,D,I,K,N																		*Team 1 -2*

Manpower

Manpower is daily worker, total manpower will be developed is six person and spread into two team.

	Equipment	
1.	Manual hand tools	: 2 Set
2.	Manual sprayer tank 15 litı	: 2 Set
3.	Herbicide	: As required
4.	Bachoe loader for digging and buried the plants	
5.	Stilth gas trimmer	: 1 set

Figure Number	Title
Figure 1	Survey Locations for Flora Monitoring *Map 3-1, Greencap (2015) Final Report of Study of Endangered Species at Rantau Dedap, SERD*

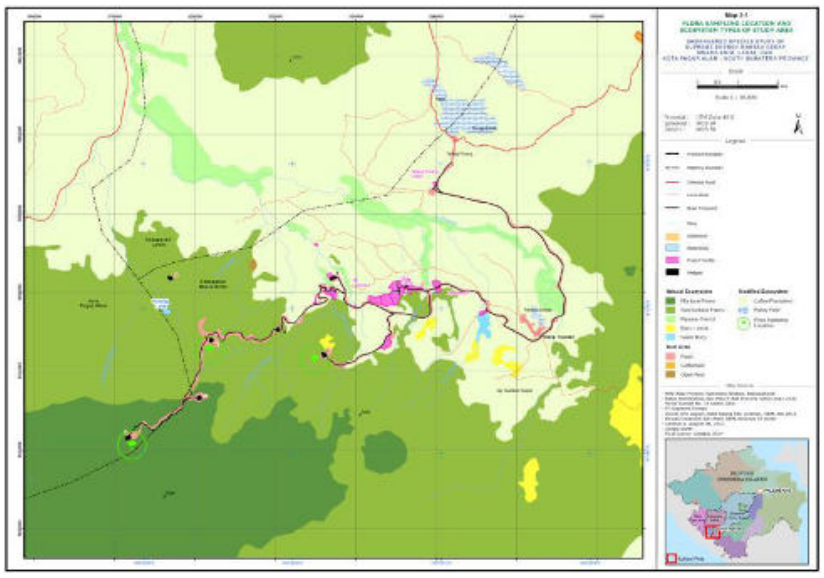


Figure 2 Survey Locations for Fauna Monitoring
Map 3-2, Greencap (2015) Final Report of Study of Endangered Species at Rantau Dedap, SERD

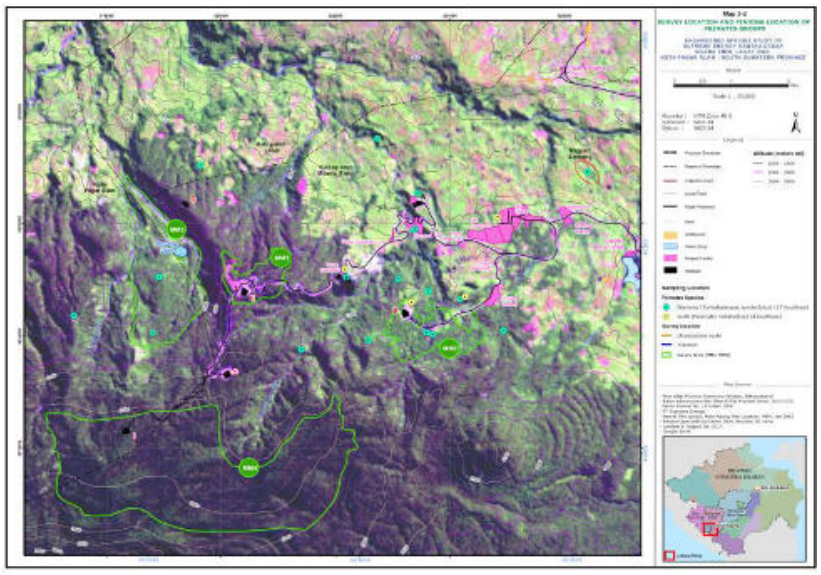
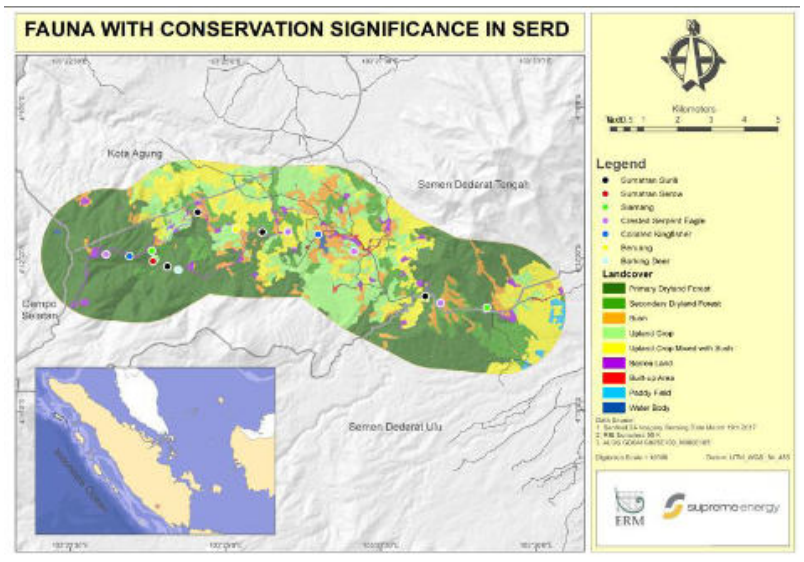


Figure 3 Survey Locations for Fauna Monitoring

2017 Fauna Survey of Transmission Line and Brine Pipeline



Rantau Dedap Geothermal Power Plant, Lahat Regency, Muara Enim Regency, Pagar Alam City, South Sumatra Province

Biodiversity Offset Strategy

supreme energy

January 2018

Version 5

ERM

The business of sustainability

FINAL REPORT

Supreme Energy

Rantau Dedap Geothermal Power Plant, Lahat Regency, Muara Enim Regency, Pagar Alam City, South Sumatra Province

Biodiversity Offset Strategy

Version 5

January 2018

Reference: 0383026 SERD Biodiversity Offset Plan

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CONTENTS

1 INTRODUCTION

1.1 PURPOSE OF THE REPORT

The Strategy complements the findings of the Critical Habitat Assessment (CHA) undertaken by ERM for the Supreme Energy Rantau Dedap (SERD) Geothermal Project (Project) (ERM 2017). Specifically, the CHA assesses the impacts on biodiversity values and applies the mitigation hierarchy according to the provisions of the International Finance Corporation (IFC) *Performance Standard 6* (PS6) *Biodiversity Conservation and Sustainable Management of Living Natural Resources* (IFC 2012).

The Strategy outlines the approach to offset the residual terrestrial biodiversity values impacted by the Project. It outlines the proposed governance, financial and administrative arrangements to manage biodiversity values necessary to achieve a no-net-loss for Natural Habitats and net gain for Critical Habitats as required by IFC PS 6.

Biodiversity offsets are designed to compensate for the residual biodiversity losses due to the Project. They are defined as (BBOP 2012):

"Biodiversity offsets are measurable conservation outcomes resulting from actions designed to compensate for significant residual adverse biodiversity impacts arising from project development after appropriate prevention and mitigation measures have been taken. The goal of biodiversity offsets is to achieve no net loss and preferably a net gain of biodiversity on the ground with respect to species composition, habitat structure and ecosystem function and people's use and cultural values associated with biodiversity."

This report provides an analysis of the biodiversity offset options available for SERD to achieve a no-net-loss of biodiversity values for Natural Habitats and net-gain of biodiversity values for Critical Habitats (IFC PS6 only).

1.2 RELEVANT ENVIRONMENTAL STANDARDS AND GUIDELINES

The relevant standards applicable to this project are:

- Asian Development Bank (ADB) Safeguard Policy Statement (SPS); and
- International Finance Corporation (IFC) Performance Standards (PS) (in particular, IFC PS6 *Biodiversity Conservation and Sustainable Management of Living Natural Resources*)

ERM has undertaken a biodiversity offsets assessment based on the guidance contained in the Business and Biodiversity Offset Program (BBOP) resource documents:

- Biodiversity Offset Design Handbook (BBOP 2012a); and
- Resource Paper: No Net Loss and Loss-Gain Calculations in Biodiversity Offsets (BBOP 2012b).

1.3 *RELEVANT INDONESIAN LAWS AND REGULATIONS*

The Indonesian Government has legislated laws and regulations to manage wildlife, national parks and conservation activities within the country. Laws and Regulations exist at the National level, Provincial and local level for this purpose. These laws cover terrestrial forest and conservation, management of forests and forestry resources, fisheries and water resources.

A desktop assessment has been completed to determine the most relevant laws and regulations necessary to facilitate the establishment and management of biodiversity offsets for the Project. A full list and summary of laws and regulations is contained at *Attachment A*.

A summary of select relevant laws and regulations is outlined below.

1.3.1 National laws and regulations

1.3.1.1 Law No. 41/1999 on Forestry Affairs

This national law outlines the principles of forestry management within Indonesia. It defines the role of jurisdictions for the management of forests and natural resources contained within Indonesian territory. The government has the authority to maintain and manage anything related to forested areas and forest products. It can stipulate certain areas as forest or non-forest areas and can stipulate the legal relations between people and forests and the legal acts concerning forestry (Article 4).

Terrestrial forest offset management will require the consideration of the rights of traditional communities to use forests that may be subject to biodiversity offsets.

1.3.1.2 Basic Forestry Law (Act No. 5 of 1967)

This Act outlines the basic principles that govern the management and conservation of state and private forests. The purpose of this Act is the protection of forest, to be achieved through a proper management of forests and forestry products. The government is required to make a general plan for the rational management and conservation of forests. The management can be undertaken by the Government, joint ventures (such as with NGOs) or granted to State enterprises. The Act also contains enforcement provisions in relation to illegal practices, including penalties.

The Act allows Government authorities to enter into Memorandums of Understanding (MoU) with NGOs and Private companies to assist in the management of forested lands within Indonesia.

1.3.1.3 Law No. 18/2013 on the Prevention and Eradication of Forest Destruction

This Law establishes forest protecting measures in order to prevent and eradicate Forest Destruction. It aims at enforcing the following principles within the national territory: justice and legal certainty; forest sustainability; state responsibility; public participation; vicarious liability; priority and integrity and coordination. Provisions concerns illegal forest logging and use specifying forest protecting measures to be applied.

This law may be used by relevant authorities to control and manage the illegal clearing of forests. This will be a relevant consideration for a biodiversity offset strategy where forest clearing and speculation is a key threat.

1.3.2 Government regulations ("peraturan pemerintah"; pp)

1.3.2.1 Government Regulation No. 24/2010 on the Use of Forest Areas

Government Regulation No. 24/2010 implements provisions on the use of forests and of forest areas for non-forestry development activities. These activities may be carried out only in production forest areas and in protected forest areas without altering the main function of forest areas.

The Regulation specifies that non-forestry development activities, which include mining, water resource facilities and infrastructure, water installation networks, public facilities and clean water and waste water channels, can only be done for activities that have an inevitable strategic aim (Article 4). Forest areas may be used only based on forest area lend use permits (Article 6). Procedures and requirements for obtaining permits are set out in the Regulation (Article 9). The Regulation further provides for: obligations of permit holders (Article 11); the monitoring and evaluation of permit holders by the Minister (Article 19); reasons for revoking permits (Article 15 and Article 17); and sanctions (Article 23).

Further investigation may be required on whether biodiversity offset management activities would require a permit under this Regulation.

1.3.2.2 Government Regulation No. 6/2007 Concerning Forest Structuring and Making of Forest Management Plans, Utilization of Forests and Use of Forest Areas

The purpose of this Regulation is to design and plan activities related to forest structuring and making of forest management plans, utilization of forests and use of forest areas. Activities are carried out in the form of Conservation Forest Management Unit (KPHK), Protection Forest Management Unit (KPHL) and Production Forest Management Unit

(KPHP). Conservation forests consist of nature reserve forest areas, nature conservation forest areas and hunting parks. The forest structuring in these areas are described in sections 7 to 11. The forest structuring activities in protection forests and production forests are listed in sections 12 and 13. A forest management plan shall be made based on the results of forest structuring in each forest management unit. Chapter III deals with matters related to the utilization of forests in conservation, protection and production forests. Forest utilization permits in protection and production forests are issued as described in sections 22 and 23 and sections 32 to 35. Licensing and fees related to the various business permits are dealt with in sections 36 to 51. Chapters V and VI deal with matters related to private forests and use of forest areas. In order to protect the state's rights to forest products and sustainable forest, there shall be a control of distribution and marketing of forest products through their proper administration (Chapter VII). To ensure the well-arranged implementation of such forest structuring and making of forest structuring plans and making of forest management plans, utilization of forests and use of forest areas, the Minister has the authority to provide guidance, control and supervision over the policy of the Governor and Bupati or Mayor (Chapter VIII).

This Regulation is relevant as it contains provisions that could be used to create relevant administrative and governance mechanisms to manage biodiversity offset areas. These include the establishment of Conservation Forest Management Units (KPHK), Protection Forest Management Units (KPHL) and the preparation of forest management plans. These mechanisms can be used to provide a regulatory structure for the management of biodiversity offsets.

1.3.3 Ministerial regulations ("peraturan menteri"; permen)

1.3.3.1 Regulation of the Minister of Forestry of RI No. P.06/MENHUT-II/2010 on norms, standards, procedures and criteria for forest management in Protected Forest Management Unit (KPHL) and Producing Forest Management Unit (KPHP)

This Regulation aims to arrange forest management in Protected Forest Management Unit (KPHL) and Producing Forest Management Unit (KPHP). Forest management include activities covering: forest layout and structuring of forest management programs; forest utilization; forest zone use; forest rehabilitation and reclamation; and forest protection and natural preservation. The Minister of Forestry shall be responsible for implementing management, control and technical supervision on the implementation of forest layout and in structuring forest management programs, forest rehabilitation and reclamation and forest protection by the KPHL and KPHP.

This Ministerial regulation contains provisions to direct the structure and management of forest management activities and management plans.

1.3.3.2 *Regulation of the Minister of Forestry No. P.6/Menhut-II/2009 on the Establishment of Forest Management Unit*

This Regulation provides for the establishment of Forest Management Units in order to support the implementation of efficient and continuous forest management. The Regulation classifies Forest Management Units into Preserved Forest Management Units, Protected Forest Management Units and Producing Forest Management Units. The Regulation further provides for criteria and indicators for the establishment of Forest Management Units and sets out procedures for their establishment.

This regulation contains relevant provisions for the establishment of Forest Management Units to undertake forest management. These provisions can be used to administer and guide the Unit in the management of a biodiversity offset area.

1.3.4 Ministerial decrees ("keputusan menteri"; kepmen)

1.3.4.1 *Decree of the Minister of Forestry No. SK.83/Menhut-II/2005 on the appointment of forest group Sungai Meranti-Sungai Kapuas in Jambi and South Sumatra provinces*

The purpose of this Decree is to realize ecosystem restoration in production forest areas by appointing the forest group Sungai Meranti-Sungai Kapuas in Jambi and South Sumatra provinces, consisting of 101,355 hectares, for ecosystem restoration activities.

This Ministerial Decree was used to outline a specific project for ecosystem restoration in South Sumatra province. A similar Ministerial Decree could be used to outline the administrative and financial arrangements necessary to manage the biodiversity offset.

2 BIODIVERSITY OFFSET DESIGN APPROACH

ERM has utilised the requirements of IFC PS 6 to outline the requirements to design the biodiversity offset. The steps are undertaken are outlined in *Table 2.1* below.

Table 2.1 Biodiversity Offset Design Steps

Design Step	Approach
1. Ensuring that the development project meets all applicable laws, regulations and policies pertaining to biodiversity offsets;	ERM has summarised and highlighted the applicable laws and regulations applicable to the Project. See *Section 1.3 Relevant Indonesian Laws and Regulations*
2. Establishing an effective process for Affected Communities to participate in designing and implementing the biodiversity offset;	ERM and SERD conducted consultation with the Indonesian Forestry Department,
3. Describing the project's scope and predicted impacts on biodiversity, applying and documenting the steps in the mitigation hierarchy and using defensible metrics that properly account for biodiversity to calculate residual impacts;	ERM has completed this step in the CHA report. Additional assessments for Critical Habitat species (net gain) and no-net-loss assessment has been undertaken. See *Section 3 Assessment of No-net-loss and Net Gain*.
4. Identifying suitable opportunities (potential offset sites, activities and mechanisms) for achieving "like-for-like or better" biodiversity gains to balance the losses due to the development;	This report provides an assessment of the suitable offset sites, mechanisms and activities necessary to achieve relevant offset goals.
5. Quantifying the required biodiversity gains to achieve a no net loss or net gain outcome of biodiversity values and selecting the preferred locations and activities to provide these gains; and	This report provides an assessment of no-net-loss/net gain and identified preferred location for biodiversity offsets.
6. Setting the specific offset activities and locations in a biodiversity offset management plan to guide implementation.	To be developed in a Biodiversity Offset Management Plan (BOMP).

3 ASSESSMENT OF NO-NET-LOSS AND NET GAIN

Mitigation and management approaches have been considered to avoid, minimize and mitigate potential impacts to biodiversity as a result of Project activities. In general, many of the indirect impacts to biodiversity values can be minimized, such as behavioral disturbances, degradation of habitats, edge effects and barriers to terrestrial fauna movement. The next step of the mitigation hierarchy necessitates consideration of biodiversity offsets for residual impacts on biodiversity values.

3.1 RESIDUAL IMPACTS ON BIODIVERSITY VALUES

3.1.1 Habitat Impacts

The residual impacts to biodiversity identified largely relate to unavoidable habitat loss within the footprint of the Project and edge effects.

Direct disturbance to habitats will be minimized where possible however this impact assessment has identified an unavoidable loss of approximately 72.63ha of natural habitat will occur due to Project related activities. ERM has completed an assessment using an appropriate offset metric for the Project within the CHA using Habitat Hectares. The results of the assessment have identified that a range of habitat areas would be required to be managed in order to achieve a no-net-loss of biodiversity values. These areas are shown in *Table 3.1*.

Table 3.1 Areas of Required Offsets to Achieve No-Net-Loss

Forest Type	Habitat Condition	Habitat Type Area (Hectares)
Primary/secondary Forest	Benchmark	516.0
	Natural	387.0
	Modified	290.0
	Degraded	211.0

3.1.2 Residual Impacts to Species (Net-Gain)

An assessment of Critical Habitat species and habitats has been undertaken to determine the requirements to achieve net-gain for these values as required by IFC PS6.

The following Critical Habitat species have been identified within the CHA:

- Rafflesia bengkuluensis (Endemic)
- *Manis javanica* Malayan pangolin (CR)
- *Maxomys inflatus* Broad-nosed Sumatran maxomys (VU/Endemic)
- *Panthera tigris sumatrae* Sumatran tiger (CR/Endemic)
- *Presbytis melalophos* Sumatran surili EN/Endemic
- *Carpococcyx viridis* Sumatran ground-cuckoo (CR)
- *Symphalangus syndactylus* Siamang (EN)

- *Vanda foetida* (Orchid) (NA/Endemic)
- *Tapirus indicus* Malayan tapir (EN)
- *Rhacophorus bifasciatus* (NT/Endemic)

The assessment has determined whether habitat offsets would be sufficient surrogates to achieve net-gains in species populations. The assessment has considered the existing threats to these species in Sumatra, Indonesia and additional threats posed by the project. The assessment is outlined in *Table 3.2*.

3.1.3 Residual Impacts to Species (No-Net-Loss)

The following species have been identified within the project concession and are subject to assessment of No-net-loss in Natural Habitats.

- *Dipterocarpus sp.* CR
- *Haemocharis integerrima*
- *Taxus sumatrana* EN
- *Apalharpactes mackloti* Sumatran trogon LC
- *Arborophila rubrirostris* Red-billed partridge LC
- *Cochoa beccarii* Sumatran cochoa VU
- *Dicrurus sumatranus* Sumatran drongo NT
- *Garrulax bicolor* Sumatran laughingthrush EN
- *Gallinula chloropus* Common moorhen LC
- *Hydrornis schneideri* Schneider's pitta VU
- *Lophura inornata* Salvadori's pheasant NT
- *Motacilla cinerea* Grey wagtail LC
- *Muscicapa dauurica* Asian brown flycatcher LC
- *Myophonus melanurus* Shiny whistling-thrush LC
- *Pericrocotus miniatus* Sunda minivet LC
- *Pernis ptilorhynchus* Oriental honey buzzard LC
- *Polyplectron chalcurum* Bronze-tailed peacock-pheasant LC
- *Trichastoma buettikoferi* Sumatran babbler NT
- *Ficedula hyperythra sumatrana* Snowy-browed Flycatcher LC
- *Arctonyx hoevenii* Sumatran hog badger LC
- *Cuon alpinus* Dhole EN
- *Hylopetes winstoni* Sumatran flying squirrel DD
- *Maxomys hylomyoides* Sumatran mountain maxomys DD
- *Muntiacus montanus* Sumatran mountain muntjac DD
- *Mus crociduroides* Sumatran shrewlike mouse DD
- *Nesolagus netscheri* Sumatran striped rabbit VU
- *Pteromycus pulverulentus* Smoky flying squirrel EN
- *Rattus korinchi* Sumatran mountain rat DD
- *Hylobates agilis* Agile Gibbon EN
- *Calamaria margaritophora* Stripe-necked reed snake DD
- *Iguanognathus werneri* Spatula-toothed snake DD
- *Typhlops hypsobothrius* Sumatra worm snake DD
- *Chalcorana crassiovis* Korinchi frog DD

- *Tor tamboides* Mahseer Fish DD

From the assessment, specific management actions are recommended for all species as habitat offsets are likely to achieve adequate conservation management. This species will require specific actions within the Biodiversity Offset Management Plan to address specific threats.

3.1.4 Requirements for monitoring and evaluation

The IFC PS6 standards and BBOP guidance recommend that a quantifiable metric be used to assess the required biodiversity gains to achieve a no net loss or net gain outcome of biodiversity values. For each species identified as Critical Habitat species or species identified as requiring additional conservation actions, the BOMP will require to outline specific monitoring measures to assess species persistence in the landscape. Where appropriate, monitoring undertaken as part of other conservation programs may be used as a surrogate for management within the offset area.

Additional conservation actions may be required to achieve net-gain if species predicted to occur (but not detected) are identified within the project area during operation.

Table 3.2 Critical Habitat Species No-net-loss/Net-Gain Assessment

Scientific Name / Common Name	IUCN	Pre-mitigation impact and threats	Residual impact after mitigation	Required Offset	Biodiversity Offset KPI
Rafflesia bengkuluensis	NA	• Habitat loss • Edge effects • Fragmentation • Degradation of habitat • Loss of individuals	Habitat loss	• Habitat offset compensates for losses. No specific offset required • Translocation and/or replanting will compensate for losses within the Project Area	• Net increase in species population within the Project Area
Vanda foetida	NA	• Habitat loss • Edge effects • Fragmentation • Hunting and poaching • Degradation of habitat • Loss if individuals	Habitat loss	• Habitat offset compensates for losses. No specific offset required • Translocation and/or replanting will compensate for losses within the Project Area	• Net increase in species population within the Project Area
Manis javanica Malayan pangolin	CR	• Habitat loss • Hunting and poaching	Habitat loss	• Habitat offset compensates for losses. No specific offset required	• Management of threats • Net increase in species population within the Project Area/DMU
Maxomys inflatus Broad-nosed Sumatran maxomys	VU	• Habitat loss • Hunting and poaching • Fragmentation	Habitat loss	• Habitat offset compensates for losses. No specific offset required	• Management of threats • Net increase in species population within the Project Area/DMU
Panthera tigris sumatrae Sumatran tiger	CR	• Habitat loss • Hunting and poaching • Degradation of habitat	Habitat loss	• Habitat offset compensates for losses. No specific offset required	• Management of threats • Net increase in species population within the Project Area/DMU
Presbytis melalophos Sumatran surili	EN	• Habitat loss • Hunting and poaching • Fragmentation	Habitat loss	• Habitat offset compensates for losses. No specific offset required	• Management of threats • Net increase in species population within the Project Area/DMU
Carpococcyx viridis *Sumatran ground-cuckoo*	CR	• Habitat loss • Hunting and poaching • Fragmentation	Habitat loss	• Habitat offset compensates for losses. No specific offset required	• Management of threats • Net increase in species population within the Project Area/DMU
Symphalangus syndactylus Siamang	EN	• Habitat loss • Hunting and poaching • Fragmentation	Habitat loss	• Habitat offset compensates for losses. No specific offset required	• Management of threats • Net increase in species population within the Project Area/DMU

Scientific Name / Common Name	IUCN	Pre-mitigation impact and threats	Residual impact after mitigation	Required Offset	Biodiversity Offset KPI
Tapirus indicus Malayan tapir	EN	• Habitat loss • Vehicle Strike • Hunting and poaching • Degradation of habitat	Habitat loss	• Habitat offset compensates for losses. No specific offset required	• Management of threats • Net increase in species population within the Project Area/DMU
Rhacophorus bifasciatus	NT	• Habitat loss • Edge effects • Fragmentation • Degradation of habitat (water pollution)	Habitat loss	• Habitat offset compensates for losses. No specific offset required	• Management of threats • Net increase in species population within the Project Area

CR = Critically Endangered; EN = Endangered; DD = Data Deficient; NT = Near Threatened; NA = Not Assessed

4 CONSULTATION

ERM undertook consultation in South Sumatra in April 2017 with the following organisations:

- Indonesian Forestry Department, Palembang
- Watershed Management Department, Palembang

The consultation conducted by ERM occurred from 5-6 April 2017. The following questions were asked of both participants:

- Are there any precedents for biodiversity offsets in protected areas in Sumatra?
- Is it lawful in Indonesia for a private company to contribute to the Indonesia Government for conservation management in Protected Areas?
- If it is lawful, can direct financial contributions be made to an Indonesia government department or a third party (such as a conservation NGO) to pay for conservation management?
- Are there any current conservation programs within Sumatra that would benefit from conservation management? If so what are the details of the programs?
- Has the Indonesia Government partnered with any conservation NGOs to facilitate protected area management?
- Is there any Protection forest that will be subject to forest restoration activities? If so, where are these areas?
- Is there private land that has been identified as a conservation priority within the area?
- What are the current costs for managing protected areas and conservation prograokms in the Region?

SERD also undertook additional consultation with the following organisations in May 2017:

- Universitas Sriwijaya
- Palembang Environmental and Forestry R&D Agency
- Environmental Agency Kota Pagar Alam
- Forum Gajah
- Forum Harimau Kita
- Protection Forest Watershed Management Board Musi
- Conservation and Natural Resources Agency South Sumatra
- Energy and Mineral Resources Agency
- GIZ BIOCLIME
- KPB SOS

4.1 RESPONSES FROM INDONESIAN DEPARTMENT OF FORESTRY, PALEMBANG

The Indonesian Department of Forestry Palembang office discussed a number of forest management activities within their area of jurisdiction. This included

current Forestry Protection Plans prepared for companies such as MedCo, Conoco Philips and Talisman Energy.

These plans have been prepared under Forestry Minister Regulation No. P.89/Menhut-II/2014 on *Village Forest*. Permits are also required for these plans under Forestry Minister Regulation No. P. 50/Menhut-II/2010 *Granting Licenses for Timber Production in Natural Production Forests*. These Forest Management Plans are prepared for 3 years.

A Memorandum of Understanding (MoU) has been prepared to enable the private sector to engage with the preparation of Forest Management Plans. The MoU can be used to manage the site for the offset management period (30 years).

A community forest program currently occurs near to the SERD site. This is conducted in Protection Forest and involves a local community program to help protect the forest and reduce deforestation.

4.2 *RESPONSES FROM WATERSHED MANAGEMENT DEPARTMENT, PALEMBANG*

The Watershed Management Department in Palembang has participated in conservation planning in South Sumatra. These forest plans have been prepared for various private companies, including DSSP Power, Conoco Philips. Forest Protection Zones or priority areas have been identified within South Sumatra, with 15,000ha available for forest rehabilitation.

5 RELEVANT CONSERVATION PROGRAMS

Conservation programs may be used as a surrogate for biodiversity offsetting where conservation actions within physical offsets are not available or are not suitable to achieve the required offset goal. Other programs are run by NGOs within Sumatra focussing on conservation actions for specific species or habitat management. Additional contributions to these programs may be used as an offset if required.

5.1 Relevant Conservation Actions undertaken by SERD

Existing conservation actions are undertaken by SERD are outlined in ***Table 5.1*** below.

Table 5.1 Existing Conservation actions undertaken by SERD

Program Name	Location	General Description
Installed forestry signs	Various locations around project area	Forestry signs are designed to raise awareness of local people of the relevant laws and regulations managing forests.
Installed Security Post + CCTV	- Post-1 (near Warehouse) - Post-2 (near Wellpad E)	The CCTV monitors local people and movement into and from the Project Area to identify any unauthorized activities.
Conduct patrol with police and forestry	Around project area	Undertake monitoring of activities within the Project area and vicinity in conjunction with local police to discourage illegal activities.
Conduct public consultation with local communities	Villages around project area	Conduct education and consultation activities to influence local villagers regarding consultation.
Bought and installed camera traps	Around project area	Monitor existence of mobile terrestrial species.
Bought drone	Project area	Monitor the extent of land-use change within the Project Area.
Conduct revegetation activities	Along access road and at unused area	Rehabilitate land following activities to restore forested areas to prevent erosion and promote conservation.
Install no-cutting signs	Around project area	Forestry signs are designed to raise awareness of local people of the relevant laws and regulations managing forests.

5.2 Relevant Conservation Programs in Sumatra

ERM has conducted research into current conservation programs in Indonesia that could be used to provide conservation contributions to satisfy the offset obligations. Consideration of the concept of additionality will be required if these programs are considered. The list of programs identified is outlined below (***Table 5.2***). A full list of conservation programs in Sumatra is contained at ***Annex A***.

Table 5.2 Relevant Conservation Programs in Indonesia

Program Name	Location	General Description
Sumatran Tiger Trust Conservation Program	Sumatra - Bukit Tigapuluh National park (Riau and Jambi provinces) - Way Kambas National Park (Lampung province)	The program objectives are to save from extinction any sub-species of tiger, in particular the Sumatran tiger; support specific collaborative projects and captive breeding and management initiatives; provide information on the current census of the distribution and status of wild tigers and ecology; and to educate the public.
Project for Forest Conservation in Sumatra	Sumatra - Bukit Barisan Selatan National Park (Southern Sumatra) - Tesso Nilo National Park (Riau province)	The program objectives are to enable local residents to maintain their livelihoods through sustainable methods, to restore forests and protect biodiversity. This is accomplished through tree-planting programs, elephant patrols and promotion of eco-tourism.
Ministry of Forestry Community-based Rehabilitation Program	Indonesia	In 2002, the Ministry of Forestry initiated a policy for social forestry, and developed a technical plan under the Five Year Plan on Forest and Land Rehabilitation Program. Catchment areas were used as units of management. The program focuses on rehabilitating 17 catchment areas over 2002 - 2007 at the cost of USD 1.6 billion. Specifically in Sumatra, rehabilitation of ex-concession areas were carried out from 1999 - 2001, covering 10,950 ha and costing $1.7 million USD.
The Wildlife Conservation Society - Indonesia Program (WCS-IP)	Indonesia	This program aims to conserve wild Places (i.e. forests and parks) and protect animals throughout Indonesia. Deforestation reduction was enforced anti-poaching/illegal wildlife trade prevention measures were pushed forward, ecological studies and research were undertaken, protective zones were set up, animal-human conflict management measures were implemented etc. These measures were enforced through laws and policies. Wild places targeted in Sumatra are the Leuser landscapes, the Way Kambas National Park and Bukit Barisan and targeted animals found in Sumatra include the Sumatran Tiger, Sumatran Rhino, Sumatran Elephant, Pangolin and the Helmeted Hornbill.
Kerinci Seblat Tiger Protection Project/ Kerinci-Seblat Tiger Protection and Conservation Programme	Sumatra Kerinci Seblat National Park, Western Sumatra	The programme aims to reduce threats to the biodiversity of Kerinci Seblat National Park by tackling wildlife and other forest crimes, mitigating human-tiger conflict, training rangers and police, and conducting research on tigers and their prey species. The program operates in 4 provinces around the park and has successfully reduced tiger poaching incidents through the effective use of law enforcement. Tiger Protection & Conservation Unit (TPCU) teams are formed as part of the program throughout the park and bordering areas, protecting tigers and their prey species by patrolling key tiger habitats, training local farmers, forest rangers and NGOs in human-wildlife conflict prevention, performing wildlife rescues and conducting law enforcement actions.
Sumatran Tiger Protection program	Sumatra Northern and Western parts of Sumatra	This program spans 2 areas in Sumatra - the Kerinci-Seblat National Park (KSNP) and Aceh's Ulu Masen-Leuser forest block. It aims to find sustainable solutions to tiger threats and build community involvement in tiger protection. Work in KSNP started in 1994 with field research. In present days, with the involvement of the National Park Authority, 5 Tiger Protection and Conservation Units are

Program Name	Location	General Description
		activated. In Aceh, the Aceh tiger Program has successfully supported the transition of 62 former combatants, illegal loggers and wildlife poachers to respected community rangers. Through this program, FFI also worked with Aceh's provincial government to develop a 30 year forest and biodiversity management plan for the area.
Program where Islamic faith leaders contribute to the reduction in deforestation	West Sumatra	The program aims to engage faith leaders in environmental actions (forest conservation). A book, "Islamic Beliefs and Sumatran Forest Management" has been written as part of this program. The book provides a model for how future conservation efforts can be directed across Southeast Asia and the rest of the Muslim world. Activities undertaken directly involved member of the community, examples of such activities include green mosque campaigns, agroforest nurseries and replanting projects.

6 CANDIDATE BIODIVERSITY OFFSET LOCATIONS

6.1 *POTENTIAL OFFSET LOCATIONS*

During the consultation, ERM and SERD discussed opportunities to locate biodiversity offsets within the landscape surrounding the Project area with xx.

The following options were identified:

1. Management and rehabilitation of 387.0ha of Benchmark/Natural forest within the Mount Patah Protection Forest Area;
2. Management and rehabilitation of 290.0ha of Modified forest within the Mount Patah Protection Forest Area with compensation;
3. Management and rehabilitation of 290.0ha of modified forest in a designated forest rehabilitation area in South Sumatra Province; or
4. Management and rehabilitation of 211.0ha of degraded forest on private land in South Sumatra Province; or
5. Management and rehabilitation of 290.0ha of modified forest on private land in South Sumatra Province; or
6. Contribution to a conservation program in Sumatra; or
7. Management and rehabilitation of 211.0ha of degraded forest in a designated forest rehabilitation area in South Sumatra Province.

7 OFFSET COST ESTIMATES AND MANAGEMENT ACTIONS

Costs for conservation have been analyzed to determine the likely value required for offset management for biodiversity offsets related to the Project.

There is little information on cost structures associated with offset management in Indonesia. Information on costs for conservation is available from: analysis of conservation costs in Indonesian National Parks and costs associated with forest rehabilitation provided by stakeholders. Additional information on the offset period, one-off costs, land purchase costs have been assessed to determine cost ranges for offset management.

ERM has collated information from these sources to determine a "best estimate" for conservation costs for biodiversity offset management for the project. This estimate should be considered as an input into the budgetary process and may not accurately reflect actual costs for offset management for the project. For this reason, the estimates provided will be required to be confirmed during implementation of offset management activities. Actual costs may be higher or lower than the estimates.

7.1 CONSERVATION COSTS

7.1.1 Protected Area Management Costs in Indonesia

ERM undertook a desktop survey of relevant on-line papers and journals to determine the current costs of managing National Parks in Indonesia. The results of this analysis are outlined below.

The State Ministry of Environment of Indonesia (Kementarian Lingkungan Hidup dan Kehutanan) (KLHK, 2006) reports that current funding of protected areas in Indonesia is under resourced compared to expenditure of other countries in South East Asia. KLHK is of the view that the funding shortfall is approximately 80% less than what is required to facilitate conservation management (KLHK, 2006). Note that consultation with WCS in November 2017 indicated that these values are indicative of protected area costs in Indonesia. Final offset costs may vary and will be outlined based on the identified offset for the project.

Research by Bruner et al (Bruner et al, 2004) supports the view that protected area management is currently significantly underfunded globally and also in Indonesia of a similar magnitude.

KLHK undertook comparative analysis of the current costs and projected required funding based on conservation needs of Indonesian Protected Areas. KLHK determined costs per hectare of differing size national parks. The 2004 actual allocated budget and estimated required costs per hectare for four National Parks are outlined below in ***Table 7.1.***

Table 7.1 Estimated Conservation costs for Terrestrial Indonesian National Parks, 2004

	Small <10,000ha	Medium >10,000 to <20,000ha	Large >120,000ha	Very Large >1,000,000ha
Name of National Park	Kelimutu, Flores Island	Gunung Gede Pangrango, West Java	Bukit Tiga Puluh, Riau Sumatra	Gunung Leuser, Northern Sumatra
Actual budget USD/ha/yr	$7.99	$4.96	$0.26	$0.13
Estimated required cost (2004) USD/ha/yr	$35.06	$10.76	$6.17	$1.39
CPI adjusted 2017 cost USD/ha/yr*	$83.51	$25.63	$14.70	$3.31

* Assumes an average annual inflation rate for Indonesia of 7.5% per annum from 2004 to 2017 (Trading Economics, 2017)

7.1.2 Forest Restoration Costs

Information on estimated forest restoration costs were provided to SERD and ERM during consultation with the Indonesian Forestry Department. These estimates are outlined in ***Table 7.2***. The estimated costs provided by the Forestry Department are for converting current agricultural land (such as rubber plantations) to native forests. Forestry Department costs are for establishing community forestry that includes mixed human uses and are not necessarily established for conservation.

Table 7.2 Cost estimations for Forest Restoration in Sumatra

Organization	Cost/ha	Ongoing costs
Restoration	1.24M IDR – 26M IDR ($93USD/ha - $188USD/ha)	Not provided
Forestry Department	16M IDR ($1203USD/ha)	1.4M IDR ($105USD/ha)

7.1.3 Compensation Costs

Compensation costs may be payable to landholders or plantation owners who currently have an income derived from land that may be subject to rehabilitation. This includes rubber, tea or fruit orchards currently growing within National Parks, Protection Forest or Non-forest areas.

The market in Sumatra currently values unconverted forest land within the range of $1,250 to $1,600 USD per hectare (Kalaweit, 2014) for land in proximity to the private Supayang Reserve in Central Sumatra. Lands within South Sumatra province may be more or less than this amount. It is estimated that that compensation cost for unconverted forest land for the area surrounding the Project are approximately $1,500 USD/ha.

Land within Protected Areas or classified as Protection Forest or Non-forest that has been planted with rubber, coffee, tea or fruit orchards would also be subject to compensation. In these circumstances, estimated compensation rates are generally derived from lost income valuations. The cost of compensation for this assessment has been determined to be approximately 104M IDR/ha or $7,700 USD/ha (for future planting area).

7.2 *LAND PURCHASE COSTS IN SUMATRA*

There are several examples of land purchases for conservation undertaken by NGOs in Sumatra. Kalaweit is currently active in this arena and undertaken purchases primarily on private land for conservation purposes.

The costs for land purchases are dependent on the asking price. This asking price depends on factors such as demand, proximity to settlements, converted use value, and existing land use value (including the value of any timber rights on the land).

SERD have advised that land purchase prices for the area surrounding the Project are approximately 300M (around access road at Block-0, Kota Agung) to 600M (around Talang Pisang Camp for bypass road) IDR/ha or between $22,222 to $44,444 USD/ha

7.3 *OFFSET MANAGEMENT ACTION COSTS*

Expected offset activities to establish, manage, maintain and evaluate the success of conservation activities for biodiversity have been derived based on existing conservation projects and generic National Park management activities to achieve successful offset outcomes. These activities will occur at different frequencies during the offset management period dependent on whether the activity is a one-off cost or recurrent at a certain interval.

Table 7.3 outlines the expected one-off offset actions and likely costs. Estimated costs were based on information provided through consultation with NGOs and knowledge of likely costs associated with the actions outlined.

Table 7.3 Required Biodiversity One-Off Offset Costs

Actions	Description	Likely Cost USD*
Management plans	Required to detail the required management actions to achieve gains in biodiversity values. Sets objectives and targets.	$10,000
Equipment	Capital expenditure on equipment such as motor bikes, signs, uniforms etc.	$30,000
Monitoring and evaluation	Required to detail and evaluate the ongoing performance of the conservation activities and management actions.	$12,000
	Total Cost	**$52,000**

* One-off costs are based on information obtained from NGOs during consultation and professional judgement of costs associate with the actions

7.4 *OFFSET MANAGEMENT PERIOD*

The offset management period has been set at a 30 year management period. This period is based on the offset gain period used in the assumptions and the length of the Concession period afforded to SERD for the project by the Government of Indonesia.

7.5 *ESTIMATION OF BIODIVERSITY OFFSET COSTS*

The calculation of offset costs is based on three inputs: the estimated management cost per hectare; the offset management period; cost of land purchase (if applicable) and the area of offset required.

The offset cost is an estimate and will be refined once a final offset design has been chosen. A range of values has been determined and presented to Supreme ($2.1 - $12.3m). Although the lowest cost recommendation has been made, final offset costs may be higher and will be finalised when the BOP is prepared. This estimation will also include ongoing contingency for management beyond the offset management period (30 years).

The four (4) options outlined at *Section 6.1* were considered when defining the offset cost estimates (Refer to *Section 8* for full profiles of these options).

Table 7.4 Estimated Offset Management Costs for Offset Options

Option	Forest Condition	Offset Size	Offset Period (year)	Routine Management and Monitoring							One-Off Cost					Total Cost
				Estimated Management Cost / ha / yr	Management cost per annum	Monitoring costs per annum	Management Cost per Annum	**Total Management Cost**	Planting costs (one off and maintenance)	**Total planting cost**	Land Purchase Costs/ha ($/ha)	**Total Land Purchase Cost**	Compensation Costs/ha ($/ha)	**Total Compensation Cost**	One-off Management Plan costs	**Total Cost (30 years)**
1	Natural	387.0	30	$83.51	$32,318	$5,000	$37,318	$1,119,551	$2,500	$967,500	$-	$-	$-	$-	$52,000	$2,139,051
2	Modified	290.0	30	$188.00	$54,520	$5,000	$59,520	$1,785,600	$5,000	$1,450,000	$-	$-	$7,700	$2,233,000	$52,000	$5,520,600
3	Modified	290.0	30	$188.00	$54,520	$5,000	$59,520	$1,785,600	$5,000	$1,450,000	$-	$-	$7,700	$2,233,000	$52,000	$5,520,600
4	Degraded	211.0	30	$188.00	$39,668	$5,000	$44,668	$1,340,040	$7,500	$1,582,500	$44,444	$9,377,684		$-	$52,000	$12,352,224
5	Modified	290.0	30	$188.00	$54,520	$5,000	$59,520	$1,785,600	$5,000	$1,450,000	$22,222	$6,444,380	$-	$-	$52,000	$9,731,980
6	NA		30		$-		$-	$-		$-	$-	$-	$-	$-	$-	$-
7	Degraded	211.0	30	$188.00	$39,668	$5,000	$44,668	$1,340,040	$7,500	$1,582,500	$-	$-	$7,700	$1,624,700	$52,000	$4,599,240

Note:

- Estimated compensation cost for benchmark / natural forest (limited human interference) is $1,500USD/ha (See *Section 7.1.3*)
- Estimated compensation cost for forestry land that currently has been converted into coffee tree plantation is 150M IDR/ha ($11,500 USD/ha)
- Estimated land purchase price for dry farm land is 225M IDR/ha ($17,400 USD/ha) (See *Section 7.2*)
- Estimated land purchase price for coffee tree plantation is 300-600M IDR/ha or $22,222 - $44,444 USD/ha (for land and crops on it) (See *Section 7.2*)
- Estimated land management costs for small protected areas is $83.51 (See *Table 7.1*)
- Estimated site management costs for Protected Areas is $188/ha/yr (See *Table 7.2*)
- Estimated site management costs for agricultural areas is $1203 USD/ha with maintenance of $105USD/ha/yr (See *Table 7.2*)
- Estimated site planting costs are $7500 for Modified Habitat, Degraded Habitat is $5000/ha and Natural Habitat is $2500/ha for year one and ongoing maintenance.
- All amounts are quoted in 2017 $USD values. Future costs will need to be adjusted for inflation.

7.6 *RECOMMENDED OFFSET MANAGEMENT ACTIONS*

The following recommended management actions should be outlined in a Biodiversity Offset Management Plan prepared for the proposed biodiversity offset site (***Table 6.5***). These actions are applicable to offset *Scenario 1* and *2*. A specific rehabilitation plan would be required to be prepared for *Scenario 3*.

Table 6.5 Recommended Offset Management Actions

S/N	Management Action	Purpose	Description
1.	Management Plan	Defines governance framework for management of offset projects.	The management plan is to provide the roles, responsibilities, accountabilities, actions, resources and budgets available to actively manage biodiversity offset sites. Clear goals and objectives linked to the monitoring and evaluation framework should be set. Development of the management plan would normally be prepared through consultation with key stakeholders and participation of affected local communities.
2.	Patrols and enforcement	Outlines the patrols and enforcement requirements to protect wildlife and forest within the offset area	Patrols of forest areas should be undertaken in conjunction with the land manager to assess poaching, hunting, illegal logging, mining and other activities within the offset area. Prosecution action should be taken against individuals identified who are undertaking illegal activities.
3.	Monitoring and evaluation	Defines approach to monitor the implementation of management actions	The monitoring and evaluation framework is to define an approach to determine the effectiveness of the management actions in achieving biodiversity conservation goals. The approach should look at the institutional, financial and governance frameworks applied as well as relevant biodiversity indicators (species richness, basal area).The monitoring and evaluation should directly relate to goals and objectives set for offset management. The outcomes of the monitoring and evaluation should be used as a basis for (i) reporting to relevant stakeholders; and (ii) informing adaptive management actions, including the periodic update of management plans.
4.	Management of hunting	Manages threats to animals from illegal hunting and poaching.	The management of hunting should aim to monitor and enforce in conjunction with the Indonesia Government and the community, activities that illegally hunt and poach wildlife within the offset site. The approach should include: patrols and surveillance for illegal hunting activities; education and awareness; and incentives.
5.	Sustainable	Manages unsustainable	The sustainable use of NTFP should focus on documenting cultural and heritage usage of

S/N	Management Action	Purpose	Description
	forest product use (NTFP)	NTFP use.	NTFP; analysis of sustainable yield for NTFP; identifying alternatives where sustainable collection is identified; and education and awareness on sustainable collection practices.
6.	Management of weeds and pests	Manages threats to biodiversity from introduced weeds and pests.	Managing weeds and pets should: identify and monitor the distribution and abundance of weeds and pests in the area; identify appropriate controls at a spatial and temporal scale; define control techniques and actions. Actions may include active control of weeds or specific hunting programs for pest animals.
7.	Fire management	Manages impacts on biodiversity from inappropriate use of fire.	Managing fire should: identify historical fire regimes within the offset site at a spatial and temporal scale; determine ecological fire regimes based on intensity and frequency of fire; defining and map exclusion zones; consider threatened species responses to fire; and design ecological fire control methods.
8.	Assisted natural regeneration	Promotes biodiversity where natural regeneration is constrained due to past land use or ecological factors.	Assisted natural regeneration should focus on the establishment of relevant plant stock to assist natural regeneration of disturbed areas. Assessment and mapping of areas identified as being suppressed or degraded; determination of suitable plant stock and planting regime; collection and propagation of plant stock; preparation and management of regeneration areas. Local community engagement in horticultural activities is recommended.
9.	Community engagement and development	Provides consultative mechanisms and engages the community in active participation in biodiversity conservation.	Community engagement and development is designed to involve the local community in the management actions developed for each the offset sites. Consultation during the preparation of the management plans is required to ensure that the management actions and approaches are acceptable to the community. This can include direct engagement in undertaking actions (hunting patrols, employment at the nursery; manufacture of nest boxes).Community engagement is an essential component in determining the appropriateness and ensuring success of the sustainable forest practices and NTFP development.
10.	Education and awareness	Provides education and awareness for local communities to promote conservation.	Education and awareness approaches are integral to the success of offset management. This should include community engagement surveys; education seminars; posters and flyers; identification of community champions and incentives. Each management action should include an education and awareness component.

8 BIODIVERSITY OFFSET OPTIONS

Based on the information provided during the stakeholders exercise and existing programs within Indonesia, ERM has identified the following options for biodiversity offsets for SERD (***Table 8.1*** to ***8.7***).

Table 8.1 Outline of Option 1

Location:	Mount Patah Protection Forest Area
Site Description:	Management and rehabilitation of 387.0ha of Natural forest within the Mount Patah Protection Forest Area
Partner:	Indonesian Government Forestry Department
Tenure:	The area is classified as Protection Forest under the Indonesian Forestry Law
Project Description:	Undertake conservation management within the area by undertaking measures to reduce threats to biodiversity values, capacity building local people and supporting the management of the Mount Patah Protection Forest Area.
Governance:	To be managed in conjunction with a relevant local conservation NGO on behalf of SERD.
Financial:	Contributions to be made to relevant NGO on an annual basis, subject to performance being me under contractual arrangements. Estimated total cost is $2,139,051 (2017 US Dollar values).
Legal:	Memorandum of Understanding (MoU) to be drafted (No. 41/1999 article 50) for an initial 5 year period, with extension to 30 years.
Management actions:	• Management Plan • Patrols and enforcement • Monitoring and evaluation • Management of hunting • Sustainable forest product use (NTFP) • Management of weeds and pests • Fire management • Assisted natural regeneration • Community engagement and development • Education and awareness • Specific species management actions for CH and NH species
Monitoring and Evaluation:	Specific monitoring and evaluation program to be established within the BOMP in relation to Critical Habitat species (net-gain requirements) and maintenance of habitats (no-net-loss).
Additionality:	The Mount Patah Protection Forest Area is currently managed by the Indonesian Forestry Department. The Forest is not managed as a National Park (Protected Forest) and hence little available funds are available for management.
Approvals Required:	Approvals may be required under Regulation No. 24/2010 to undertake forest restoration activities within a Protection Forest.

Table 8.2 Outline of Option 2

Location:	Mount Patah Protection Forest Area
Site Description:	Management and rehabilitation of 290.0ha of Modified forest within the Mount Patah Protection Forest Area with compensation
Partner:	Indonesian Government Forestry Department
Tenure:	The area is classified as Protection Forest under the Indonesian Forestry Law
Project	Undertake conservation management within the area by undertaking

Location:	Mount Patah Protection Forest Area
Description:	measures to reduce threats to biodiversity values, capacity building local people and supporting the management of the Mount Patah Protection Forest Area. The project will be conducted on existing modified forest areas that have been cleared. Compensation to local landowners is payable.
Governance:	To be managed in conjunction with a relevant local conservation NGO on behalf of SERD.
Financial:	Contributions to be made to relevant NGO on an annual basis, subject to performance being me under contractual arrangements. Estimated total cost is $5,520,600 (2017 US Dollar values), including compensation.
Legal:	Memorandum of Understanding (MoU) to be drafted (No. 41/1999 article 50) for an initial 5 year period, with extension to 30 years.
Management actions:	• Management Plan • Patrols and enforcement • Monitoring and evaluation • Management of hunting • Sustainable forest product use (NTFP) • Management of weeds and pests • Fire management • Assisted natural regeneration • Community engagement and development • Education and awareness • Specific species management actions for CH and NH species
Monitoring and Evaluation:	Specific monitoring and evaluation program to be established within the BOMP in relation to Critical Habitat species (net-gain requirements) and maintenance of habitats (no-net-loss).
Additionality:	The Mount Patah Protection Forest Area is currently managed by the Indonesian Forestry Department. The Forest is not managed as a National Park (Protected Forest) and hence little available funds are available for management.
Approvals Required:	Approvals may be required under Regulation No. 24/2010 to undertake forest restoration activities within a Protection Forest.

Table 8.3 Outline of Option 3

Location:	To be advised
Site Description:	Management and rehabilitation of 290.0ha of modified forest in a designated forest rehabilitation area in South Sumatra Province
Partner:	Indonesian Government Forestry Department
Tenure:	The area is classified as Protection Forest or Non-Forest Area under the Indonesian Forestry Law
Project Description:	Undertake conservation management within the area by undertaking measures to reduce threats to biodiversity values, capacity building local people and supporting the management of Protection Forest or Non-Forest Area designated as rehabilitation priority.
Governance:	To be managed in conjunction with a relevant local conservation NGO and the Indonesian Forestry Department on behalf of SERD.
Financial:	Contributions to be made to relevant NGO on an annual basis, subject to performance being me under contractual arrangements. Estimated total cost is $5,520,600 (2017 US Dollar values).
Legal:	Forest Management Plan under Forestry Minister Regulation No. P.89/Menhut-II/2014 on Village Forest. Permits are also required for these plans under Forestry Minister Regulation No. P. 50/Menhut-II/2010 Granting Licenses for Timber Production in Natural Production Forests.

Location:	To be advised
	These Forest Management Plans are prepared for 3 years. Memorandum of Understanding (MoU) to be drafted (No. 41/1999 article 50) for an initial 3 year period, with extension to 30 years.
Management actions:	• Management Plan • Patrols and enforcement • Monitoring and evaluation • Management of hunting • Sustainable forest product use (NTFP) • Management of weeds and pests • Fire management • Assisted natural regeneration • Community engagement and development • Education and awareness • Specific species management actions for CH and NH species (if applicable to the chosen offset site)
Monitoring and Evaluation:	Specific monitoring and evaluation program to be established within the BOMP in relation to Critical Habitat species (net-gain requirements) and maintenance of habitats (no-net-loss).
Additionality:	The offset site has not been chosen, however it is likely that the area would not receive current funds for management.
Approvals Required:	Approvals may be required under Regulation No. 24/2010 to undertake forest restoration activities within a Protection Forest.

Table 8.4 Outline of Option 4

Location:	Private land to be advised
Site Description:	Management and rehabilitation of 211.0ha of degraded forest on private land in South Sumatra Province
Partner:	Conservation NGO
Tenure:	The area is classified as Non-Forest under the Indonesian Forestry Law
Project Description:	Undertake conservation management within the area by undertaking measures to reduce threats to biodiversity values, capacity building local people and supporting the management of the Forest Area.
Governance:	To be managed in conjunction with a relevant local conservation NGO on behalf of SERD.
Financial:	Contributions to be made to relevant NGO on an annual basis, subject to performance being me under contractual arrangements. Estimated total cost is $12,352,224 (2017 US Dollar values).
Legal:	Contractual arrangements to be made with the relevant conservation NGO
Management actions:	• Management Plan • Patrols and enforcement • Monitoring and evaluation • Management of hunting • Sustainable forest product use (NTFP) • Management of weeds and pests • Fire management • Assisted natural regeneration • Community engagement and development • Education and awareness • Specific species management actions for CH and NH species (if appropriate to the site)
Monitoring and Evaluation:	Specific monitoring and evaluation program to be established within the BOMP in relation to Critical Habitat species (net-gain requirements) and maintenance of habitats (no-net-loss).

Location:	Private land to be advised
Additionality:	The offset site has not been chosen, however it is likely that the area would not receive current funds for management.
Approvals Required:	No approvals required as the site would be on private land.

Table 8.5 Outline of Option 5

Location:	Private land to be advised
Site Description:	Management and rehabilitation of 290.0ha of modified forest on private land in South Sumatra Province
Partner:	Conservation NGO
Tenure:	The area is classified as Non-Forest under the Indonesian Forestry Law
Project Description:	Undertake conservation management within the area by undertaking measures to reduce threats to biodiversity values, capacity building local people and supporting the management of the Forest Area.
Governance:	To be managed in conjunction with a relevant local conservation NGO on behalf of SERD.
Financial:	Contributions to be made to relevant NGO on an annual basis, subject to performance being me under contractual arrangements. Estimated total cost is $9,731,980 (2017 US Dollar values).
Legal:	Contractual arrangements to be made with the relevant conservation NGO
Management actions:	• Management Plan • Patrols and enforcement • Monitoring and evaluation • Management of hunting • Sustainable forest product use (NTFP) • Management of weeds and pests • Fire management • Assisted natural regeneration • Community engagement and development • Education and awareness • Specific species management actions for CH and NH species (if appropriate to the site)
Monitoring and Evaluation:	Specific monitoring and evaluation program to be established within the BOMP in relation to Critical Habitat species (net-gain requirements) and maintenance of habitats (no-net-loss).
Additionality:	The offset site has not been chosen, however it is likely that the area would not receive current funds for management.
Approvals Required:	No approvals required as the site would be on private land.

Table 8.6 Outline of Option 6

Location:	Contribution to a conservation program in Sumatra
Site Description:	Contribution to an existing Conservation Program undertaken in Sumatra
Partner:	Conservation NGO running a current program within Sumatra
Tenure:	Various tenures but mainly within protected areas (including KSNP)
Project Description:	Contribution to one or a selected program including: • Sumatran Tiger Trust Conservation Program • Project for Forest Conservation in Sumatra • Ministry of Forestry Community-based Rehabilitation Program • The Wildlife Conservation Society - Indonesia Program (WCS-IP)

Location:	Contribution to a conservation program in Sumatra
	• Kerinci Seblat Tiger Protection Project/ Kerinci-Seblat Tiger Protection and Conservation Program • Sumatran Tiger Protection program • Program where Islamic faith leaders contribute to the reduction in deforestation
Governance:	To be managed in conjunction with a relevant conservation NGO on behalf of SERD.
Financial:	Contributions to be made to relevant NGO on an annual basis, subject to performance being me under contractual arrangements. No cost estimation is available.
Legal:	Contractual arrangements required between SERD and NGO service provider. Permits under Regulation No. 24/2010 to undertake forest restoration activities within Protected Forest.
Monitoring and Evaluation:	Monitoring and evaluation framework to be determined based on existing settings of the program.
Additionality:	Programs are currently funded however the funding horizons are limited and contributions may extend existing programs or augment an existing programs.
Approvals Required:	Existing approvals may be applicable for each project.

Table 8.7 Outline of Option 7

Location:	To be advised
Site Description:	Management and rehabilitation of 211.0ha of degraded forest in a designated forest rehabilitation area in South Sumatra Province
Partner:	The area is classified as Protect Forest or Non-Forest under the Indonesian Forestry Law
Tenure:	Undertake conservation management within the area by undertaking measures to reduce threats to biodiversity values, capacity building local people and supporting the management of the Forest Area.
Project Description:	Management and rehabilitation of 211.0ha of degraded forest in a designated forest rehabilitation area in South Sumatra Province
Governance:	To be managed on behalf of SERD by the Forestry Department.
Financial:	Contributions to be made to relevant NGO on an annual basis, subject to performance being me under contractual arrangements. Estimated total cost is $4,599,240 (2017 US Dollar values).
Legal:	Contractual arrangements to be made with the Indonesian Forestry Department
Monitoring and Evaluation:	Specific monitoring and evaluation program to be established within the BOMP in relation to Critical Habitat species (net-gain requirements) and maintenance of habitats (no-net-loss).
Additionality:	The offset site has not been chosen, however it is likely that the area would not receive current funds for management.
Approvals Required:	No approvals required as the site would be on private land.

8.1 *STRENGTHS, WEAKNESSES, OPPORTUNITIES AND THREATS ANALYSIS*

ERM has used the following offset rules in determining the suitability of each of the offset options and are assessed for each of the offset options in ***Table 8.7.***

1. Offsets should be "like for like" where possible (trading is only allowed within the same land class type);
2. Environmental contributions for specific programs can be used to substitute for the direct management of biodiversity where measurable conservation outcomes can be demonstrated;
3. Incremental loss and fragmentation of biodiversity values should be avoided;
4. Management of offset sites can be used to improve biodiversity values however this should not take the place of actions that are already funded;
5. Areas with existing or potential land uses that are likely to be in conflict with biodiversity offsets will be avoided (mining, indigenous land claims);
6. Location of offsets in the landscape that facilitate connectivity with adjacent habitats will be of preference;
7. Large offset sites that are connected to existing protected areas will be of preference;
8. Sites that are similarly used by comparable ethnic groups sharing similar cultural values will be of preference; and
9. Fairness and equity should be applied with affected stakeholders; and
10. Offsets chosen should be permanent and ongoing.

Table 8.8 Strengths, Weaknesses, Opportunities and Threats Analysis of Offset Options

	Compliant with the offset rule
	Possibly compliant with the offset rule
	Not compliant with the offset rule
	Not applicable to this option

	Factors relevant to SERD		Relevant external factors	
Offset Rules	**Strengths** *Characteristics that give the option an advantage over others for SERD*	**Weaknesses** *Characteristics that place the option at a disadvantage relative to others for SERD*	**Opportunities** *Elements that are advantageous for the option for other stakeholders*	**Threats** *Elements that could constrain the option for other stakeholders*
Option 1: Management and rehabilitation of 387.0ha of Benchmark/Natural forest within the Mount Patah Protection Forest Area				
1. 2. 3. 4. 5. 6.	• The Mount Patah Protection Forest Area contains the same suite of species and forest types to that impacted[1]. This includes Critical habitat species, such as the Sumatran Tiger. This ensures that the like-for-like rule is complied with. • Funds provided are likely to be additional to the current funding afforded to the Forestry Department, which is understood to be low. • Management of threats (such as hunting, poaching, illegal logging) will reduce background losses within the Protection Forest area.	• Forest management activities are likely to reduce background losses as the forest within the Mount Patah Protection Forest is already in Benchmark/Natural Condition. This will make it more difficult to demonstrate no-net-loss/net gain outcomes. • The Mount Patah Protection Forest Area is not currently classified as a Protected Forest (National Park) and hence the legal options to constrain activities that pose threats to the biodiversity are less. • Delivery of management options will require careful control to ensure delivery and demonstration of offset	• The Indonesian Department of Forestry will receive assistance to manage the Mount Patah Protection Forest that currently receives little funding or management support. • The Mount Patah Protection Forest contains significant biodiversity values, including montane forests and a population of Sumatran Tigers. Conservation management will assist in protecting these values. • Local communities are likely to respond favorably to the offset being within close proximity to the Project Area. • Facilitates private sector, government and NGO engagement	• Offset delivery will be through an NGO. Careful management and monitoring will be required by SERD and the Indonesian Forestry Department to ensure adequacy of outcomes. • Contractual arrangements will need to be put in place that enables measures to be undertaken for poor performance. • Area proposed is already in Benchmark/Natural condition, meaning gains in biodiversity values may be difficult to demonstrate. This may attract negative stakeholder scrutiny.

[1] Although recent information has not been gathered, the Mount Patah Protection Forest Area has at least previously contained the same suite of species and forest types to the area impacted, including Critical habitat species such as the Sumatran Tiger. This increases the likelihood that the like-for-like rule is complied with.

Offset Rules	Factors relevant to SERD: Strengths *Characteristics that give the option an advantage over others for SERD*	Factors relevant to SERD: Weaknesses *Characteristics that place the option at a disadvantage relative to others for SERD*	Relevant external factors: Opportunities *Elements that are advantageous for the option for other stakeholders*	Relevant external factors: Threats *Elements that could constrain the option for other stakeholders*
7. 8. 9. 10.	Direct forest restoration may focus on areas damaged along the perimeter of the forest. • This option is least costly with an estimated total cost of $2,139,051 over 30 years. No land purchase or compensation costs would be payable. • Local communities are likely to respond favorably to the offset area being located close to the Project area.	gains.	on conservation. Local service providers are likely to see participation as a business opportunity.	
Option 2: Management and rehabilitation of 290.0ha of Modified forest within the Mount Patah Protection Forest Area with compensation				
1. **2.** 3. 4. 5. 6.	• The Mount Patah Protection Forest Area contains the same suite of species and forest types to that impacted (this is assumed given the close proximity of the area to the Project site). This includes Critical habitat species, such as the Sumatran Tiger. This ensures that the like-for-like rule is complied with. • Forest management activities in Modified condition forest will restore currently damaged forest values within the Protection Forest area. • Funds provided are likely to be additional to the current funding	• The Mount Patah Protection Forest Area is not currently classified as a Protected Forest (National Park) and hence the legal options to constrain activities that pose threats to the biodiversity are less. • Compensation costs will be payable to local farmers who currently operate within the Protection Forest. The compensation cost is estimated at $2,233,000. The option is costly with an estimated total cost of $5,520,600. • Delivery of management options will require careful control to ensure delivery and demonstration of offset gains.	• The Indonesian Department of Forestry will receive assistance to manage the Mount Patah Protection Forest that currently receives little funding or management support. • The Mount Patah Protection Forest contains significant biodiversity values, including montane forests and a population of Sumatran Tigers. Conservation management will assist in protecting these values. • Local communities are likely to respond favorably to the offset being within close proximity to the Project Area. • Facilitates private sector, government and NGO engagement	• Offset delivery will be through an NGO. Careful management and monitoring will be required by SERD and the Indonesian Forestry Department to ensure adequacy of outcomes. • Contractual arrangements will need to be put in place that enables measures to be undertaken for poor performance.

Offset Rules	Factors relevant to SERD		Relevant external factors	
	Strengths *Characteristics that give the option an advantage over others for SERD*	**Weaknesses** *Characteristics that place the option at a disadvantage relative to others for SERD*	**Opportunities** *Elements that are advantageous for the option for other stakeholders*	**Threats** *Elements that could constrain the option for other stakeholders*
7. 8. 9. 10.	afforded to the Forestry Department, which is understood to be low. • Management of threats (such as hunting, poaching, illegal logging) will reduce background losses within the Protection Forest area. Direct forest restoration may focus on areas damaged along the perimeter of the forest. • Local communities are likely to respond favorably to the offset area being located close to the Project area.		on conservation. Local service providers are likely to see participation as a business opportunity.	
Option 3: Management and rehabilitation of 290.0ha of modified forest in a designated forest rehabilitation area in South Sumatra Province				
1. **2.** 3. 4. 5. 6. 7. 8.	• Enables the rehabilitation of priority forest area within South Sumatra Province that has been identified for management. • Forest restoration activities are likely to demonstrate that no-net-loss/net gain outcomes have been achieved. This however is dependent on whether the same forest types can be found within a priority rehabilitation area.	• The chosen offset site may not match like-for-like with the biodiversity values impacted at the project (being montane forests). • Priority rehabilitation areas within the Province are generally lowland forests located to the West of the Project Area, meaning the same forest types and species are unlikely to be present. This means that additional species management programs will be required to be developed to achieve no-net-loss/net gain, at additional costs. • Compensation costs will be payable	• The Indonesian Department of Forestry will receive funding to undertake forest restoration within a priority area. • Facilitates private sector, government and NGO engagement on conservation. Service providers near to the offset area are likely to see participation as a business opportunity.	• Offset delivery will be through an NGO. Careful management and monitoring will be required by SERD and the Indonesian Forestry Department to ensure adequacy of outcomes. • Contractual arrangements will need to be put in place that enables measures to be undertaken for poor performance. • Local community stakeholders are unlikely to support the offset being located away from the Project Area.

Offset Rules	Factors relevant to SERD		Relevant external factors	
	Strengths *Characteristics that give the option an advantage over others for SERD*	**Weaknesses** *Characteristics that place the option at a disadvantage relative to others for SERD*	**Opportunities** *Elements that are advantageous for the option for other stakeholders*	**Threats** *Elements that could constrain the option for other stakeholders*
9. 10.		to local farmers who currently operate within the Protection Forest. The compensation cost is estimated at $2,233,000. The option is costly with an estimated total cost of $5,520,600. • Local community stakeholders are unlikely to support the offset being located away from the Project Area.		
Option 4: Management and rehabilitation of 211.0ha of degraded forest on private land in South Sumatra Province				
1. 2. 3. 4. 5. 6. 7. 8. 9. 10.	• Enables the rehabilitation of a forest area within South Sumatra Province that is currently in private ownership. • Forest restoration activities are likely to demonstrate that no-net-loss/net gain outcomes have been achieved. This however is dependent on whether the same forest types can be found within land available for sale.	• The chosen offset site may not match like-for-like with the biodiversity values impacted at the project (being montane forests). • Land available for purchase may not contain Montane forests. This means that additional species management programs will be required to be developed to achieve no-net-loss/net gain, at additional costs. • The option is costly $12,352,224) with significant amount of land purchase costs $9,377,684). • Local community stakeholders are unlikely to support the offset being located away from the Project Area. • Will mean that SERD will remain the owner of land with the priority purpose of conservation, meaning ongoing obligations for management.	• Facilitates private sector, government and NGO engagement on conservation. Service providers near to the offset area are likely to see participation as a business opportunity.	• Offset delivery will be through an NGO. Careful management and monitoring will be required by SERD and the Indonesian Forestry Department to ensure adequacy of outcomes. • Contractual arrangements will need to be put in place that enables measures to be undertaken for poor performance. • Local community stakeholders are unlikely to support the offset being located away from the Project Area. • Land will be in private ownership, meaning that there will be little community benefits.

Offset Rules	Factors relevant to SERD		Relevant external factors	
	Strengths *Characteristics that give the option an advantage over others for SERD*	**Weaknesses** *Characteristics that place the option at a disadvantage relative to others for SERD*	**Opportunities** *Elements that are advantageous for the option for other stakeholders*	**Threats** *Elements that could constrain the option for other stakeholders*
Option 5: Management and rehabilitation of 290.0ha of modified forest on private land in South Sumatra Province				
1. 2. 3. 4. 5. 6. 7. 8. 9. 10.	• Enables the rehabilitation of a forest area within South Sumatra Province that is currently in private ownership. • Forest restoration activities are likely to demonstrate that no-net-loss/net gain outcomes have been achieved. This however is dependent on whether the same forest types can be found within land available for sale.	• The chosen offset site may not match like-for-like with the biodiversity values impacted at the project (being montane forests). • Land available for purchase may not contain Montane forests. This means that additional species management programs will be required to be developed to achieve no-net-loss/net gain, at additional costs. • The option is costly $9,731,980) with significant amount of land purchase costs ($6,444,380). • Local community stakeholders are unlikely to support the offset being located away from the Project Area. • Will mean that SERD will remain the owner of land with the priority purpose of conservation, meaning ongoing obligations for management.	• Facilitates private sector, government and NGO engagement on conservation. Service providers near to the offset area are likely to see participation as a business opportunity.	• Offset delivery will be through an NGO. Careful management and monitoring will be required by SERD and the Indonesian Forestry Department to ensure adequacy of outcomes. • Contractual arrangements will need to be put in place that enables measures to be undertaken for poor performance. • Local community stakeholders are unlikely to support the offset being located away from the Project Area. • Land will be in private ownership, meaning that there will be little community benefits.
Option 6: Contribution to a conservation program in Sumatra				
1. 2. 3.	• Is efficient for SERD to contribute to an existing conservation program. • SERD would be able to build good relationships with conservation NGOs. • Contributes to conservation	• The conservation programs identified may not match the species and habitat impacts identified by the Project. New conservation programs would need to be developed. • Difficulty in demonstrating no-net-	• Conservation NGOs would have guaranteed funding to run programs over the 30 year offset period. • Conservation priorities within Sumatra would be supported for identified species and habitats,	• Government stakeholders unlikely to be satisfied that conservation NGOs receive funding for conservation over forest rehabilitation initiatives. • Community representatives near to the Project Area would not be

Offset Rules	Factors relevant to SERD		Relevant external factors	
	Strengths *Characteristics that give the option an advantage over others for SERD*	**Weaknesses** *Characteristics that place the option at a disadvantage relative to others for SERD*	**Opportunities** *Elements that are advantageous for the option for other stakeholders*	**Threats** *Elements that could constrain the option for other stakeholders*
4. 5. 6. 7. 8. 9. 10.	priorities within Sumatra run by NGOs. • Provides long-term funding to conservation NGOs in Sumatra to focus on conservation priorities.	loss/net gain as the existing programs have objectives that are not in line with achieving this offset outcomes. • Programs may not be additional to those that are proposed to be run in the future. • The costs of contributions are unknown; however the costs should be equivalent to those for the other options assessed. • Community relationships are likely to suffer as the offset may not be near to the project location. • Difficulties in delivering outcomes as SERD will have less control over the programs that are run.	enabling funding to be applied efficiently to achieve conservation gains.	satisfied that funding was provided for programs run in Sumatra rather than the local area.
Option 7.	Management and rehabilitation of 211.0ha of degraded forest in a designated forest rehabilitation area in South Sumatra Province			
1. 2. 3. 4. 5. 6. 7. 8. 9.	• Enables the rehabilitation of a forest area within South Sumatra Province that is currently a priority rehabilitation area for the Department of Forestry. • Forest restoration activities are likely to demonstrate that no-net-loss/net gain outcomes have been achieved. This however is dependent on whether the same forest types can be found within land available. • The same suite of species is	• The chosen offset site may not match like-for-like with the biodiversity values impacted at the project (being montane forests). • Land available may not contain Montane forests. This means that additional species management programs will be required to be developed to achieve no-net-loss/net gain, at additional costs. • The option has an estimated cost of $4,599,240. • Local community stakeholders are	• Facilitates government and NGO engagement on conservation. Service providers near to the offset area are likely to see participation as a business opportunity.	• Offset delivery will be through an the Forestry Department. Careful management and monitoring will be required by SERD and the Indonesian Forestry Department to ensure adequacy of outcomes. • Contractual arrangements will need to be put in place that enables measures to be undertaken for poor performance. • Local community stakeholders are unlikely to support the offset being located away from the Project Area.

	Factors relevant to SERD		Relevant external factors	
Offset Rules	**Strengths** *Characteristics that give the option an advantage over others for SERD*	**Weaknesses** *Characteristics that place the option at a disadvantage relative to others for SERD*	**Opportunities** *Elements that are advantageous for the option for other stakeholders*	**Threats** *Elements that could constrain the option for other stakeholders*
10.	unlikely to exist within the area.	unlikely to support the offset being located away from the Project Area.		

9 RECOMMENDED BIODIVERSITY OFFSET AND NEXT STEPS

ERM recommends that **Option 2** (Management and rehabilitation of 290.0ha of Modified forest within the Mount Patah Protection Forest Area with compensation) is the most satisfactory option for SEML to comply with the offset rules and satisfy the requirements of IFC PS6.

This option has the least risks for delivery, satisfies the requirements for like-for like offsets, is an additional conservation measure, builds capacity and reduces threats and enables SEML to measure conservation outcomes to demonstrate no-net-loss/net gain outcomes. It also is likely to be the most acceptable to the local community.

The recommended next steps include:

1. Conduct additional consultation with Mount Patah Protection Forest to determine the area to be subject to management (Minimum size of 290.0ha);
2. Prepare a MoU with Indonesian Department of Forestry to undertake a 5 year rehabilitation plan for the confirmed area with an ability to continue the rehabilitation and maintenance for 30 years;
3. Prepare a BOMP for the offset area as well as Critical Habitat and Natural Habitat species;
4. Undertake a costing of the BOMP and allocate budget on an annual basis (adjusted based on CPI);
5. Discuss with local NGOs regarding offset delivery, including an assessment of their capacity and ability to deliver on offset rehabilitation;
6. Short list NGOs and conduct a tender process to deliver on the BOMP;
7. Issue the tender and make contractual terms to ensure the delivery of the offset plan, including adaptive management frameworks.

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Ministry of Forestry (2007) **Conservation Strategy and Action Plan for the Sumatran Tiger** (*Panthera tigris sumatrae*) Indonesia 2007-2017.

Annex A Relevant Indonesian Laws and Regulations

Annex A - Relevant Indonesian Laws and Regulations

1. Laws/ Acts of Parliament ("Undang-Undang"; UU)

1.1 Law No. 41/1999 on Forestry Affairs

The principles of forestry management are stated as being for conservation, democracy, justice, togetherness, transparency, and integrity.

Forest management is aimed at providing maximum prosperity for the people based on justice and sustainability by: securing existence of forest at adequate extent and proportional distribution; optimizing production, protected and conservation forests to attain environmental , social, cultural and economic benefits proportionally and sustainably; increasing the carrying capacity of watersheds; improving community capacity in participation, justice, and sustainability to create social and economic resilience against climate change; and, securing distribution of benefits on a just and sustainable basis (Article 3).

All forests and natural resources contained therein within Indonesian territory are under the control of the state. The government has the authority to maintain and manage anything related to forest, forest area and forest products. It can stipulate certain areas as forest or non-forest areas and can stipulate the legal relations between people and forests and the legal acts concerning forestry (Article 4).

Article 67 recognizes the rights of traditional communities to derive their daily needs from the forest they are entitled to live in and empowers them to act as per their tradition, without contravening the provisions of the Law.

1.2 Act on the conservation of biological resources and their ecosystems (Act No. 5 of 1990)

The Act establishes the basic principles and the general rules for the management, conservation and use of biological resources, natural habitats and protected areas. As this is a framework law, many of its provisions need to be completed by regulatory texts. After the general provisions (Chapter 1), it deals with life-support systems (2), the preservation of plant and animal species diversity, including their ecosystems (3), sanctuary reserves (4), the preservation of plant and animal species (5), the sustainable utilization of living resources and their ecosystems (6), nature conservation areas (7), wild species utilization (8), citizen participation (9), delegation of assistance responsibilities (10), investigation (11), punishment (12), transitional measures (13) and the concluding provisions (14). The conservation of biological resources and their ecosystems should be guided by a series of basic principles, namely (i) their sustainable, harmonious and balanced use: (ii) the enhancement of human well-being and quality of life; (iii) the protection of life-support systems, the conservation of animal and plant species diversity and their ecosystems, and the sustainable use of biological resources and their ecosystems. The protection of life-support systems aims to safeguard the ecological processes that ensure the survival of living organisms and enhance

human well-being and quality of life. Areas to protect life-support systems can be established to this effect. These must be managed in such a way that their protective function is maintained. The conservation of plant and animal species diversity must be ensured both within (in situ) and outside (ex situ) their natural habitats. In the first case, the diversity of species should be ensured in sanctuary reserves, which may be strict nature reserves or wildlife sanctuaries. In the second case, the protection of the species should be ensured through their multiplication to avoid their extinction. Plants and animals are classified into two categories: protected species - which are in turn sub-divided into endangered species and rare species - and unprotected species. Apart from specific listed exceptions, protected species may not be captured, collected, displaced, killed, destroyed, transported, traded, etc. The sustained use of biological resources and their ecosystems should be implemented in two ways: by strictly maintaining the conservation function of the nature protection areas; and managing plant and animal species with due consideration to their long-term survival and the maintenance of their diversity. There are three types of nature protection areas: national park, grand forest park and natural recreation park. Research, education, the improvement of species and recreational activities are permitted, but activities likely to harm their integrity are prohibited. People's awareness should be raised through education and extension programs to encourage their participation in actions to conserve biological resources and their ecosystems. Those violating the provisions of the Act are liable to fines and imprisonment.

1.3 Law No. 32/2009 on Environmental Protection and Management

This Law aims to create environmentally sustainable development through means of an environmental planning policy, and the rational exploitation, development, maintenance, restoration, supervision and control of the environment.

Environmental protection and management shall be planned through the following phases: environmental inventorying to obtain data and information on natural resources; stipulation of ecoregions; and the formulation of environmental protection and management plans (Article 5).

The Law states that Government responsibility includes: controlling natural resources; controlling environmental pollution and damage; implementing strategic environmental assessments (KLHS); providing quality standards of the environment; regulating legal actions and legal relations between persons and/or other legal subjects; controlling activities which have social impacts; and developing a funding system for efforts to preserve environmental functions.

Every business and/or activity having substantial impact on the environment is subject to an environmental impact analysis (AMDAL) in order to obtain a license to conduct such business or activity as discussed in detail in the Law.

1.4 Fisheries Law No. 31/2004.

The Law is a basic fisheries legislation consisting of 111 articles divided into 17 Chapters: General provisions (I); Principles and objectives (II); Scope (III); Fish cultivation (IV); Fishery business (V); Fishery information system and statistics (VI); Levies (VII); Fishery research and development (VIII); Fishery education, training and elucidations (IX); Empowerment of small fishermen and small fish breeders (X); Delegation of duty and assistance (XI); Monitoring of fishery affairs (XII); Court of fishery affairs (XIII); Investigation, prosecution and examination in the sessions of the court of fishery affairs (XIV); Criminal provisions (XV); Transitory provisions (XVI); Closing provisions (XVII).The Law stipulates provisions on utilization of fish resources, either for fish catching or fish breeding, in the Indonesian EEZ and the open seas according to the international conditions, to ensure their preservation and the protection of the environment. The Ministry shall determine provisions for the regulation of: fishing gear, allowable catch, fish breeding, prevention of pollution, protected fish, etc. (art. 7). All individuals and companies carrying out fishing business shall be licensed, except for small fishermen and small fish breeders. The Government shall establish a court of fishery affairs authorized to examine, hear and rule criminal cases in fishery affairs.

1.5 Law No. 7/2004 on Water Resources

The present Law (comprehending 100 articles) repeals the prior Law No. 11/1974 and includes the following Chapters: General Provisions (I); Authority and responsibilities (II); Conservation of Water resources (III); Enhancement and efficiency in the use of water resources (IV); Control over water destructibility (V); Planning (VI); Construction, Operation and Maintenance (VII); Water resources Information System (VIII); Empowerment and Supervision (IX); Financing (X); Right, obligation and role of Community (XI); Coordination (XII); Settlement of dispute (XIII); Class Action and Organization (XIV); Investigation (XV); Criminal Provisions (XVI); Transitional Provision (XVII); Conclusion (XVIII).The provisions of this Law aim to protect, manage, rationalize the usage, reduce the wastes and supervise the community utilization of aforesaid water resources in order to guarantee water supply, quality and conservation. In the execution of water resources management, the people are entitled to: obtain information related to water resources management; obtain proper compensation for loss incurred as a result of the execution of water resources management; declare their objection against the announced water resources management plan within a certain period in accordance with local conditions; file reports and claims with the related authority for loss incurred to them regarding the execution of water resources management; etc.

1.6 Law No. 29/2000 on Plant Varieties Protection

This Ordinance provides for the protection of plant varieties and for the granting and protection of proprietary rights to persons who breed or discover plant varieties. The Government shall consider applications for plant variety rights. A plant variety must be new, distinct, stable and homogenous to be protected. The Law further provides for the following matters: rights and

responsibilities of plant variety protection rights holder; plant variety protection rights application; transfer of plant variety protection rights; expiration, cancellation or revocation of plant variety protection rights; penalties; etc.

1.7 Environmental Management Act 1997 (No. 23 of 1997)

This Act aims at creating an environmentally sustainable development through means of an environmental planning policy, and the rational exploitation, development, maintenance, restoration, supervision and control of the environment. The Act is divided into the following Chapters: General Provisions (I); Principles, Objective, and Target (II); Community Rights, Obligations and Role (III); Environmental Management Authority (IV); Preservation of Environmental Functions (V); Environmental Compliance Requirements (VI); Environmental Dispute Settlement (VII); Investigation (VIII); Criminal Provisions (IX); Transitional Provisions (X); Closing Provisions (XI).The natural resources shall be controlled by the State, the arrangements thereof being determined by the Government. To this end the latter shall: (a) regulate and develop policies in the scheme of environmental management; (b) regulate the supply, allocation, use and management of the environment, and the re-use of natural resources, including genetic resources; (c) regulate legal actions and legal relations between persons and/or other legal subjects as well as legal action regarding natural resources and artificial resources, including genetic resources; (d) control activities which have social impact; (e) develop a funding system for efforts to preserve environmental functions. Further provisions establish the principles and criteria that the Government shall take into account in exercising its functions and stress the importance of the collaboration of local authorities in assisting the Central Government. Particular attention should be paid also to the importance given by the Act to the role that communities should play in the environmental management. Every business and/or activity which should have an impact on the environment is subject to an environmental impact analysis to obtain a license to conduct such business or activity. In issuing a license the following should be taken into account: (a) spatial management plans; (b) community opinion; (c) considerations and recommendations of authorized officials who are involved with such business and/or activity. Further provisions concern the environmental dispute settlement either out of Court or through the Court, as well as investigation powers of the Republic of Indonesia National Police Investigators and offences and penalties.

1.8 Act concerning Basic Provisions for the Management of the Living Environment (Act No. 4 of 1982)

An Act containing the basic provisions relative to the management and protection of the environment. The 24 articles are divided into 9 sections: General Provisions (I); Principles and objectives (II); Rights, obligations and authorities (III); Protection of the living environment (IV); Institutions (V); Compensation and Restoration (VI); Penalties (VII); Transitional Provisions (VIII); Concluding provisions (IX).Provisions on the protection of inorganic

natural resources, on the conservation of organic natural resources and its ecosystem, on the protection of man-made resources and on the protection of the cultural heritage shall be established by Acts. Environmental quality standards and provisions on the prevention and abatement of pollution shall be established by "legislation". Plans considered to have an impact on the environment must be accompanied by an environment impact analysis carried out in accordance with government regulations (Articles. 11-17).

1.9 Law No. 18/2013 on the prevention and eradication of Forest Destruction

This Law, consisting of 11 Chapters, establishes forest protecting measures in order to prevent and eradicate Forest Destruction. It aims at enforcing the following principles within the national territory: justice and legal certainty; forest sustainability; state responsibility; public participation; vicarious liability; priority and integrity and coordination. Provisions concerns illegal forest logging and use specifying forest protecting measures to be applied.

2. Government Regulations ("Paraturan Pemerintah"; PP)

2.1 Government Regulation No. 76/2008 concerning forest rehabilitation and reclamation

This Regulation concerning forest rehabilitation and reclamation is stipulated in order to implement the provisions in Article 42 (3), Article 44 (3) and Article 45 (4) of Law No. 41 1999 on Forestry.

It provides for the rehabilitation of unproductive land through reforestation, greening, the maintenance and improvement of vegetation quality, plant enrichment and land preservation. It further provides for forest reclamation activities which aim at repairing or recovering damaged land with forest vegetation. The Government Regulation defines phases which must be conducted to achieve forest rehabilitation and forest reclamation. The Minister, Governor or Regent/Mayor, according to their respective authority, shall take action in managing, controlling and supervising the implementation of forest rehabilitation and reclamation activities.

2.2 Government Regulation No. 24/2010 on the Use of Forest Areas

Government Regulation No. 24/2010 implements provisions on the use of forests and of forest areas for non-forestry development activities. These activities may be carried out only in production forest areas and in protected forest areas without altering the main function of forest areas.

The Regulation specifies that non-forestry development activities, which include mining, water resource facilities and infrastructure, water installation networks, public facilities and clean water and waste water channels, can only be done for activities that have an inevitable strategic aim (Article 4). Forest areas may be used only based on forest area lend use permits (Article 6). Procedures and requirements for obtaining permits are set out in the Regulation (Article 9). The Regulation further provides for: obligations of

permit holders (Article 11); the monitoring and evaluation of permit holders by the Minister (Article 19); reasons for revoking permits(Article 15 and Article 17); and sanctions (Article 23).

2.3 Regulation of the State Minister of Living Environment No. 10/2010 on mechanisms for pollution and/or damage prevention to living environment pertaining to forest and/or land fire

This Regulation aims to effectively prevent pollution or damage to the living environment pertaining to forest and/or land fire. The Regulation addresses: land preparation and clearance for cultivation or non-cultivation activities by land burning; water management in topsoil land; monitoring which shall be conducted by means of early warning and early detection of forest and/or land fire prevention and field surveillance; reporting; and state agencies responsible for the management and supervision of these activities.

2.4 Regulation of the State Minister of Living Environment No. 1/2010 on water pollution control system

This Regulation provides guidelines for the Government and regional administration in exercising water pollution control and water quality management. The Regulation covers: inventory and identification of water pollution resources; determination of capability of the water resource to accommodate incoming pollution load without causing water to be polluted; determination of standard waste water quality; determination of water pollution control policy; permits; water quality monitoring; management and supervision; and provision of information. The Regulation sets out procedures and requirements for obtaining environmental permits relating to the discharge of waste water to water resources and environmental permits relating to the utilization of waste water into the soil for soil application.

This Regulation repeals Decision of the Minister of Living Environment No. 111/2003 concerning guideline on terms and procedures for permits and guideline for study on discharge of waste water into the water or water resource as amended by Decision of the State Minister of Living Environment No. 142/2003.

2.5 Government Regulation No. 35/2002 on Reforestation Fund

This Regulation provides for the establishment of a Reforestation Fund for the conservation of forest resources and to support efforts in recovering damaged forests and critical lands. Chapter II and III deal with matters related to the imposition of reforestation funds and payment procedures. The distribution of the reforestation fund shall be as follows: 40% for the production area and 60% for the central government. These funds will be used to finance reforestation and rehabilitation programs and their supporting activities i.e. forest protection, prevention and management of forest fires, delineation of area boundaries, research and development, etc. The remaining part of the Regulation contains penal provisions and provisions of miscellaneous nature.

2.6 *Government Regulation No. 58/2007 amending Government Regulation No. 35/2002 on reforestation funds*

This Regulation amends Government Regulation No. 35/2002 on reforestation funds by substituting Article 7 sentence 5 referring to the payment of reforestation funds in US dollars.

2.7 *Government Regulation No. 34/2002 concerning forest structuring and making of forest management plans, utilization of forests and use of forest areas*

The purpose of this Regulation is to design and plan activities related to forest structuring and making of forest management plans, utilization of forests and use of forest areas. Activities are carried out in the form of Conservation Forest Management Unit (KPHK), Protection Forest Management Unit (KPHL) and Production Forest Management Unit (KPHP). Conservation forests consist of nature reserve forest areas, nature conservation forest areas and hunting parks. The forest structuring in these areas are described in sections 7 to 11. The forest structuring activities in protection forests and production forests are listed in sections 12 and 13. A forest management plan shall be made based on the results of forest structuring in each forest management unit. Chapter III deals with matters related to the utilization of forests in conservation, protection and production forests. Forest utilization permits in protection and production forests are issued as described in sections 22 and 23 and sections 32 to 35. Licensing and fees related to the various business permits are dealt with in sections 36 to 51. Chapters V and VI deal with matters related to private forests and use of forest areas. In order to protect the state's rights to forest products and sustainable forest, there shall be a control of distribution and marketing of forest products through their proper administration (Chapter VII). To ensure the well-arranged implementation of such forest structuring and making of forest structuring plans and making of forest management plans, utilization of forests and use of forest areas, the Minister has the authority to provide guidance, control and supervision over the policy of the Governor and Bupati or Mayor (Chapter VIII). The remaining part of this Regulation contains provisions related to administrative sanctions and provisions of miscellaneous nature.

2.8 *Government Regulation No. 82/2001 on management of water quality and control over water pollution*

This Regulation aims at managing the quality of water and controlling water pollution. The Government shall formulate plans for enhancing efficiency in the use of water. Water quality shall be classified into 4 classes: standard drinking water; water to be used for recreation infrastructures/facilities; water to be used for breeding of hot water fish; and water to be used for watering plants, etc. The text sets out provisions for the quality standards of water, for the monitoring of water quality, and for the status of water quality. The Minister shall stipulate a national policy on the control over water pollution. The utilization and disposal of waste water shall be subject to the granting of a

license as provided in the Regulation. Remaining provisions deal with sanctions, penalties, compensations, and transitional provisions.

2.9 Government Regulation on Rivers (No. 35 of 1991)

This Government Regulation lays down general provisions concerning a number of governmental functions relating to the development, conservation and mitigation of harmful effects, of rivers, natural lakes and reservoirs. All relevant activities are subject to river basin plans, the formation of which is the responsibility of the Minister responsible for water resources, while the implementation of plans devolves upon State-owned water management companies (Perum) or the provincial governments (Article 11). River structures, including reservoirs, can be constructed, operated and maintained directly by the Government or, on license from it, by Perums or other third parties (Article 12-15). Provincial governors are mandated to coordinate all flood mitigation activities and are empowered to take related emergency measures (Article 19 and 20). To protect the bed and banks of rivers, a strip of land measuring at least five meters from the outer foot of the embankment or, if no embankment exists, measuring such width as is determined by the above-mentioned Minister, is to be set aside for controlled management under the direct authority of the Minister (Article 4-6). The disposal of wastes in or near rivers, which is likely to result in pollution or degradation of the quality of river waters so as to impair further water use and to harm the environment, is prohibited (Article 27). The taking of water from rivers is subject to a government license, except for personal consumption (Article 28). The excavation and removal of inert materials from the bed and banks of rivers is to be restricted to locations designated by the provincial governors (Article 29).

2.10 Government Regulation No. 27 Concerning Swamps

The Regulation provides for the conservation of swamps with a view to maintaining the balance of the ecosystem, making beneficial use of water resources in the swamp, and developing the natural resources potential of the swamps, through long-, medium- and short-term technical plans. It is forbidden to damage the ecosystem of swamp conservation areas, and to dispose of materials and solid or liquid waste in those areas. Holders of titles to land inside such areas are under the obligation not to interfere with their protection functions. A license is required for the use of water found in swamp conservation areas for commercial purposes, as well as for the use of trees, animals and other natural resources in those areas. The reclamation of swamps is permissible under swamp reclamation plans, based on river basin development plans. The control and development of swamps, as well as the supervision and enforcement of swamp conservation legislation, are the responsibility of the Minister of Public Works, who may delegate his functions to the provincial government.

2.11 Government Regulation No. 20/1990 on Water Pollution Control

The Regulation is divided into the following Chapters: General Definitions (I); Making an Inventory of Quality and Quantity of Water (II); Water Grouping (III); Control (IV); Licensing (V); Supervision and Monitoring (VI); Financing (VII); Sanction (VIII); Transitional Provisions (IX); Concluding Provision (X).The Regulation aims at assuring and controlling the quality of water. To these ends it makes provisions for the inventory of quality and quantity of water, for the designation of a technical department by the Governor and the arrangement of data collected.

For this Project, the water shall be grouped Group D: water to be used for agricultural purposes, as well as for urban, business industry or hydraulic power plant.

The Minister assigned to manage the living environment shall establish the quality standard of liquid waste, to be reviewed at least once every five years. The disposal of waste into the water is subject to the granting of a permit by the Governor, whereas the disposal of household waste shall be regulated by Regional Regulation and the disposal of liquid waste into the sea shall be regulated in separate Regulation. The quality of water shall be monitored by the Governor/Head of Province, according to the criteria set out in Article 30.

2.12 Government Regulation of the Republic of Indonesia concerning the control of water pollution (No. 20 of 1990)

Article 1 contains definitions. Articles 2 to 6 provide for the making of inventories of quality and quantity of water resources under supervision of the Provincial Governors. Article 7 lists various categories of water according to its (beneficial) use: drinking, fisheries and livestock, cultivation, and industry. The Provincial Governor shall exercise control of water pollution in his province (Article 10). This authority shall determine the capability of waters to absorb pollution (Article 14). Effluent standards shall be determined by the Minister in accordance with Article 15. Provincial Governors may define more severe standards in accordance with Articles 15 and 25. They shall also issue permits for the discharge of liquid waste (Article 26). Articles 29 to 34 provide for surveillance and monitoring of water pollution. Polluters shall submit reports to the Provincial Governor (Article 32), who may warn polluters to meet standards and revoke permits (Article 33) laboratories at central and local government level shall be appointed (Article 34). Remaining articles concern financing, sanctions, and transition.

2.13 Government Regulation No. 24/2010 on the use of forest areas

This Government Regulation implements provisions on the use of forests and of forest areas for non-forestry development activities. These activities may be carried out only in production forest areas and in protected forest areas without altering the main function of forest areas. The Regulation specifies non-forestry development activities, which include mining, water resource facilities and infrastructures, water installation networks, public facilities and

clean water and waste water channels. Forest areas may be used only in possession of forest area lend use permits. Procedures and requirements for obtaining permits are set out in the Regulation. The Regulation further provides for: obligations of permit holders; the monitoring and evaluation of permit holders by the Minister; reasons for revoking permits; sanctions; etc.

2.14 Government Regulation No. 76/2008 concerning forest rehabilitation and reclamation

This Government Regulation provides for the rehabilitation of unproductive land by means of reforestation, greening, maintenance and improvement of the quality of vegetation, plant enrichment and application of land preservation technology. It further provides for forest reclamation activities which aim at repairing or recovering damaged land with forest vegetation. The Government Regulation defines phases which must be conducted to undergo forest rehabilitation and forest reclamation. The Minister, Governor or Regent/Mayor, according to their respective authority, shall take action in managing, controlling and supervising the implementation of forest rehabilitation and reclamation activities.

2.15 Government Regulation No. 3/2008 on the amendment to Government Regulation No. 6/2007 on forest arrangement and formulation of forest management plan as well as forest exploitation

This Government Regulation amends Government Regulation No. 6/2007 on forest arrangement and formulation of forest management plan as well as forest exploitation. Amendments have been made to articles 6-8, 13, 14, 25, 26, 29, 33, 36, 38, 40, 44, 50, 52-54, 57, 61, 62, 65, 70, 71, 74, 75, 81, 96, 118, 120, 128-130, 132, 133 and 141 dealing with the following matters: forest management areas; forest management plans; utilization of environmental services in protected forests and production forests; collection of non-timber forest products in protected forests; validity period of licenses to exploit forests in protected and production forests; utilization of timber forest products in production forests; utilization of non-timber forest products inside timber estates in production forests; rights and obligations of holders of licenses to exploit forests; extension and termination of licenses; distribution and marketing of forest products; and administrative sanctions.

2.16 Regulation of the minister of Finance No. 121/PMK.05/2007 on the opening of forest development account and first placement of reforestation funds into forest development account

The purpose of this Regulation is to open a forest development account where reforestation funds stipulated by the Minister of Finance shall be placed.

2.17 Government Regulation No. 6/2007 on forest arrangement and formulation of forest management plan as well as forest exploitation

The purpose of this Regulation is to design and plan activities related to forest arrangement and making of forest management plan including forest exploitation throughout forest areas. Activities shall be carried out by the

following organizations: Conservation Forest Management (KPHK), Protection Forest Management (KPHL) and Production Forest Management (KPHP). Functions and tasks of the organizations are set out in the Regulation. A forest management plan, including long-term and short-term forest management plans, shall be made based on the results of forest arrangement activities carried out in each forest management organization. The Regulation also provides for the issuance of licenses for the exploitation of conservation forests, protected forests and production forests and for licensees rights and obligations. In order to protect the state's rights to forest products and forest conservation, there shall be a control of the marketing of forest products through their proper administration. The remaining part of this Regulation contains provisions related to administrative sanctions and provisions of miscellaneous nature.

2.18 Government Regulation regarding forest resource provisions (No. 51 of 1998)

In the framework of sustainable forest management, this Regulation provides for the collection of levies named PSDH/forest resource provision and resource royalty. PSDH shall be paid by holders of specified forest exploitation and collection rights, on the basis of the yield of from state forests. These rights include the right to fell trees, to carry out forest rejuvenation activities, and to process and market forest yields. The PSDH shall be calculated by the Minister of Forests and Plantations on the basis of market prices and production costs (both defined). Utilization of PSDH shall be decided by the Minister of Finance after having heard the Minister of Forestry and Plantations.

2.19 Government Regulation on Game Hunting Affairs (No. 13 of 1994)

The Regulation consists of the following Chapters: General Provisions (I); Game, Hunting Site and Season (II); Hunting Paraphernalia (III); Hunting Act and Hunting License (IV); A Hunter's Rights and Obligations (V); Business Operation of a Hunting Park (VI); Business Operation of a Hunting Garden (VII); Supervision (IX); Sanctions (IX); Closing Provisions (X).Main purpose of the present Regulation on game hunting is to protect and conserve the natural resources and their ecosystems. To this end, it gives detailed criteria for the enforcement of hunting seasons and for the establishment of hunting areas. Further provisions concern the issuance of the hunting license, according to the provisions of Chapter IV, and the rights and obligations of the permit holders. Hunting activities may be entrusted to officials by the competent Minister for research purposes. As far as hunting parks are concerned, the Regulation makes detailed provisions for their management by the "hunting park operators", who are entitled to carry out the activities specified in the license and receive compensation from visitors.

2.20 Government Regulation No. 28 re Forest Protection

The text of this Regulation is divided into 9 Chapters: General provisions (I); Protection of forest areas, reserved forests and other forests (II); Protection of

forest soils (III); Protection of forests from damage (IV); Protection of forest products (V); Implementation of forest protection (VI); Offences and penalties (VII); Transitional provisions (VIII); Final provisions (IX).The physical demarcation of all forests is carried out in accordance with existing legislation. In Chapter II definitions of "forest areas", "reserved forests", and "other forests" are given. Except under licenses from the Ministry of Forestry uses of forest areas must be consistent with the area's function and use as defined in articles 3 and 4 of the Forest Law of 1967. Forestry offices in the provinces are responsible for the protection inside and outside forest areas.

2.21 Government Regulation on Forestry Planning (No. 33 of 1970)

Forestry planning shall consist of a General Plan, Forest Determination Plan, Forest Arrangement Plan, Forest Usage Arrangement Plan, operational plans for forest exploitation, operational sketches, forestry arrangements, and forestry usage arrangements. A description of each type of planning is given in Article 1. The objective of forestry planning is to enable to carry out all activities listed in article 1 in an orderly and rational fashion. The Ministry of Agriculture shall undertake a survey and inventarization for purpose of forest planning (Article 3). Articles 4 to 9 give some indications how, and on how each type of plan shall be prepared and what it shall include.

2.22 Government Regulation No. 60/2007 regarding the conservation of fishery resources

The purpose of this Government Regulation is to prescribe general conservation and management measures for the protection of fishery resources. The conservation of fishery resources shall include the conservation of ecosystems, of fish species and of fish genetics. The Regulation defines the types of ecosystem with fishery resources and specifies the activities to be executed for their conservation. Water conservation areas shall be instituted for the conservation of ecosystems and shall consist of national water parks, water tourism parks, water wildlife reserves and fishery wildlife reserves. Provisions are also made for the conservation of fish species and fish genetic. The conservation of fish species shall be done through: grouping fish types into protected fish species and unprotected fish species; stipulating the protection status of fish types; the preservation of protected and unprotected fish species; breeding protected and unprotected fish species; and research and development. The conservation of fish genetic resources shall be executed through: preservation and reproduction; and gamete conservation. The Regulation also provides for the issuance of permits for the conservation of fishery resources. Permits shall be issued for the following: fish catching in water conservation areas; fish cultivation in water conservation areas; water tourism activities; performing research and education; reproduction activities; trade, import and export of fish species; etc. The Regulation further provides for the following matters: education and conservation training; fostering of society; supervision over the conservation of fishery resources; and sanctions.

3. Presidential Regulations ("Peraturan Presiden"; PerPres)

3.1 Presidential Regulation No. 89/2007 regarding the National Movement for the Rehabilitation of Forest and Land

This Regulation provides for the establishment of a National Movement for the Rehabilitation of Forest and Land Coordination Team in order to restore, preserve and enhance forest, land and river stream areas through forest and land rehabilitation. The Regulation defines functions and internal organization of the Team. The Regulation further provides for tasks of the National Movement for the Rehabilitation of Forest and Land Coordination Team and for costs needed to implement them.

4. Presidential Decrees ("Keputusan Presiden"; KePres)

4.1 Presidential Decree No. 22 on the establishment of an integrated forest safeguarding team

The Decree concerns the establishment of the Central Integrated Forest Safeguarding Team (TPHT Pusat), which shall: (a) formulate policies on forest safeguarding; (b) control, supervise and coordinate the implementation of forest safeguarding policies. For the implementation of its tasks the TPHT Pusat shall be assisted by (a) a Task force and (b) a Secretariat. Further provisions concern the establishment of Provincial TPHT (Regional TPHT) by the Ministry of Forest as the Chairman of TPHT Pusat.

4.2 Presidential Decree Re-afforestation Fund (No. 29 of 1990)

The Re-afforestation Fund is a fund collected from Forest Exploitation Right Holders, Forest Production Collection Right Holders and Timber Utilization Permit Holders, through so-called "Upstream Timber Processing Industry Entrepreneurs". The funds shall be used in the framework of the development of timber estates and the rehabilitation of forest land (Article 1). Upstream Timber Processing Industry shall be an industry directly processing logs and/or chip raw material. These entrepreneurs shall collect and deposit the funds (Article 2) and shall register with the Ministry of Forestry. Other obligations of Upstream Timber Processing Industry Entrepreneurs are specified in Article 11. Logs and other non-processed wood and processed timber shall be accompanied by a Transportation Certificate when transported (Article 12).

5. Ministerial Regulations ("Peraturan Menteri"; PerMen)

5.1 Ministerial Regulation P. 20/Menhut-II/2012 on Implementation of Forest Carbon

Regulation No. P.20/Menhut-II/2012 replaces the procedures to apply for a permit or permission from the Ministry of Forestry for REDD+ activities that were found in Regulation No. P.68/Menhut-II/2008 and Regulation No. P.30/Menhut-II/2009. According to Regulation No. P. 20/Menhut-II/2012, forest carbon projects can be implemented in state forests that have been designated to have the functions of either production, protection, conservation

or a private/community forest. The proponents of forest carbon activities can be the government, state-owned or private enterprises, cooperatives or a community. In order to obtain an 'operating licence for forest carbon,' the project proponent submits a written request to the Minister of Forestry that includes a description of the project activities, the project map, duration, estimated value of the activities and risk management.

5.2 Minister of Forestry Regulation No. P.4/Menhut-II/2011 - Forest Reclamation Guidelines

This regulation prescribes forest reclamation guidelines that intend to act as a reference for reclamation of land formerly under "forest area utilization". The guideline aims for forest reclamation to be done in accordance with "general patterns, standards and criteria in order to recover the forest to re-function at optimum accordingly to its allocation" (Article 3).

The Forest Reclamation Guidelines contain provisions for location inventory; decision on location; planning; execution; institution; technical monitoring and assistance; the reporting mechanism for implementation of forest reclamation activities; and sanctions (Article 4).

5.3 Ministerial Regulation P. 30/Menhut-II/2009 on Procedures for Reducing Emissions from Deforestation and Forest Degradation

On 1 May 2009, the Minister of Forestry signed the Minister of Forestry Regulation P.30/2009 on Procedures for Reducing Emissions from Deforestation and Forest Degradation ("REDD Regulation"). The REDD Regulation is the first national legal regime for the implementation of REDD projects, and the issuance and trading of carbon credits generated by such projects.

The REDD Regulation lists the different types of forest areas that are eligible for REDD projects, which include concessions that may be held privately, such as Wood Forest Product Utilization Concessions and Ecosystem Restoration Concessions.

REDD projects may also be implemented on forested lands that have not been formally designated as forest areas, but are subject to pre-existing land rights. Forested land which is not under any form of land right is not eligible for the implementation of REDD projects.

The Regulation requires that REDD project proponents must involve both a national Indonesian and an international entity. REDD project proposals, including a REDD implementation plan, must be submitted to the Minister of Forestry for approval. The Regulation sets the maximum duration of REDD projects at 30 years initially, which may be extended.

5.4 Regulation of the Minister of Forestry of RI No. P. 12/Menhut-II/2013 concerning the Guidance for the implementation of Smallholders Seed Plantation

This Regulation, consisting of 4 articles, establishes the Guidance for the implementation of Smallholders Seed Plantation. The above mentioned Guidance shall be contained in future attachments to this Regulation.

5.5 Regulation of the Forestry Minister No. P.63/Menhut-II/2011 on guide to planting tree for the holders of borrow-and-use forest permits within the framework of rehabilitating river basin areas

This Regulation provides a guide to realize the planting of trees by holders of borrow-and-use forest area permits within the framework of river basin area rehabilitation. The Regulation provides for: target locations for the planting of trees to rehabilitate river basin areas; types of trees to be planted in conservation forests, protected forests, etc.; size of planting areas; procedures for the proposal and approval of locations for the planting of trees; annual plans for the planting of trees; evaluation of planting and management of planting results; monitoring and technical guidance; sanctions; etc.

5.6 Regulation of the Minister of Forestry of RI No. P. 45/Menhut-II/2011 concerning measuring and testing of forest product

This Regulation regulates the measurement and testing of forest products in order to protect state rights, to protect the quality of forest products from the ecological and economical point of view and to improve forest products competitiveness and sustainable management of forests. Measurement and testing shall be carried out by authority officers to determine the type and volume/weight of all forest products from state or private forests. The Regulation further provides for procedures for the measurement and evaluation of forest products.

5.7 Regulation of the Minister of Forestry of the Republic of Indonesia No. P.4/Menhut-II/2011 on forest reclamation guidelines

This Regulation prescribes forest reclamation guidelines to provide reference for undergoing forest reclamation activities on land formerly used as forest area utilization. Forest reclamation shall be done in accordance to general patterns, standards and criteria in order to recover the forest to re-function at optimum accordingly to its allocation. The Regulation provides for: location inventory and decision on location; forest reclamation planning; implementation of reclamation activities such as land management, erosion and sedimentation control, re-vegetation and maintenance; institutions responsible for handling forest reclamation; activities of technical monitoring and assistance; reporting mechanisms of forest reclamation implementation; and sanctions.

5.8 Regulation of RI Forestry Minister No. 39/MENHUT-II/2010 concerning general pattern, criteria and standard of forest rehabilitation and reclamation

The Regulation provides relatively detailed explanation on the formulation of the general pattern, criteria, and standards of forest rehabilitation and reclamation for businesses in the forestry sector. The Regulation sets out basic

principles and approaches for the performance of forest rehabilitation and reclamation. The criteria and standard of rehabilitation cover the aspects of: conservation forests, protection forests and production forests; protection zones and cultivation zones; institutions responsible for the rehabilitation of forest and land; technology used for the rehabilitation of forests and land. The reclamation of forests shall use the following criteria and standards: characteristics of activity locations; types of activities; land arrangement; control of erosion and waste; re-vegetation; and social economy development.

5.9 Regulation of the State Minister of Living Environment No. 10/2010 on mechanisms for pollution and/or damage prevention to living environment pertaining to forest and/or land fire

This Regulation aims to effectively prevent pollution or damage to the living environment pertaining to forest and/or land fire. The Regulation addresses: land preparation and clearance for cultivation or non-cultivation activities by land burning; water management in topsoil land; monitoring which shall be conducted by means of early warning and early detection of forest and/or land fire prevention and field surveillance; reporting; and state agencies responsible for the management and supervision of these activities.

5.10 Regulation of the Minister of Forestry of RI No. P.06/MENHUT-II/2010 on norms, standards, procedures and criteria for forest management in Protected Forest Management Unit (KPHL) and Producing Forest Management Unit (KPHP)

This Regulation aims to arrange forest management in Protected Forest Management Unit (KPHL) and Producing Forest Management Unit (KPHP).Forest management include activities covering: forest layout and structuring of forest management programs; forest utilization; forest zone use; forest rehabilitation and reclamation; and forest protection and natural preservation. The Minister of Forestry shall be responsible for implementing management, control and technical supervision on the implementation of forest layout and in structuring forest management programs, forest rehabilitation and reclamation and forest protection by the KPHL and KPHP.

5.11 Regulation of the Minister of Forestry of RI No. 60/Menhut-II/2009 on guidelines for evaluation of successful forest reclamation

This Regulation prescribes guidelines for the evaluation of successful forest reclamation on a formerly used forest zone. Criteria for successful forest reclamation include orderly arrangement of the land surface, control of erosion and sedimentation, and re-vegetation and tree planting. The Regulation specifies methods of evaluation on successful forest reclamation and procedures and results of evaluation.

5.12 Regulation of the Minister of Forestry No. P.6/Menhut-II/2009 on the establishment of Forest Management Unit

This Regulation provides for the establishment of Forest Management Units in order to support the implementation of efficient and continuous forest management. The Regulation classifies Forest Management Units into Preserved Forest Management Units, Protected Forest Management Units and Producing Forest Management Units. The Regulation further provides for criteria and indicators for the establishment of Forest Management Units and sets out procedures for their establishment.

5.13 Joint Regulation of the Minister of Finance No. 06.1/PMK.01/2007 and the Minister of Forestry No. 02/MENHUT-II/2007 on management of Reforestation Fund in Forest Development Account

This Joint Regulation provides for the management of a Reforestation Fund placed in the Forest Development Account. The funds shall be used for the reforestation and rehabilitation of forests in order to recover, maintain and increase functions of forests and land. Funds can be transferred to institution's work units within the Ministry of Finance and shall be used only for Forest and Land Rehabilitation under a loan scheme. Loans may be granted to corporate body enterprises, cooperatives or forest farmers.

5.14 Regulation of the Minister of Forestry No. P.10/Menhut-II/2006 on Inventorying of Production Forests of the Forest Management Unit Level

The purpose of this Regulation is to undertake periodically comprehensive forest inventorying in order to ascertain the conditions of standing stocks and to monitor the conservation trend of standing stocks in production–forest management units. Every manager of Production-Forest Management Units (KPHP) or holders of Business License to Utilize Timber Forest Products (IUPHHK) shall undertake forest inventorying as provided for in Chapter III. Chapters IV and V deal with reporting of results of forest inventorying and formulation of action plans, and the making of permanent measuring compartments. The Ministry of Forestry shall supervise the activities of forest inventorying (Chapter VI). The remaining Chapters contain sanctions and transitional provisions.

6. Ministerial Decrees ("Keputusan Menteri"; KepMen)

6.1 Decree of the Minister of Forestry No. Sk.159/Menhut-II/2004 RE ecosystem restoration in production forest areas

The Decree provides for the management, conservation and preservation of the ecosystem of certain forest areas destined to production of forest products, in order to improve and protect both fauna and flora, the soil and other assorted natural resources that could be affected by the production processes, by the appointment of license holders working in the field of forest protection and restoration.

6.2 Decree of the State Minister for Environmental affairs No. 110/2003 on the Guidelines on stipulation of accommodating capacity of load of water pollution in water sources

Article 1 defines the Accommodating Capacity of Load of Water Pollution as "the capability of water in a water source to receive load of pollution without causing the water to get polluted", in other words it indicates the threshold of polluting agents under which water is not yet polluted. The Guidelines indicate in details two methods of pollution capability assessment most frequently used and their technicalities, The Weight Scale and the Streeter-Phelps Methods and their operating procedures.

6.3 Joint Decree of the Minister of Transmigration and the Settlement of Forest Squatters, the Minister of Forestry and the Minister of Agriculture re the development of people's forest transmigration

The aim of the present Decree is to create harmony in planning, implementation, supervision and control of the development of "Trans -HR" and within this framework to enhance opportunities for transmigrating and local people to participate in forestry and agriculture and to prevent damage to natural resources. Articles 6 to 12 define tasks of the Ministry of Transmigration and the Ministry of Forestry, and of "executive parties", including environmental impact assessment.

6.4 Joint Decree of the Minister of Home Affairs and the State Minister for the Supervision of the Development and the Living Environment regarding the Agency entrusted with the management of natural resources and the living environment in regions (No. 23 of 1979)

All Governors and Bupati/Walikotamadya being Heads of Regions are designated as public officers responsible for the management of natural resources and the living environment in their respective regions. Management encompasses the task of regulating, planning and implementing use of natural resources and in relation to this the preservation, development and enhancement of the quality of the living environment. Article 3 specifies in more detail the tasks of Regional Heads in relation to preparation of plans, and issuing and implementation of regulations. Article 5 provides for assistance to the Regional Heads, whereas article 6 lists instructions, directives, etc. to be complied with in implementing tasks as prescribed in the present Decree. Article 7 introduces an obligation to report to superior levels by all parties involved.

6.5 Decree of the Minister of Forestry No. SK.83/Menhut-II/2005 on the appointment of forest group Sungai Meranti-Sungai Kapuas in Jambi and South Sumatra provinces as wide as 101,355 hectares to directive for ecosystem restoration location in production forest area

The purpose of this Decree is to realize ecosystem restoration in production forest areas by appointing the forest group Sungai Meranti-Sungai Kapuas in Jambi and South Sumatra provinces, consisting of 101,355 hectares, for ecosystem restoration activities.

6.6 Decree of the Minister of Forestry and Estates No. 625/kpts-II/1998 the silvicultural system of selective felling and path planting (TPTJ) in the management of natural production forests

This system of selective felling of trees with a minimum diameter of 40 cm and followed by artificial rejuvenation, shall be adopted in natural production forests including lowland forests (as defined) where possible according to the Ministry of Forestry. A Forest Business Operation Working Plan shall incorporate a plan for this silvicultural system and reports shall be made annually to the Director general of Forest Business Operation. Guidelines for selective felling shall be established.

6.7 Decree of the Ministry of Forestry regarding the control of game hunting (No. 616/kpts-II/1996)

In order to further implement article 42 of Regulation No. 13 of 1994, this Decree provides for control of hunting of game in Hunting Parks and Hunting Areas in local forest zones by local forestry officers and policemen. Heads of Regional Offices of the Ministry of Forestry shall coordinate the control in their territory and report to the Ministry of Forestry. Control includes inspection of hunting licenses, hunting equipment, examination of the game hunted, etc.

6.8 Decree of the Minister of Forestry No. 622/KPTS-II/95 on the guidelines for community forests

The Decree is divided into the following Chapters: General Provisions (I); The Objectives of Community Forests (II); Forest Areas for Community Forest Activities (III); The Implementation of Community Forest Activities (IV); The Participants of Community Forest Activities (V); The Rights of the Participants of Community Forests (VI); The Obligations of the Participants of Community Forests (VII); Financing (VIII); The Cancellation of an Agreement (IX); Guidance, Control, Supervision and Nurturing of Community Forests (X); Transitional Provision (XI); Closing Provision (XII).The Decree establishes forest areas where Community Forest activities may be carried out. Forest Activities shall comprehend planning, planting, cultivating, protecting, picking, processing and marketing. The participants of Community Forest activities may be individuals, groups or cooperatives appointed by the Head of a First-Level Region Forestry Service on the basis of the suggestions given by the Village Head or the Executive Board of the Cooperative concerned. The appointed participants shall conclude an agreement with a regional forestry agency concerning their participation in the Community Forestry activities. Chapter VI and VII deal with the rights and obligations of the participants, respectively. The control of Community Forest activities shall be conducted by the Head of a Regional Office; the supervision over such activities shall be conducted by Heads of First-Level and Second-Level Region Forestry Services.

6.9 Joint Decree of the State Minister of Food Affairs, the Minister of Forestry and the Commander-in-Chief of the Armed Forces No. KEP-10/M/09/1995, No. 509/KPTS-II/1995, No. NKB/5/IX/1995 relative to the development of food

reserve forests through the civic mission operations of the armed forces of the Republic of Indonesia

A Decree relative to the development of Food Reserve Forests and the assistance of the Civic Mission of the armed forces in implementing government programs for the development of such forests. A Food Forest Reserve is a forest in which plantations of "long-age" plants which are accepted by less-developed communities as a substitute source of food supply, are developed (Article 1). Initially pilot units in 10 provinces/first-level regions shall be established.

6.10 Decree No. 260/Kpts-II/95 of the Ministry of Forestry relative to Guidelines for Efforts to Prevent and Extinguish Forest Fires

The Guidelines consist of the following Parts: Introduction (I); Efforts to Control Forest Fires (II); Organization (III); Reporting (IV); Responsibility and Obligation (Part V); Forest Fire Control coordination (Part VI); Financing in the Framework of Forest Fire Control (Part VII); Evacuation and Rescue (Part VIII).These Guidelines shall be used all over Indonesia and for the drawing up of a Regulation of a First-Level Region on the prevention and extinguishing of forest fires.

6.11 Joint Decree of the Minister of Forestry and the State Minister of Environmental Affairs on the establishment of a Permanent Working Committee for Biological Natural Resources and their Ecosystems (No. 167/KPTS-VI/1995 and No. 01/MENLH/3/1995)

With a view to promote the cooperation between the Ministry of Forestry and the Office of the State Minister of Environmental Affairs, the Decree makes provisions for the establishment of a Permanent Working Committee for the Conservation of Biological Natural Resources and their Ecosystem (PANJATAP KSDAH). The Working Committee shall formulate guiding principles and co-ordinate, monitor and evaluate the implementation of policies (a) on the management of Natural Reserves, Areas for the Conservation of Nature, Hunting Parks and protected Forests; (b) on the preservation of biodiversity; (c) on the management of life buffer system protection zones; (d) on the utilization of forest/forest produce in a sustainable manner; (e) on the promotion of community participation in the conservation of biological natural resources and their ecosystem. The Committee shall report the implementation of its tasks periodically and shall be responsible to the Minister of Forestry and the State Minister of Environmental Affairs.

6.12 Decree on Guidelines for the Determination of Regional Identities of Flora and Fauna (No. 48 of 1989)

The Decree provides for the determination of regional identities of flora and fauna as an attempt to identify certain regions from the uniqueness and diversity of certain species of plants and animals native to, or typical of, the regions concerned, so that the special characteristics of these can be described.

The aims of determining such regional identities are: to promote the sense if sharing the ownership of natural wealth; to increase public awareness; to promote regional tourism; and to develop regional industries. The species serving as regional identities are those which: are original species in the region concerned; have typical value of utilization by local communities; have aesthetic value; are scarce or limitedly distributed; etc. The regional identities of flora and fauna which have been determined are to be developed and safeguarded by regional administrations and local communities.

6.13 Provincial Regulation No. 1/2014 on Northern Sumatra Province's Integrated Watershed Management

This provincial regulation provides the scope, implementation and monitoring plan for the integrated watershed management program of Lake Toba. It consists of 16 chapters as follows: Chapter 1 General Requirements; Chapter 2 Purposes, Principles and Objectives; Chapter 3 Scopes; Chapter 4 Plans; Chapter 5 Implementation; Chapter 6 Monitoring and Evaluation; Chapter 7 Guidance and Supervision; Chapter 8 Participation and Community Empowerment; Chapter 9 Source of Funds; Chapter 10 Penalties; Chapter 11 Intensive and Disincentives Utilization; Chapter 12 Dispute Resolution; Chapter 13 Provisions of Investigation; Chapter 14 Administrative Sanction; Chapter 15 Criminal Provisions and Chapter 16 Closure.

6.14 Presidential Instruction No. 4/2005 on eradication of illegal logging in forest areas and distribution throughout the territory of the Republic of Indonesia

The purpose of this Presidential Instruction is to undertake the eradication of illegal logging in forest areas and distribution throughout the territory of the Republic of Indonesia by taking action against anybody who: harvests or collects timber forest results without an authorized license; receives, buys or sells timber forest results collected illegally; carries, controls or has timber forest results without certificate of legitimacy, etc. Ministries in charge of implementing these instructions and their duties are also described.

Annex B – Conservation Programs in Indonesia

Annex B Conservation Programs in Indonesia

Program Name	Location	Organisation	General Description	Year	Sponsors	Government Bodies Involved	Funds (USD)	Conservation Priorities
Sumatran Orangutan Conservation Program	Sumatra Northern Sumatra (Aceh and North Sumatra provinces)	Sumatran Orangutan Conservation Programme (SOCP). SOCP is a collaborative programme of PanEco Foundation, Yayasan Ekosistem Lestari and the Indonesian Ministry of Environment and Forestry's Directorate General of Natural Resource and Ecosystem Conservation.	The SOCP objective is to conserve viable populations of the Critically Endangered Sumatra Orangutan (Pongo ebelii) through habitat protection, rehabilitation and reintroduction of ex-captive orangutans to the wild, education, survey work and scientific research. SOCP is the outcome of the signing of a Memorandum of Understanding between the 3 organizations mentioned previously and Frankfurt Zoological Society. The programme is run from a quarantine facility, the Batu Mbelin orangutan quarantine center near Medan in North Sumatra.	1999	Various organisations	Indonesian Ministry of Environment and Forestry's Directorate General of Natural Resource and Ecosystem Conservation	Not specified	Sumatran Orangutan
Sumatran Rhino Conservation Program	Sumatra Bukit Barisan Selatan National Park in Southern Sumatra	International Rhino Foundation Rhino Foundation of Indonesia (Yayasan Badak Indonesia)	The program's objective is to increase the population of Sumatran rhinos in Indonesia by monitoring and protecting rhinos and their habitats through Rhino Protection Units. The program also strives to understand the basic biology of rhinos, breed the species at the Sumatran Rhino Sanctuary and work with local communities to build support for conservation.	1993	Various corporate entities		For 2017, more than $200,000 USD in funds secured (for all International Rhino Foundation programs)	Sumatran Rhino
Sumatran Tiger Trust Conservation Program	Sumatra - Bukit Tiga Puluh National Park	World Association of Zoos and Aquariums (WAZA) Sumatran Tiger	The program objectives are to save from extinction any sub-species of tiger, in particular the Sumatran tiger; support specific collaborative projects and captive breeding and maangement initiatives;	Not specified	Not specified	Ministry of Forest	Not specified	Sumatran Tiger

Program Name	Location	Organisation	General Description	Year	Sponsors	Government Bodies Involved	Funds (USD)	Conservation Priorities
	in Riau and Jambi provinces - Way Kambas National Park in Lampung province	Trust Program Konservasi Harimau Sumatera	provide information on the current census of the distribution and status of wild tigers and ecology; and to educate the public.					
Various programs under the Sumatra Forest Institute: 1) Forest Protection Unit 2) Community Agroforestry Development Unit 3) Wildlife Rescue Unit 4) Volunteerism Management Unit	Sumatra In Northern Sumatra : - Batang Toru Forest Range - Batang Gadis National Park	Sumatra Rainforest Institute	The Forest Protection Unit was founded to rehabilitate and enrich the degraded tropical forests of North Sumatra, with a particular focus on Mandailing Natal district and Tapanuli district. The FPU manages community forest rehabilitation initiatives, engaging local community members to assist in the rehabilitation of damaged areas through tree planting, soil enrichment and community-based monitoring and patrols to prevent further damage.	Not specified	TFCA Sumatera Tropical Forest Conservation Action The Rufford Foundation American Forests	Not specified	Not specified	North Sumatra forests
Bukit Tigapuluh Landscape Conservation Programme	Sumatra Bukit Tiga Puluh National Park in Riau and Jambi provinces	Frankfurt Zoological Society	The project aims to protect the flora and fauna of Bukit Tigapuluh National Park with a focus on the conservation of the Sumatran Orangutan and Asian Elephant.	Not specified	Not specified	Jambi Province Conservation Authority	Not specified	Biodiversity of Bukit Tigapuluh National Park
Project for Forset Conservation in Sumatra	Sumatra - Bukit	WWF	The program objectives are to enable local residents to maintain their livelihoods through sustainable methods,	2011	Sony	Not specified	Not specified	National Park biodiversity

Program Name	Location	Organisation	General Description	Year	Sponsors	Government Bodies Involved	Funds (USD)	Conservation Priorities
	Barisan Selatan National Park in Southern Sumatra - Tesso Nilo National Park in Riau province		to restore forests and protect biodiversity. This is accomplished through tree-planting programs, elephant patrols and promotion of eco-tourism.					
Sumatran Elephant Conservation Center	Sumatra	International Elephant Foundation	Funding and establishment of Sumatran Elephant Conservation Centers by International Elephant Foundation. In 2004, IEF established Conservation Response Units (CRU) to provide protection for plant and animals species in the region through elephant back patrols of wildlife areas. This promotes the better co-existence of man and animal.	2000	Not specified	Government of Sumatra	Not specified	Elephant Conservation
Global Conservation - Leuser Ecosystem, Sumatra, Indonesia	Sumatra - Leuser Ecosystem National Park in Northern Sumatra	Global Conservation, with partners: - Forum Konservasi Leuser - HaKA (Forest, Nature and Environment of Aceh) - Wildlife	The program will span three years and is focused on wildlife habitat protection, removal of illegal plantations and logging operations, SMART ranger patrols and lobbying and legal actions to enforce Leuser Ecosystem's existing protection as a national park and UNESCO World Heritage Site. Global Conservation is sponsoring four initiatives (i) Stop Aceh Governor's Revisions to the Aceh Spatial Plan, (ii) Habitat Acquisition and New Protection for Core Wildlife Areas, (iii) Closing	2016-2018	Not specified	Not specified	USD 840,000 (for 1,200,000 hectares)	National Park biodiversity

Program Name	Location	Organisation	General Description	Year	Sponsors	Government Bodies Involved	Funds (USD)	Conservation Priorities
		Conservation Society	Illegal Palm Plantations and Restoring Forests, (iv) SMART Ranger Patrols.					
"Village Forest" Kepayang, South Sumatra - Rehabilitation of Burnt Areas and Landscape Management on Peatland	Sumatra In South Sumatra (Peatland)	Deutsche Gesselschaft fur Internationale Zusammernarbeit GmbH (German Society for International Cooperation)	The project involves rehabilitating peatland forest after land and forest fires. This involves redesigning peat hydrological units, canal blocking, irritating areas with root and deep peat firest, and managing water and tenure arrangements.	2016	GIZ	Forestry Service South Sumatra, Indonesia	Not specified	Peatland
Ministry of Forestry Community-based Rehabilitation Program	Indonesia	Government of Indonesia	In 2002, the Ministry of Forestry initiated a policy for social forestry, and developed a technical plan under the Five Year Plan on Forest and Land Rehabilitation Program. Catchment areas were used as units of management. The program focuses on rehabilitating 17 catchment areas over 2002 - 2007 at the cost of USD 1.6 billion. Specifically in Sumatra, rehabilitation of ex-concession areas were carried out from 1999 - 2001, covering 10,950 ha and costing 1.7 million USD.	2002	Various programs funded by different sponsors, including government of Indonesia, NGOs, and corporate associations.	Ministry of Forest	Depending on the project, expenses range from 45,000 USD to 1.1 billion USD	Forest Rehabilitation and Community Forestry
Restorasi Ekosistem Riau	Sumatra Kampar Peninsula in Riau province	Main Organisation APRIL Group Partner Organisations FFI Bidara The Nature Conservancy	APRIL Group, one of Indonesia's largest pulp and paper company, received a 60 year license to restore the ecosystem of the Kampar Peninsula in 2013. The Project, called Restorasi Ekosistem Riau (RER), will cost $100 million over the next ten years. Restoration efforts include planting specific species of trees in the degraded forests, maintenance to prevent fire, and protecting the	2013	APRIL	Indonesian Ministry of Environment and Forestry	1,000,000 USD for 150,000 hectares of land	Peatland Biodiversity

Program Name	Location	Organisation	General Description	Year	Sponsors	Government Bodies Involved	Funds (USD)	Conservation Priorities
			biodiversity in the area. As of 2015, more than 5,000 trees covering over 8 hectares have been planted.					
Artha Graha Peduli's Green Society Program	Sumatra Tambling Wildlife Nature Conservation (TWNC) Southern Tip of Sumatra	Artha Graha Peduli (AGP Foundation)	Tambling Wildlife Nature Conservation area covers 48,000 hectares of forest (part of the South Bukit Barisan National Park at 365,000 hectares) and 14,000 hectares of marine reserve. AGP has managed TWNC since 1996, and programs are targeted at reducing or stabilizing the rate of deforestation in TWNC. Tasks conducted under the progra include the reforestation of an estimated 10,000 trees, assisting Indonesian forest patrols with additional personnel and providing short courses to villages surrounding TWNC on the importance and significance of the forest, and empowering villages surrounding TWNC to work and assist in AGP's green activities.	1996	AGP Foundation	Ministry of Forestry	Not specified	Forest Restoration and rehabilitation
The Wildlife Conservation Society - Indonesia Program (WCS-IP)	Indonesia	Wildlife Conservation Society	This program aims to conserve wild Places (i.e. forests and parks) and protect animals throughout Indonesia. Deforestation reduction was enforced anti-poaching/illegal wildlife trade prevention measures were pushed forward, ecological studies and research were undertaken, protective zones were set up, animal-human conflict management measures were	1995	Not specified	Ministry of Environment and Forestry	Not specified	Biodiversity protection especially endangered mammals and forests conservation

Program Name	Location	Organisation	General Description	Year	Sponsors	Government Bodies Involved	Funds (USD)	Conservation Priorities
			implemented etc. These measures were enforced through laws and policies. Wild places targeted in Sumatra are the Leuser landscapes, the Way Kambas National Park and Bukit Barisan and targeted animals found in Sumatra include the Sumatran Tiger, Sumatran Rhino, Sumatran Elephant, Pangolin and the Helmeted Hornbill.					
Kerinci Seblat Tiger Protection Project/ Kerinci-Seblat Tiger Protection and Conservation Programme	Sumatra Kerinci Seblat National Park in Western Sumatra	Fauna & Flora International (FFI), Australia Zoo Wildlife Warriors	The programme aims to reduce threats to the biodiversity of Kerinci Seblat National Park by tackling wildlife and other forest crimes, mitigating human-tiger conflict, training rangers and police, and conducting research on tigers and their prey species. The programme operates in 4 provinces around the park and has successfully reduced tiger poaching incidents through the effective use of law enforcement. Tiger Protection & Conservation Unit (TPCU) teams are formed as part of the programme throughout the park and bordering areas, protecting tigers and their prey species by patrolling key tiger habitats, training local farmers, forest rangers and NGOs in human-wildlife conflict prevention, performing wildlife rescues and conducting law enforcement actions.	2000	Dreamworld Wildlife Foundation Australia Zoo Wildlife Warriors	National Park Authority	USD 232,000	Biodiversity protection especially the Sumatran tiger
Global Trees Campaign	Indonesia	Fauna & Flora International (FFI) and Botanic Gardens	The Global Trees Campaign supports the Indonesian government in developing and implementing a conservation action plan for 12 of the country's highest	1999	Various programs funded by different	Various government departments	Not specified	Forest conservation

Program Name	Location	Organisation	General Description	Year	Sponsors	Government Bodies Involved	Funds (USD)	Conservation Priorities
		Conservation International	priority tree species, including a number of Dipterocarp species. This is led by the 'Indonesia Forum for Threatened Trees', a network of leading tree conservation experts from various government departments, NGOs, botanic gardens and research institutes. The campaign also supports local nature reserves and community groups to better protect trees from logging and support their regneration in the wild through habitat management and targeted tree planting. A series of biodiversity surveys have also been carried out in Kerinci Seblat National Park in hopes to discover more endemic, threatened and protected species. The data collected will be used to design the management practices and conservation plans to improve habitat quality and protect flora and fauna.		sponsors, including British American Tobacco, USDA Forest Service, SOS – Save Our Species, The Mohamed bin Zayed Species Conservation Fund, Lara, Lee and George Gund III Foundation, Garfield Weston Foundation, Fondation Franklinia, DfID UK Darwin Initiative			
Harapan Rainforest Initiative - Birdlife's Forest of Hope Programme	Sumatra Harapan Rainforest in Jambi and South Sumatra provinces	Burung Indonesia (Birdlife Indonesia) RSPB (BirdLife UK) Birdlife International	Birdlife's Forest of Hope Programme aims to bring together and build on successful forest conservation and management programmes in tropical forests around the world. The Harapan Rainforest in Sumatra is the first Forest of Hope site and is used as a model for forest restoration, wildlife conservation and sustainable local development. This	2004	German Ministry of Environment's International Climate Initiative (through KfW Entwicklungsbank), the	Ministry of Forestry	Not specified	Harapan Rainforests

Program Name	Location	Organisation	General Description	Year	Sponsors	Government Bodies Involved	Funds (USD)	Conservation Priorities
			initiative was made possible after the Indonesian Ministry of Forestry passed a decree, management licence called an Ecosystem Restoration Concession, enabling 'production forest' designated for logging to be restored and managed for conservation		Global Conservation Fund of Conservation International, the European Union, DANIDA, BirdLife Partner			
Sumatran Tiger Protection program	Sumatra	Fauna & Flora International (FFI)	This program spans 2 areas in Sumatra - the Kerinci-Seblat National Park (KSNP) and Aceh's Ulu Masen-Leuser forest block. It aims to find sustainable solutions to tiger threats and build community involvement in tiger protection. Work in KSNP started in 1994 with field research. In present days, with the involvement of the National Park Authority, 5 Tiger Protection and Conservation Units are activated. In Aceh, the Aceh tiger Program has successfully supported the transition of 62 former combatants, illegal loggers and wildlife poachers to respected community rangers. Through this programme, FFI also worked with Aceh's provincial government to develop a 30 year forest and biodiversity management plan for the area.	1994	Not specified	National Park Authority Aceh Provincial Government	USD 323,000	Sumatran Tiger
Human-elephant conflict mitigation in Aceh province-	Sumatra Aceh	Fauna & Flora International (FFI) and US Fish and	The program: (i) established Conservation Response Units;	Not specified	US Fish and Wildlife Service	Not specified	USD 272,387.0	Elephant Conservation

Program Name	Location	Organisation	General Description	Year	Sponsors	Government Bodies Involved	Funds (USD)	Conservation Priorities
Indonesia, through establishment of Conservation Reponse Units.	province	Wildlife Service	(ii) assessed a human-elephant conflict (HEC) mitigation approach based on site specific characteristics; (iii) gained commitment from local government and community for sustainable HEC mitigation; (iv) built up the capacity of local communities and rangers in addressing wider issues of HEC; and (v) established community base forest protection to address the underlying causes of HEC.					
Micro-finance model in sustaining community guarding in human-elephant conflict hotspots	Sumatra Way Kambas National Park in Lampung province	US Fish and Wildlife Service Wildlife Conservation Society	The program aims to develop Way Kambas National Park as a demonstration site for implementation of low-cost and self-sustainable financing for conflict mitigation by community. It also aims to deploy a collaborative community-led guarding team for mitigating human-elephant conflict (HEC), and introduce inland fisheries to encourage investments that support HEC mitigation as an alternative livelihood.	Not specified	US Fish and Wildlife Service	Not specified	USD 71,000	Elephant Conservation
Conservation of Sumatran Elephants and their habitat through community Conservation Response Units	Sumatra Buffer zone of Gunung Leuser National Park in Northern Sumatra	Fauna & Flora International (FFI) US Fish and Wildlife Service	This project aims to build up the capacity of local communities in forest patrols, monitoring and human-elephant conflict mitigation. Community education and awareness activities will also be a component of the program and forest protection will be integrated with ecotourism development.	Not specified	US Fish and Wildlife Service	Not specified	USD 146,804	Elephant Conservation
Creating conservation	Sumatra	US Fish and Wildlife Service	The project aims to introduce more community and institutional	Not specified	US Fish and Wildlife	Not specified	USD 103,000	Elephant Conservation

Program Name	Location	Organisation	General Description	Year	Sponsors	Government Bodies Involved	Funds (USD)	Conservation Priorities
constituencies, building local capacity, and removing barriers to behavioural changes	Northern Sumatra, Aceh province		organisations to make livelihood alternatives readily available and boost outreach activities to promote the adoption of these alternatives. These activities aim to help individuals dependent on human-elephant conflict businesses make a change in livelihood.		Service			
Field Veterinary expertise and services for Sumatran Elephant conservation programmes and activities	Sumatra	US Fish and Wildlife Service Veterinary Society for Sumatran Conservation (Vesswic)	This program provides the veterinary expertise required for the implementation of conservation projects. Information can include translocation of wild elephants, treatment of injured elephants resulting for human-elephant conflict and more.	Not specified	US Fish and Wildlife Service	Not specified	USD 101,735	Elephant Conservation
Long-term multi-stakeholder elephant conservation and management	Sumatra Riau province	US Fish and Wildlife Service and World Wildlife Fund Indonesia	This program aims to conduct multi-stakeholder management option studies for all elephant areas in Riau, conduct an assessment of options to mitigate human-elephant conflict for each sub-population of elephants in Riau, develop a provincial elephant management and conservation strategy for Riau and produce a peer reviewed Standard Operating Procedure for Riau's Flying Squads.	Not specified	US Fish and Wildlife Service	Not specified	USD 95,000	Elephant Conservation
Protection of threatened megavertebrates by anti-poaching unuts	Sumatra Bukit Barisan Selatan National Park in Southern Sumatra	US Fish and Wildlife Service and International Rhino Foundation	The program aims to protect the wildlife (e.g. Asian Elephant, Sumatran Rhinoceros, Sumatran tigers, Malayan tapirs) and their habitats in Bukit Barisan Seletan National Park	Not specified	US Fish and Wildlife Service	Not specified	USD 244,152	Wildlife conservation
Sumatran-wide	Sumatra	US Fish and	The program aims to protect Asian	Not	US Fish and	Ministry of	USD 114,000	Elephant

Program Name	Location	Organisation	General Description	Year	Sponsors	Government Bodies Involved	Funds (USD)	Conservation Priorities
elephant survey, human-elephant conflict mitigation and elephant poaching reduction project		Wildlife Service and Wildlife Conservation Society	elephant populations by promoting measures such as the training of rangers and other staff to reduce human-elephant conflicts and poaching activities. The elephant surveys are also designed and conducted using modern peer-reviewed sampling based survey methods. Also, human-elephant conflict reduction strategies are implemented.	specified	Wildlife Service	Forestry		Conservation
Program where Islamic faith leaders contribute to the reduction in deforestation	Sumatra	Durrell Institute of Conservation and Ecology (DICE), Fauna & Flora International (FFI), Islamic Foundation for Ecology and Environmental Sciences, the British Council and Conservation International	The program aims to engage faith leaders in environmental actions (forest conservation). A book, "Islamic Beliefs and Sumatran Forest Management" has been written as part of this program. The book provides a model for how future conservation efforts can be directed across Southeast Asia and the rest of the Muslim world. Activities undertaken directly involved member of the community, examples of such activities include green mosque campaigns, agroforest nurseries and replanting projects.	Not specified	Darwin Initiative	Not specified	Not specified	Forest conservation

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Summary of Past Engagement Activities

No	Date of consultation	Location	Theme	Participants (Number of Participants)	Information Disseminated	Key Issues Raised
1	13 Mar 2008	Dusun IV Yayasan / Rantau Dedap	Project Information	Project affected communities	Information on planned project activities (exploration)	• Purpose of the project • Benefits of the project • Employment opportunities • Electricity black-out and shortage • Land procurement
2	18 Oct 2010	Muara Enim Regency Office	Project information	Regent of Muara Enim Regency and his team	Project activity dissemination as shown in Project Work plan; the contribution of the Project to sustainable development.	• Employment opportunities • Electricity black-out and shortage in Muara Enim • Boundary of the project with other Regency • Regency non tax revenue sharing
3	22 July 2011	Pondok Pesantren Darul Ikhlas, Semende Darat Ulu District, Muara Enim Regency, South Sumatera Province.	Stakeholder consultation meeting	The attendees for the stakeholder consultation meeting were invited by invitation letter. The attendance list of the stakeholder consultation meeting recorded 89 attendees of the meeting	Socialize the project activity. Clean Development Mechanism.	• Question was raised concerning the possibility of accident that would be happened same as in Lapindo • The possibility of profit sharing for the Semende Darat Ulu District • Expectation of road repair in the Semende Darat Ulu District. • Possibility of land damaged by construction of Rantau Dedap Geothermal Power Plant. • An expectation that the project activity would give benefits for local community: Scholarship, mosque renovation, builds schools. • The possibility of cultural shift in society, such as a change from agrarian to industrial community due to the existence of this project.

No	Date of consultation	Location	Theme	Participants (Number of Participants)	Information Disseminated	Key Issues Raised
4	27 Jan 2012	Kota Agung - Lahat	Geothermal Project Socialization	Head of Lahat Regency, Head of Police Resort, Head of sub district, Sub district police, sub-district army, local government apparatus, 5 Village community, public figures (Tokoh Masyarakat), youth groups, Community, and Journalists (more than 100 participants)	Public consultation with respect to planned project activities i.e.: Who is Supreme Energy What is Geothermal Project Benefits and contribution Project legal frame The construction.	• Expectation of road repair • Question was raised concerning the possibility of accident that would be happened same as in Lapindo • An expectation that the project activity would give benefits for local community
5	02 Feb 2012	Desa Segamit – SDU Muara Enim.	Project information	Head of sub district, Sub district police, sub-district army, local government apparatus, community patron (Tokoh Masyarakat), youth groups, and project affected communities.	Public consultation with respect to planned project activities i.e.: Who is Supreme Energy What is Geothermal Project Benefits and contribution Project legal frame The construction.	• The possibility of profit sharing for the Semende Darat Ulu District • Expectation of road repair in the Semende Darat Ulu District. • An expectation that the project activity would give benefits for local community: Scholarship, mosque renovation, builds schools.
6	24 dan 27 Feb 2013	Kota Agung & SDU	Form the Villages Forum	Key stakeholders and affected community members	Villages Forum will bridge the company and community interest, as well as serves as the front liner on the dissemination process.	
7	22 Jul 2012 - 15 Sep 2012	Kota Agung Sub district – Lahat Regency	Land acquisition and compensation process dissemination	Land owners, local government/ regency & sub district level	Project background, land requirements, procedure for land acquisition, negotiations, grievance mechanism, potential benefits to the communities	• Welcomed the project activities, and expressed support for the project and Company. • Clarity on negotiation process and fair compensation for land and crops lost

No	Date of consultation	Location	Theme	Participants (Number of Participants)	Information Disseminated	Key Issues Raised
					including employment opportunities	• Concern from coffee planters within the protection area, whether they will be compensated for crops since the land does not belong to them • Tentative timing and schedule of the project • Concerns with respect to land measurement (land owner not in agreement with the size measured by the topographic surveys), age of crops (compensation of coffee is based on age, the decree rates for 20 year old coffee plants is low) • Potential for employment in the project stage, priority of local labor over outside labor • Impacts during construction and operation, dust, noise, and outside labor conflicts • Clarity on what the process for registering any complaints, grievances regarding the project activities • Need for better infrastructure in the project area, roads and other infrastructure, improvement of school buildings and facilities in schools, improvement to the mosques
8	28 Jul 2012 s/d 02 Sep 2013	Desa Segamit Kecamatan Semende Darat Ulu (SDU) Muara Enim		Affected persons, village head, community representatives		
9	15 Sep 2012 s/d 17 Mar 2013	Desa Tunggul Bute, Kecamatan Kota Agung - Lahat		Affected persons, village head, community representatives		
10	02 Apr 2013	Kota Agung - Lahat	Public Announcement	Project affected communities and wider audience	Public announcement was published	
12	3 July 2013	Jakarta	Socialization of geothermal activities	University students from Muara Enim at Jakarta	Introduction to geothermal activities at Muara Enim, Lahat and Pagaralam	
13	9 - 11 September	Kamojang	Site visit to	Affected persons, village	Information on actual condition of	Positive feedback on synergy between

No	Date of consultation	Location	Theme	Participants (Number of Participants)	Information Disseminated	Key Issues Raised
	2013	Geotheral	geothermal site	head, community representatives	a geothermal site	geothermal operations and community activities and livelihood
14	11 September 2013	SERD Jakarta Office	Meet and greet	Affected persons, village head, community representatives	Showing commitment of SERD Management	Positive feedback, employment opportunities, corporate social responsibilities
15	17 December 2013	Serbaguna Hospital, Muara Enim	Public Consultation Meeting for AMDAL	Government officials, community representatives, community leaders, women and youth group representatives and NGOs.	Information on the project and plans for exploration and exploitation	Land acquisition and compensation, expectations for employment, air quality in terms of dust and noise during construction/exploration phase, land clearing of vegetation, and impact on flora and fauna.
16	02 Feb 2014 03 Feb 2014	Muara Enim Rantau Dedap	Media Gathering Spud in Rtd – B1	All media in West Sumatra (newspapers & electronics), local government's public relation, 35 participants were involved	Project disclosed information, company policy & procedure, and question & answer.	• Purpose of the project • Benefits of the project • Employment opportunities • Electricity black-out and shortage • Forestry permit & land procurement • The possibility of accident that would be happened same as in "Lapindo mud"
17	08 Feb 2014	Kota Agung dan SDU	ADB Lender Site Visit	Local villagers visiting the local market	Questions were asked by the ADB Lender about the knowledge of the local community and government officials about the project and the consultation so far as well as land acquisition and compensation process.	• Public awareness • Information disclosure • Social compliance • Land Acquisition & crops compensation process
18	23 Mar 2014	Rantau Dedap - Segamit	Grievance Mechanism (GM)	Project affected communities, local government and	GM dissemination including the GM procedure, contact detail and discuss other project issues.	

No	Date of consultation	Location	Theme	Participants (Number of Participants)	Information Disseminated	Key Issues Raised
			Dissemination	traditional leaders		
19	02 – 03 Jul 2014	Kota Agung dan SDU	Lender's Consultant Site Visits	Local villagers visiting the local market	Questions were asked by Lender's Consultants about the knowledge of the local community and government officials about the project and the consultation so far as well as land acquisition and compensation process.	• Environment and social compliance • Land Acquisition & crops compensation process • BAP & CHA
20	10 October 2015	Talang Pisang - Rantau Dedap	CSR Stakeholder Meeting	Kades Tunggul Bute Dan Segamit	Socialization of four pillars and program synchronization with the results of the kecamatan Development Planning Consultative Meeting (MUSRENBANG--Musyawarah Perencanaan Pembangunan) accommodating proposed CSR Program.	Need for better infrastructure in the project area, roads and other infrastructure, improvement of school buildings and facilities in schools, improvement to the mosques
21	2015	6 villages	Community Capacity Building (Needs Analysis)	Total of 122 survey respondents	Survey on social data and training needs	Improving life skills, in particular farming, farm animal raising and fishing
22	3 February 2016	Segamit Village	Training Coffee and Vegetable Cultivation (Workshop)	40	Training/Extension Services on farming	Farmers interested to learn more about proper cultivation of coffee
23	3 February 2016	Rantau Dedap Hamlet	Training Coffee and Vegetable Cultivation (Workshop)	40	Training/Extension Services on farming	Farmers have insufficient knowledge of fertilizer application and face pest problems

No	Date of consultation	Location	Theme	Participants (Number of Participants)	Information Disseminated	Key Issues Raised
24	4 February 2016	Tunggul Bute Village	Training Coffee and Vegetable Cultivation (Workshop)	60	Training/Extension Services on farming	Farmers obtain information on how to manage coffee and vegetable plantations better including how to manage pests.
25	5-8 March 2016	Tunggul Bute Village, Rantau Dedap Hamlet and Segamit Village	Training in the field (biopore preparation, fertilizing of coffee)	21 participants (Rantau Dedap/Segamit) 20 (Tunggul Bute)	Training/Extension Services on farming	Farmers learn in the field how to do biopore and fertilizer coffee.
26	27 Sep 2016	Jakarta	AMDAL Technical Commission	42	AMDAL documets (ANDAL, RKL, RPL)	• Refine data and the description of activities • Refine justification of activities • Refine predicted impacts (H_2S dispersion, GHG calculation, traffic, runoff, surface water, geohazards, electromagnetic) • Employee recruitments • Ensure good coordination with Forestry auhorities • Ensure consistencies of RKL/RPL with the predicted impacts • Socialization to more community members
27	29 Sep 2016	Muara Enim	AMDAL General Commission	57	NTS and AMDAL documents	• Refine data and the description of activities • Refine justification of activities • Refine predicted impacts (GHG calculation, traffic, runoff, surface water, geohazards) • Employee recruitments • Socialization to more community members
28	15May 2017	Palembang	SERD Biodiversity / Critical Habitat	36	Biodiversity / Critical Habitat Assessment Results and Biodiversity Action Plans	• Very appreciated SERD shared the valuable information

No	Date of consultation	Location	Theme	Participants (Number of Participants)	Information Disseminated	Key Issues Raised
			Assessment Presentation			• SERD has a large environmental responsibility due to the location of the project is within Protection Forest • DMU is recommended to use watershed as natural boundaries. • With the establishment of the Forest Management Unit (Kesatuan Pengelolaan Hutan - KPH) and disbandment of the local forestry agency, illegal hunting and oaching may increase in the project area. The provincial government should be more proactive in preventing this. • Is there any external agency involvement should wildlife conflict or sighting is reported? Forum Gajah is ready to help if the company needs assistance in human and wildlife conflict.
29	28 Jul 2017	Lahat	E&S NTS	200		• Fair and transparent recruitment process. • Villagers request to SERD to support the training to local communities to meet the SERD employment requirement. • During mobilization of the material and equipment, PT SERD shall coordinate with local communities. • SERD CSR Program shall be more wider to reach all the village near PT. SERD. • SERD explains that the ESIA study result including Biodiversity Action Plan, Critical Habitat Assessment, Stakeholder Engagement Plan and Grievance Redress Mechanism to make the community more aware that SERD has the procedure to keep the project safe to

No	Date of consultation	Location	Theme	Participants (Number of Participants)	Information Disseminated	Key Issues Raised
						community and no harm to environment. • The next meeting will be more focus on women and youth including customary representatives that will be conducted in terms of Focus Group Discussion.

Appendix 6

EIA Technical Commission Meeting Results and Minutes of Meeting

KEMENTERIAN LINGKUNGAN HIDUP DAN KEHUTANAN
DIREKTORAT JENDERAL PLANOLOGI KEHUTANAN DAN TATA LINGKUNGAN
DIREKTORAT PENCEGAHAN DAMPAK LINGKUNGAN USAHA DAN KEGIATAN
Gedung A Lt 6 Jl. DI Panjaitan Kav. 24, Kebon Nanas – Jakarta Timur 13410
Telepon (021) 85904925; Faksimile 85906168

BERITA ACARA
RAPAT TIM TEKNIS KOMISI PENILAI AMDAL PUSAT
PEMBAHASAN ANALISIS DAMPAK LINGKUNGAN HIDUP (ANDAL), RENCANA PENGELOLAAN LINGKUNGAN HIDUP DAN RENCANA PEMANTAUAN LINGKUNGAN HIDUP (RKL-RPL) RENCANA KEGIATAN PENGUSAHAAN PANAS BUMI UNTUK PLTP RANTAU DEDAP DENGAN KAPASITAS 250 MW YANG BERLOKASI DI KABUPATEN MUARA ENIM, KABUPATEN LAHAT, DAN KOTA PAGAR ALAM, PROVINSI SUMATERA SELATAN OLEH PT SUPREME ENERGY RANTAU DEDAP

Nomor: 90 /BA/DIT.PDLUK/LHK/2016

- Hari/Tanggal : Selasa/27 September 2016
- Tempat : Ruang Rapat Fokker Lantai 2
  Klub Eksekutif Persada Purnawira
  Jl. Raya Protokol Halim Perdanakusuma, Jakarta Timur
- Pemrakarsa Kegiatan : PT Supreme Energy Rantau Dedap
- Penanggung Jawab : Muhammad Arief Tarunaprawira
- Jabatan : *Senior Manager* SHE
- Pimpinan Rapat : Direktur Pencegahan Dampak Lingkungan Usaha dan Kegiatan, Kementerian Lingkungan Hidup dan Kehutanan,
  selaku
  Ketua Tim Teknis Komisi Penilai AMDAL Pusat

1. Anggota Tim Teknis Komisi Penilai AMDAL Pusat yang hadir adalah:
   a. Prof. Dr. Ir. Kardono, M.Eng. (Pakar Kualitas Udara dan Kebisingan);
   b. Dr. Ir. Agus Priyono Kartono, M.Si. (Pakar Kehutanan *Biodiversity*);
   c. Prof. Dr. Linawati Hardjito M.Sc. (Pakar Kualitas Air)
   d. Wakil dari Direktorat Jenderal Penataan Agraria, Kementerian Agraria dan Tata Ruang;
   e. Wakil dari Deputi Koordinasi Bidang Infrastruktur dan Pengembangan Wilayah, Kementerian Koordinator Bidang Perekonomian;
   f. Wakil dari Direktorat Teknik dan Lingkungan Ketenagalistrikan, Direktorat Jenderal Ketenagalistrikan, Kementerian Energi dan Sumber Daya Mineral;
   g. Wakil dari Direktorat Panas Bumi, Direktorat Jenderal Energi Baru Terbarukan dan Konservasi Energi, Kementerian Energi dan Sumber Daya Mineral;
   h. Wakil dari Direktorat Kesehatan Lingkungan, Direktorat Jenderal Kesehatan Masyarakat, Kementerian Kesehatan;
   i. Wakil dari Direktorat Lalu Lintas, Direktorat Jenderal Perhubungan Darat, Kementerian Perhubungan;
   j. Wakil dari Direktorat Jenderal Perkebunan, Kementerian Pertanian;
   k. Wakil dari Direktorat Pengukuhan dan Penatagunaan Kawasan Hutan, Direktorat Jenderal Planologi Kehutanan dan Tata Lingkungan, Kementerian Lingkungan Hidup dan Kehutanan;
   l. Wakil dari Direktorat Pemolaan dan Informasi Konservasi Alam, Direktorat Jenderal Konservasi Sumber Daya Alam Hayati dan Ekosistem, Kementerian Lingkungan Hidup dan Kehutanan;

m. Wakil dari Direktorat Konservasi Keanekaragaman Hayati, Direktorat Jenderal Konservasi Sumber Daya Alam Hayati dan Ekosistem, Kementerian Lingkungan Hidup dan Kehutanan;
n. Wakil dari Direktorat Jenderal Pengendalian DAS dan Hutan Lindung, Kementerian Lingkungan Hidup dan Kehutanan;
o. Wakil dari Direktorat Jenderal Perhutanan Sosial dan Kemitraan Lingkungan, Kementerian Lingkungan Hidup dan Kehutanan;
p. Wakil dari Pusat Air Tanah dan Geologi Tata Lingkungan, Badan Geologi, Kementerian Energi dan Sumber Daya Mineral;
q. Wakil dari Asosiasi Perusahaan Pemboran Minyak, Gas dan Panas Bumi Indonesia; dan
r. Wakil dari Direktorat Pencegahan Dampak Lingkungan Usaha dan Kegiatan, Kementerian Lingkungan Hidup dan Kehutanan.

2. Rapat Tim Teknis Komisi Penilai AMDAL Pusat dalam rangka pembahasan dokumen Analisis Dampak Lingkungan Hidup (ANDAL), Rencana Pengelolaan Lingkungan Hidup dan Rencana Pemantauan Lingkungan Hidup (RKL-RPL) Rencana Kegiatan Pengusahaan Panas Bumi untuk PLTP Rantau Dedap dengan Kapasitas 250 MW yang berlokasi di Kabupaten Muara Enim, Kabupaten Lahat, dan Kota Pagar Alam, Provinsi Sumatera Selatan oleh PT Supreme Energy Rantau Dedap, Pemrakarsa menyepakati untuk melakukan beberapa hal sebagai berikut:
   a. memperjelas deskripsi rencana kegiatan, antara lain: kapasitas PLTP, jumlah sumur, kebutuhan lahan, mekanisme pembukaan dan penyiapan lahan, perhitungan konversi *steam* menjadi listrik, komposisi gas dalam *steam* khususnya H_2S, neraca massa dan neraca limbah, perhitungan densitas *steam*, desain cerobong, volume CO_2 yang dihasilkan, pengelolaan limbah B3, pengelolaan limbah cair (antara lain: karakteristik effluent pengelolaan limbah cair domestik), sumber air bersih, kepastian rencana *landfill*, mekanisme penggunaan kawasan hutan, desain drainase, kapasitas sumur injeksi, perhitungan volume lumpur pemboran, jadwal rencana pemboran, kebutuhan tenaga kerja beserta kualifikasinya, serta mobilisasi alat dan material, uji hidrostatik, serta sistem tanggap darurat, *switch yard* dan typical konstruksi pipa;
   b. mengeluarkan lingkup kegiatan eksplorasi yang telah dilakukan dan memiliki dokumen lingkungan sendiri;
   c. memperjelas kembali kesesuaian lokasi rencana kegiatan dengan RTRW setempat yang berlaku, baik RTRW provinsi maupun kabupaten dan kota termasuk Perdanya;
   d. memperjelas kegiatan lain di sekitar lokasi rencana kegiatan termasuk jarak dan keterkaitan dampaknya serta meng-*overlay*-kan dalam peta, antara lain: kegiatan perkebunan kopi;
   e. menjelaskan kesesuaian lingkup rencana kegiatan dalam ANDAL ini, dengan *feasibility study* tekno-ekonomi yang diproses di Kementerian ESDM, termasuk menyesuaikan judul dokumennya;
   f. meninjau kembali dan melengkapi data rona lingkungan awal dengan fokus pada komponen lingkungan yang kemungkinan terkena dampak atau yang relevan dengan rencana kegiatan serta menggunakan data terbaru dan hasil eksplorasi yang telah dilakukan, antara lain: data geologi (antara lain: data *subsurface*, *geohazard*), topografi, data parameter kualitas udara, data flora dan fauna (antara lain: indeks keanekaragaman, keberadaan satwa langka dan kondisi untuk tiap tipe ekosistem), data kualitas air khususnya TSS dan keberadaan logam berat, indeks dominansi di biota perairan, kondisi bukaan lahan, data fasilitas kesehatan masyarakat, dan data tata guna lahan;
   g. menyampaikan data rencana pengelolaan CO_2;
   h. meninjau kembali konsistensi dan memperbaiki proses pelingkupan dengan mempertajam justifikasi pada evaluasi dampak potensial sampai dengan dampak penting hipotetik dengan memperhatikan deskripsi rencana kegiatan, komponen lingkungan, dan kegiatan lain di sekitar, khususnya untuk dampak terhadap kualitas udara dan aspek air;
   i. meninjau kembali penetapan batas wilayah studi, antara lain batas sosial dan batas ekologis, serta batas waktu kajian untuk tiap dampak penting hipotetik, dengan mempertajam justifikasi penetapannya;

j. meninjau kembali perhitungan besaran untuk masing-masing dampak disesuaikan dengan kapasitas PLTP yang dilingkup dalam dokumen ini dan ditempatkan dalam konteks lokasi dan kegiatan;

k. meninjau kembali kajian dampak parameter yang melebihi baku mutu, antara lain BOD dan COD;

l. meninjau kembali kajian dampak sedimentasi dan erosi, antara lain dengan mempertimbangkan kondisi kemiringan lereng dan faktor erodibilitas tanah;

m. memperdalam kajian dampak penurunan kualitas air, antara lain dengan mempertimbangkan faktor tahapan pembukaan lahan, laju erosi, termasuk rencana pengelolaannya;

n. meninjau kembali kajian dampak terhadap kualitas udara, antara lain perhitungan laju alir H_2S dan justifikasi modelingnya;

o. meninjau kembali kajian dampak terhadap flora dan fauna, dengan mempertimbangkan kondisi flora dan fauna langka dan dilindungi, termasuk mempertimbangkan untuk menyiapkan pengelolaan terhadap perubahan perilaku satwa;

p. meninjau kembali kajian dampak terhadap kualitas tanah dengan mempertimbangkan rencana *landfill* dan kontaminasi logam berat;

q. mengkaji dampak timbulan gelombang elektromagnetik;

r. mengkaji dampak emisi NH_3;

s. memperdalam kajian dampak aspek geologi termasuk geologi *subsurface* dan geohidrologi;

t. memperdalam kajian dampak kualitas dan kuantitas air tanah, dengan mempertimbangkan laju erosi, termasuk menyiapkan pengelolaan berkurangnya kuantitas air tanah yang digunakan sebagai sumber air penduduk;

u. memperdalam kajian dampak sosial dari kegiatan pembebasan lahan;

v. mengkaji dampak gangguan lalu lintas;

w. meninjau kembali evaluasi holistik dampak penting beserta justifikasinya, dengan fokus untuk mendapatkan gambaran keterkaitan antar dampak penting, prioritas dan arahan pengelolaan dampak yang harus dilakukan;

x. meninjau kembali RKL-RPL dengan memperjelas relevansinya dan mengkonsistensikan mulai dari dampak, sumber dampak, titik pemantauan, sampai pada institusi pengawas dan pelaporan serta menggunakan rencana pengelolaan dan pemantauan yang aplikatif, antara lain skema perekrutan tenaga kerja lokal, pengelolaan emisi H_2S dan CO_2, rencana mitigasi kebencanaan terhadap penduduk, serta mempertimbangkan restorasi ekosistem dalam pengelolaan aspek tata air;

y. meninjau dan memperjelas kembali serta mengkonsistensikan metodologi yang akan digunakan, yang mencakup parameter yang dikaji, metode pengumpulan data dan analisis data, penentuan lokasi titik sampling, metode prakiraan dampak untuk masing-masing dampak penting hipotetik serta metode evaluasi dampak penting;

z. meninjau kembali dan memperjelas metode pengambilan sampel yang meliputi jumlah, lokasi, responden, waktu, serta justifikasi penetapannya termasuk peta pengambilan sampel, khususnya untuk aspek biodiversitas;

aa. melakukan koordinasi dengan instansi terkait baik di tingkat pusat maupun daerah sehubungan dengan pelaksanaan rencana kegiatan, khususnya terkait penggunaan kawasan hutan;

bb. melakukan sosialisasi kepada pihak-pihak terkait serta masyarakat terkena dampak sehubungan dengan pelaksanaan rencana kegiatan;

cc. meninjau kembali serta memperbaiki tampilan gambar dan peta-peta sehingga lebih informatif serta sesuai dengan kaidah kartografi;

dd. meninjau kembali dan memperbaiki redaksional penulisan antara lain: kesalahan penulisan, satuan, sumber data, nomenklatur serta inkonsistensi data dan informasi; dan

ee. meninjau kembali peraturan perundang-undangan yang diacu, dengan memperhatikan peraturan terbaru dan terkait dengan rencana kegiatan dan dampak yang ditimbulkan, baik di tingkat pusat maupun daerah.

3. Atas berbagai saran, masukan dan tanggapan, Pemrakarsa menyatakan akan menanggapi semua masukan yang disampaikan oleh peserta rapat.

4. Berita Acara Rapat Tim Teknis Komisi Penilai AMDAL Pusat ini akan disampaikan pada rapat Komisi Penilai AMDAL Pusat tanggal 29 September 2016.

Demikian Berita Acara ini dibuat dengan sebenar-benarnya.

Pemrakarsa Kegiatan,	Pimpinan Rapat,
Muhammad Arief Tarunaprawira *Senior Manager* SHE PT Supreme Energy Rantau Dedap	**Ary Sudijanto** Direktur Pencegahan Dampak Lingkungan Usaha dan Kegiatan Kementerian Lingkungan Hidup dan Kehutanan, *selaku* Ketua Tim Teknis Komisi Penilai AMDAL Pusat

KOMPILASI SARAN/MASUKAN RAPAT TIM TEKNIS KOMISI PENILAI AMDAL PUSAT PEMBAHASAN DOKUMEN ANDAL, RKL DAN RPL
RENCANA KEGIATAN PENGUSAHAAN PANAS BUMI UNTUK PLTP RANTAU DEDAP 250 MW DI KABUPATEN MUARA ENIM,
KABUPATEN LAHAN, DAN KOTA PAGAR ALAM, PROVINSI SUMATERA SELATAN
OLEH PT SUPREME ENERGY RANTAU DEDAP (SERD)

JAKARTA, 27 SEPTEMBER 2016

No.	Saran/Masukan	Hal	Tanggapan	Hal
A.	**Ir. Pri Utami, M.Sc (Pakar Geothermal)**			
1.	Bagian I ANDAL Bab I Pendahuluan 1.1.1. Status Studi ANDAL Penjelasan mengenai jumlah dan status sumur pada Tabel 1-2 supaya sinkron dengan tabel 1-3 tentang hasil dari 6 sumur eksplorasi, agar tidak membingungkan. Sebenarnya dari 48 sumur berapa yang akan menjadi sumur produksi dan berapa yang akan menjadi sumur injeksi? Menurut tabel 1-2 seolah-olah ke 48 sumur adalah sumur produksi saja. Seharusnya akan direncanakan kemana brinenya dicerminkan pada isi tabel, sebelum diuraikan diparagraf 1.1.3 dan paragraf 1.2.2.5.		Pada Tabel 1-2, wellpad untuk explorasi adalah wellpad B, C dan I. sedangkan wellpad E telah disiapkan tetapi tidak dilakukan pemboran di well pad tersebut. Dari 8 wellpad, 2 wellpad (B dan E) direncanakan sebagai wellpad injeksi, sedangkan 6 wellpad lainnya yaitu wellpad C, I, L, M, N, dan X direncanakan sebagai wellpad produksi. Setiap 1 wellpad maksimal sumur adalah 6 dengan mempertimbangkan luas wellpad dan untuk meminimalisir interference antar sumur.	
2.	1.1.3 Deskripsi Umum rencana kegiatan Halaman I-10 Penamaan kegiatan no.1: akan lebih tepat bila dinamakan pemboran dan uji produksi sumur panas bumi, sebab semua sumur (apapun peruntukan yang direncanakan) memiliki unsur eksplorasi. Hanya bila pemboran telah selesai dan kondisi sumur benar-benar diketahui maka peruntukannya (produksi, injeksi, make up) dapat dipastikan. Bisa saja ternyata sumur adalah dry hole, walaupun demikian data yang diperoleh darinya melengkapi pengetahuan tentang keadaan bawah permukaan lapangan panas bumi yang bersangkutan.	1-10	Sudah diperbaiki.	
3.	Penanganan K3LL (Halaman I-14) penjelasan kurang sistematis a) Perlu dijelaskan dulu penanganan dan pengendalian dampak pemboran dan uji produksi baru kemudian penaanganan dan pengendalian dampak PLTP (jangan dicampur). b) Point-point penting yang akan ditangani dan dikendalikan disinggung lebih dahulu baru kemudian diuraikan dibagan yang lebih akhir. c) Tentang penanganan dampak pemboran yang ada baru penjelasan tentang penanganan limbah padat (*drill cutting* dan *drill mud)*. d) Perlu penjelasan bahwa drill cutting bukan sekedar merupakan limbah pemboran, tetapi bahwa sampel *drill cutting* ini merupakan data primer bawah permukaan. Maka sebagian akan didokumentasikan disimpan dan dianalisis, untuk mengetahui keadaan geologi bawah permukaan.	1-14	Penjelasan K3LL telah diperbaiki lebih sistematis	I-14 s/d I-19

No.	Saran/Masukan	Hal	Tanggapan	Hal
	e) *Contingency plan* bila terjadi, misalnya, *steam burst* pada saat pemboran perlu disebut dulu sebelum diuraikan panjang lebar di bagian belakang. f) Emisi gas pada saat uji produksi seharusnya dimuat pada subbab paragraf tentang penanganan dan pengendalian dampak pemboran (bukan dicampur dengan penanganan dampak PLTP). g) Belum ada rencana pembersihan lingkungan dan/atau penggantian vegetasi pasca uji produksi.			
4.	Bab II Deskripsi Rona Lingkungan Awal a. Perlu diketahui bahwa fisiografi dan geomorfologi adalah bagian dari geologi, sehingga tidak tepat jika dibuat paragraf-paragraf yang mendahului geologi. Semestinya fisiografi dan geomorfologi menjadi subbab paragraf geologi. b. Penyampaian geologi untuk kepentingan ANDAL ini mestinya hanya fokus tentang analisis kondisi geologi bagi ANDAL, bukan seperti deskripsi kondisi geologi untuk laporan survey pendahuluan. c. Manifestasi panas bumi merupakan faktor yang sangat penting dalam ANDAL panas bumi. Manifestasi panas bumi dapat menjadi sumber potensi *thermal hazard* dapat pula menjadi indikator perubahan lingkungan akibat pengembangan. Bagaimana pengusul akan menggunakannya sebagai *base line* rona awal lingkungan? d. Perlu diketahui bahwa alterasi hidrothermal di permukaan merupakan bagian dari manifestasi panas bumi, jadi semestinya tidak dibahas sendiri, tetapi terintegrasi dengan pembahasan manifestasi panas bumi. Sama halnya dengan mata air panas ataupun *fumarole*, *altered ground* juga bisa mengalami perubahan, sehingga harus menjadi dalam rencana pemantauan kondisi awal dan dan perubahan yang mungkin terjadi selama pengembangan lapangan. Altered ground juga memiliki potensi longsor, amblesan, atau jenis gerakan tanah lainnya. Hal ini belum disinggung dalam laporan. e. Dampak perubahan manifestasi dapat bersifat katastrofik.		a. Penjelasan fisiografi dan geomorfologi sudah dimasukkan sebagai bagian dari subbab geologi b. Pembahasan dan penulisan rona lingkungan geologi sudah diperbaiki c. Rona awal manifestasi permukaan telah diperoleh berdasarkan sampling geokimia yang dilakukan sebelum pemboran eksplorasi. Re-sampling manifestasi permukaan akan dilakukan sebelum pemboran pengembangan. Dengan kegiatan re-sampling diharapkan perubahan karakteristik reservoir atau potensi hazard dapat dimonitor. d. Alterasi hydrothermal erat kaitannya dengan kehadiran manifestasi permukaan. Seharusnya zonasi alterasi dapat digunakan untuk identifikasi bahaya longsor. e. Setuju, sehingga manifestasi akan dimonitor.	2-10 s/d 2-24
5.	Bagian I: RKL-RPL Umum: apresiasi atas dicantumkannya daftar istilah, karena daftar tersebut sangat membantu penyamaan persepsi bagi pembaca laporan dari berbagai latar belakang pengetahuan/pengalaman.			
6.	RKL-RPL Manifestasi Panas Bumi Pada setiap tahap operasional belum disinggung jenis dampak sbb: a. Perubahan manifestasi panas bumi sejak tahap pra konstruksi, konstruksi, operasi dan pasca operasi. Harap diketahui bahwa		a. Manifestasi yang terdapat pada daerah panas bumi akan dilakukan monitoring secara berkala (sekali setahun atau sekali dua tahun). Monitoring terhadap manifestasi ini bukan hanya monitoring	

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	beberapa manifestasi panas bumi yang ada di daerah yang akan dikembangkan mungkin punya keterkaitan erat dengan perubahan morfologi (misalnya munculnya erupsi hidrothermal akibat pemotongan tebing). b. Manifestasi mungkin juga muncul belakangan (tahap oeprasi dan pasca operasi) sebagai akibat kerusakan konstruksi sumur. Contoh yang mengenaskan terlah terjadi di lapangan Onikobe (Jepang). Tampaknya pengembang masih memandang bahwa dampak-dampak tersebut adalah dampak tidak penting. Tetapi harap diingat bahwa pengalaman di indonesia (walau tidak dipublikasikan) dan manca negara (banyak yang sudah dipublikasikan dan ditarik lessons learnt) menunjukkan bahwa hal-hal tersebut di atas telah menjadi dampak penting.		terhadap komposisi akan tetapi juga monitoring terhadap bentukan fisik dari manifestasi. Seperti debit air/uap, aktifitas dari manifestasi apakahmenjadi besar atau kecil, luasan area dan juga apakah ada penurunan muka tanah disekitar manifestasi. b. Monitoring terhadap kondisi dalam sumur juga akan dilakukan melalui pengukuran temperature dan tekanan di dalam sumur yang akan dilakukan secara berkala. Selain itu monitoring terhadap keadaan kondisi permukaan disekitar tapak sumur juga akan dilakukan untuk melihat apakah ada manifestasi yang muncul akibat kebocoran dari sumur.	
7.	Longsor Antisipasi terjadinya bencana geologi khususnya perlu dibahas. Walaupun longsor mungkin tidak terkait dengan aktivitas pengembangan lapangan tetapi dapat saja terjadi karena faktor litologi dan hidroklimatologi dan faktor-faktor pemicu lain seperti gempa bumi. Bagaimana pengembang akan menjelaskannya kepada pemerintah dan para pemangku kepentingan lainnya bila hal itu terjadi dan tidak ada upaya pemantauan potensi kejadian dan rencana mitigasi sejak tahap pra konstruksi.		Sesuai dengan hasil studi geotek oleh PT SERD, telah dilakukan upaya mitigasi dan monitoring secara berkala mau pun incidental pada lokasi-lokasi yang rawan longsor	
B.	**Dr. Ir. Arie Herlambang, MS (Pakar Hidrologi)**			
1.	1. Dokumen bagus, rapih, gambar jelas, peta dan legenda sudah diperbaiki dan jelas terbaca. 2. Permasalahan peningkatan air limpasan dan perubahan kualitas air permukaan, terutama terjadi pada saat konstruksi, dalam analisis mohon diperkuat dengan melakukan estimasi berapa banyak potensi air permukaan yang muncul pada saat konstruksi. Potensi bangkitan air permukaan ini kemudian yang dikelola agar tidak menimbulkan banjir atau genangan atau erosi pada bagian lahan yang terbuka. 3. Ukuran kolam tangkapan atau catch pond dilakukan pendekatan hitungan berdasarkan potensi air limpasan, berapa lama retention time untuk catch pond mohon disampaikan dan diamana posisinya pada peta yang ada. 4. Pada saat konstruksi dan hujan lebat, potensi bangkitan TSS menjadi tinggi pada saat hujan lebat, terutama pada kondisi lahan yang baru dibuka. Lakukan analisis berapa potensi peningkatan TSS-nya pada saat hujan lebat. Kaitkan potensi peningkatan TSS ini dengan keberadaan catch pond dengan waktu pengendapan dan waktu pemeliharaannya. 5. Perlu ada gambaran utuh (tidak sepotong-potong), gambaran proses yang terjadi pada PLTP ini. Gabungkan Gambar 1.12, Gambar 1.13,	Umum	1. Terima kasih. 2. Kajian bedaran dampak peningkatan air limpasan dan perubahan kualitas air permukaan sudah dicantumkan dalam Bab 3 Prakiraan Dampak. Sedangkan rencana pengelolaan dan pemantauan nya sudah dicantum dalam dokumen RKL-RPL 3. Sistem drainase mengikuti jalan akses dan area bukaan proyek. 4. Kajian besaran dampak peningkatan TSS sudah dicantumkan dalam dokumen ANDAL Bab 3 Prakiraan Dampak 5. Menurut kami, gambaran proses di PLTP secara terpisah lebih jelas menggambarkan proses yang terjadi di PLTP termasuk untuk material balance nya.	Bab 3

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	Gambar 1.14, Gambar 1.15, Gambar 1.17 dan Gambar 1.18 dalam ukuran yang lebih besar (A3), dalam bentuk yang lebih sederhana. Beri gambaran material balance-nya , bagaimana perubahan bentuknya, temperatur, dan tekanan bisa tergambar dalam sistemnya. Analisis potensi dampak akan lebih mudah dan bisa terlihat secara utuh oleh pembaca. Jelaskan bagian-bagiannya secara runtun, mulai dari awal sampai akhir, terutama pengendalian dan pengelolaan dampaknya.			
2.	Hidrologi 1. Lakukan analisis daerah tangkapan mana yang paling terpengaruh oleh kegiatan ini ; 2. Lakukan gambaran rona awal (udara, kualitas air sungai, dan air tanah) secara utuh pada daerah yang potensi terkena dampak akibat kegiatan ini , termasuk informasi debit alirannya dari waktu ke waktu ; 3. Gambar 2-10 sesuaikan dengan kondisi eksisting, jangan terlalu konseptual, nama-nama sungai sesuaikan, demikian juga dengan gambar geologi dan stratigrafinya ; 4. Mohon perhatikan masukkan pada saat KA Andal, Senin 2 Mei 2014.	2-24	1. Gambaran dan analisis rona awal dilakukan sesuai dengan informasi yang dibutuhkan untuk kajian. 2. Gambaran dan analisis rona awal dilakukan sesuai dengan informasi yang dibutuhkan untuk kajian. 3. Terima kasih untuk sarannya. Saran disesuaikan. 4. Gambar 2-10 sudah merupakan gambaran prospek panas bumi Rantau Dedap berdasarkan hasil studi dari Konsultan Thermochem Inc	2-25
3.	Hidrogeologi 1. Dalam peta hiodrogeologi beri gambaran kondisi muka air tanah eksisting dengan menggunakan peta. Peta muka air tanah merupakan peta yang paling penting untuk melihat apakah kegiatan ini berdampak atau tidak, karena air tanah (air geothermal) berhubungan erat dengan operasional PLTP. Muka air tanah menjadi indikator kegiatan ini berdampak atau tidak ? 2. Lakukan overlay antara peta muka air tanah dan potensi geothemal (Peta 2-7 – hal 2.33) serta peta struktur geologi (Gambar 2.11 – hal 2-28) dengan skala yang sama. Gambaran secara utuh ini sangat diperlukan, dan akan mempermudah evaluasi pada saat terjadi perubahan, dan peta ini juga bermanfaat buat pengembangan selanjutnya.	2-27	1. Berdasarkan dari studi geotech, tidak ada potensi air tanah dangkal dan air tanah dalam yang terpengaruh oleh kegiatan proyek pengembangan panas bumi Rantau Dedap. Kegiatan panas bumi mengambil dan memanfaatkan steam geotermal. Kegiatan proyek melindungi air tanah dengan menggunakan casing pada saat melakukan pemboran. 2. Terima kasih untuk sarannya. Peta ovelay telah ditambahkan dalam dokumen ANDAL	Peta 2-11
4.	Kualitas air permukaan 1. Gambaran kualitas air permukaan sebaiknya dibahas terkait dengan pembahasan hidrologi, pada saat pembagian daerah tangkapan, sehingga pembaca bisa runtut membacanya. Gambaran debit aliran belum dibahas secara utuh dalam dokumen ini. Gambaran debit terkait dengan gambaran kualitas air, kualitas air bisa berubah pada saat musim kemarau dan musim hujan. 2. Kualitas air sungai di lokasi kegiatan masih bagus, lokasi pengambilan sampel petanya disampaikan dekat dengan tabel kualitasnya, sehingga	2-34	1. Subbab pembahasan Hidrologi dan Kualitas Air Permukaan telah diurutkan. 2. Peta lokasi pengambilan sampel terdapat pada Peta 2-8	2-32 dan 2-35

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	pembaca bisa melihat lokasinya dengan mudah, dalam peta sampaikan juga dimana lokasi kegiatan, sehingga kita bisa melihat kesesuaian antara sampel dengan keberadaan lokasi kegiatan.			
5.	Kualitas air sumur dangkal 1. Pembahasan kualitas air sumur dangkal satukan pembahasannya dengan pembahasan hidrogeologi ; 2. Sampaikan peta ketinggian muka air tanah dangkalnya, dengan skala peta yang sesuai dan mudah terbaca ; 3. Dalam kaitannya dengan aktifitas kegiatan, perlu disampaikan gambaran kualitas air tanah dalam dan ketinggian muka air tanahnya, aktifitas PLTP terkait dengan keberadaan air tanah dalam. Ketinggian muka air tanah dalam sangat terkait dengan penggunaan potensi geothermal untuk kegiatan PLTP, oleh karena itu ketinggian permukaan air tanah dalam di lokasi PLTP harus dilakukan monitoring. 4. Peta 2-8 (Hal 2-43), tambahkan monitoring kualitas air tanah dalam dan ketinggian muka air tanahnya, pada sumur monitoring air tanah dalam.	2-37	1. Untuk subbab Hidrogeologi akan diurutkan dengan Kualitas Air Sumur Dangkal (definisi). 2. Peta hidrologi sudah tercantum dalam dokumen 3. Kegiatan PLTP hanya memantau kualitas air tanah pada sumur penduduk karena kegiatan PLTP tidak berkaitan langsung dengan air tanah. 4. Monitoring air tanah dalam tidak diperlukan dalam kegiatan PLTP.	
6.	Peningkatan laju limpasan air permukaan 1. Dalam pengembangan metodologi ini sesuaikan dengan kondisi catchmen area yang paling berpengaruh, dan rencana kegiatannya, sampaikan peta lokasi kegiatan, berikan gambaran antara formula yang disampaikan dengan estimasi besarnya nilai tiap parameter. 2. Lakukan perhitungan sederhana berapa potensi peningkatan laju limpasan yang muncul akibat rencana kegiatan.	3-15	Kajian besaran dampak telah tercantum dalam dokumen ANDAL Bab 3 Prakiraan Dampak	3-15
7.	Kualitas Air 1. Beri gambaran kualitas air atau uap yang dipakai untuk proses pembangkitan energi ; 2. Uap yang digunakan untuk pembangkit listrik kan akan menjadi air, beri gambaran bagaimana kualitas airnya setelah digunakan dan sebelum dilakukan injeksi dan berapa potensi debitnya ? Metodologi 1. Tambahkan metodologi untuk melakukan monitoring ketinggian muka tanah dangkal dan dalam di sekitar lokasi kegiatan ; 2. Untuk monitoring ketinggian muka air tanah dalam di lokasi sekitar kegiatan juga penting di monitor karena terkait dengan aktifitas kegiatan ;	Note	Kualitas Air 1. Kualitas air dan uap yang digunakan untuk pembangkitan memiliki komposisi kimia yang sebagai berikut : pH netral 6-7, chloride berkisar 1500 ppm dan komposisi gas yang rendah berkisar 0.8 – 1.2 wt% gas dalam uap. 2. Air yang berasal dari pemisah (separator) akan langsung di injeksikan kedalam sumur injeksi, sedangkan uap akan digunakan untuk memutar turbin. Terdapat sisa kandungan air yang berada di cooling tower setelah pembangkitan, air ini juga akan diinjeksikan kedalam sumur injeksi. Pada umumnya kualitas air seperti akan tetap sama seperti saaat sebelum separator, kecuali kandungan mineral silika yang kemungkinan bertambah seiring dengan penurunan temperature. Metodologi	

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			1. Untuk melakukan monitoring ketinggian muka air tanah dangkal akan dilakukan melalui survey pengukuran muka air tanah disumur penduduk sekitar atau dengan cara membuat sumur air tanah. 2. Perubahan muka air tanah juga dapat dimonitor dengan metode geofisika (mikro gravity) yang rencananya akan dilakukan pada saat pembangkit listrik telah beroperasi.	
C.	**Prof. Dr. Ir. Kardono, MEng (Pakar Kualitas Udara)**			
1.	a. Uraian tentang rencana 250 MW belum jelas benar baik dari penyediaan steam nya maupun progres pengembangannya dari 2x46 MW menjadi total 250 MW dan waktu pembangunannya per unit hingga waktu penyelesaian 250 MW tsb. b. Asumsi data kadar H2S berubah-ubah sepanjang dokumen ini. c. Apakah prakiraan dampak kualitas udara khususnya H2S tahap operasi PLTP sudah berdasarkan 250 MW?	Umum	a. Pada subbab status studi Amdal sudah ditambahkan uraian bahwa berdasarkan izin kapasitas yang akan dikembangkan adalah 250 MW. Namun berdasarkan feasibility study kapasitas tahap pertama adalah 2 x 46 MW. b. Berdasarkan hasil eksplorasi, terdapat 3 jenis steam yang ada di Lapangan Rantau Dadap, yakni: - Very low NCG 0,09%wt berkadar H_2S maksimum 15,8% mol. - Low to moderate NCG 1%wt berkadar H_2S maksimum 6,71% mol. - High NCG 2% berkadar H_2S maksimum 5%mol. c. Studi Amdal ini hanya mengkaji dampak untuk 2 x 46 MW	
2.	a. Disebutkan:"PT. SLRD telah meenyelesaikan pekerjaan penyusunan Study Kelayakan pada bulan Februari 2016 yang kemudian akan menjadi acuan KA. Studi kelayakan dilakukan secara bersamaan dengan studi Andal …" b. Dokumen yang saya pegang ini KA atau Andal? Mengapa Studi kelayakan akan menjadi acuan KA?	1-1	Sudah diperbaiki.	
3.	a. Tabel 1-2. Kegiatan penting yang tercantum dalam dokumen KA Andal. b. Bukankah ini dokumen Andal?	1-2	Sudah diperbaiki.	
4.	a. Tabel 1-3 memuat 4 sumur produksi yang menghasilkan 24,3 MW HP steam dan 10,1 MW LP steam. b. Mengapa steam tersebut yang hanya 34,4 MW bisa memberikan konversi listrik menjadi 92 MWe? c. Kemudian di hal 1-10 tiba-tiba di tahap berikutnya akan mengembangkan total 250 MWe sedangkan tambahan steam dari 12 sumur hanya menghasilkan 70,2 MW HP dan 10,8 MW LP atau 81 MW? d. Lihat di hal 1-13 Tabel 1-5, baris 2. PLTP pada tahap pertama menyebutkan kebutuhaan steam berdasarkan dual flash technology : 79,2 HP dan 31,2 LP; ini dari mana?	1-9, 1-10 dan 1-13	a. Empat sumur tersebut merupakan sumur eksplorasi, yang nantinya akan dimanfaatkan sebagai sumur produksi. b. Guna mememnuhi kebutuhan 92 MW, maka dibutuhkan tambahan pemboran sumur di beberapa wellpad, sehingga perhitungan material balance produksi steam adalah: 4 sumur eksplorasi + Wellpad I, L dan M + Wellpad C = 34,3 + 46,7 + 10,9 = 92 MW c. Pengembangan Lapangan Panasbumi Rantau Dadap akan berlangsung dalam 2 tahap, yakni: - Tahap -1 : Pengembangan sampai 92 MW - Tahap – 2 : Pengembangan bertahap menjadi 250 MW	

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			Pada saat ini SERD fokus untuk pengembangan Tahap-1 hingga memperoleh steam setara dengan 92 MW. d. *Engineering consideration*: guna menjaga fleksibilitas operasi, maka dibutuhkan *buffer steam* sebesar 20%. Dengan demikian laju produksi steam pada wellhead adalah sebesar 92 MW + 20% = 110,4 MW. Alokasi steam untuk HP steam + LP steam = 79,2 + 31,2 = 110,4 MW.	
5.	a. Data kadar H2S dalam steam (atau dalam NCG) berdasarkan pengukuran saat eksplorasi itu berapa %? b. Mengapa pelepasan NGC melalui PLTP mengeluarkan 32 mg/Nm3? Dari mana perhitungannya? Di Tabel 1-14 hal 1-38 diberikan data 35 mg/Nm3, mana yang benar?	1-15	a. Berdasarkan hasil eksplorasi, terdapat 3 jenis steam yang ada di Lapangan Rantau Dadap, yakni: - Very low NCG 0,09%wt berkadar H_2S maksimum 15,8% mol. - Low to moderate NCG 1%wt berkadar H_2S maksimum 6,71% mol. - High NCG 2% berkadar H_2S maksimum 5%mol. %mol = %vol b. Emisi gas PLTP (mg/Nm^3) = berat gas H_2S keluar dari Cooling Tower (dalam mg) dibagi dengan volume total gas yang keluar dari Cooling Tower (dalam Nm^3). - Mass flow rate gas H_2S keluar Cooling Tower = % gas H_2S X % NCG X Steam flow rate masuk Turbin. - Volume total gas yang keluar dari Cooling Tower = Volume NCG + Volume udara yang disedot Cooling Tower dari perhitungan L/G ratio. Evaporation losses Cooling Tower diabaikan. - Jadi emisi gas H_2S PLTP = Mass flow rate (mg/s) H_2S dibagi dengan total gas flow rate (Nm^3/s). Emisi gas H_2S dari Cooling Tower PLTP adalah 32 mg/Nm^3 sedangkan Baku Mutu Emisi H_2S adalah 35 mg/Nm^3.	
6.	a. Gas removal system yang ditunjukkan dalam Gambar 1-2 fungsinya untuk apa? b. Yang masuk ke gas removal system itu apa? Dan yang keluar NCG? Selain NCG ke mana perginya?	1-16	a. Steam yang masuk Turbin berkadar NCG. NCG adalah gas yang tidak mengembun pada saat masuk di Condenser. NCG terutama terdiri atas gas CO_2, N_2 dan H_2S. Steam keluar Turbin yang masuk ke Condenser akan terekspansi, sehingga sebagian besar steam akan mengembun (mencair) dan sebagian masih dalam fase gas atau uap. NCG tidak mengembun dan bercampur dengan steam yang belum sempat mengembun tersebut, yang di dalamnya terdapat gas H_2S. b. Condenser harus beroperasi pada tekanan vacuum, sehingga guna menciptakan tekanan vacuum tersebut dibutuhkan alat yang disebut *Steam jet ejector*. Cara kerja *Steam jet ejector* adalah dengan	

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			menyedot fase gas dari Condenser, sehingga NCG juga ikut tersedot oleh *Steam jet ejector* tersebut akibatnya tekananan Condenser menjadi vacuum. Di dalam *Steam jet ejector*, steam akan mengembun dan NCG akan terpisah dari fase cair. Kemudian NCG yang telah terpisah tersebut dialirkan melalui Stack Cooling Tower untuk dilepas ke atmosfer. Maka dari itu timbul emisi gas H_2S dari Stack Coling Tower tersebut. Pelepasan NCG ke atmosfer membutuhkan alat bantu berupa aliran udara (Force draft system) yang disedot oleh Cooling Tower. L/G (Liquid to Gas Ratio) Cooling Tower harus senantiasa dikendalikan agar mencapai efisiensi *heat transfer* maksimum. L/G ratio akan menetukan juga besarnya emisi gas H_2S dari Cooling Tower.	
7.	Pekerjaan pengupasan dan pengurugan tanah termasuk perataan, apakah tidak ada dampak pada kualitas udara maupun kebisingan?	1-21	Kegiatan dianggap tidak berdampak penting karena kegiatan terletak jauh dari pemukiman.	
8.	Gambar 1-4 tida bisa dibaca.	1-26	Saran telah diakomodasikan.	
9.	a. Cara menghitung dari 1 ppm H2S menjadi ug/Nm3 itu menggunakan rumus apa? b. 12,187 itu angka apa? c. ppm dalam hal ini ppm volume? d. Perhitungan saya jika 1 ppm H2S = 1390-an ug/Nm3 @ 25C, 1 atm. e. Densiti H2S @ 25C, 1 atm = 1,39 g/L (kg/m3). f. Di halaman bagian bawah tertulis "kadar H2S sebesar 14% mol", apa artinya ini?	1-37	a. Ada banyak cara untuk mengkonversi ppm H_2S menjadi $\mu g/Nm^3$, antara lain yang dapat digunakan adalah: - ppmv = $(mg/m^3)(273.15 + °C) / (12.187) (MW)$ - ppmv = $(mg/m^3)(24,45)/(MW)$ Pengertian Nm^3 adalah bahwa gas diukur pada suhu 25°C pada tekanan 1 atm. b. Volume gas setiap mol pada kondisi standar = 22,414 m^3/kgmol. Maka 273,15 °K dibagi dengan 22,414 = 12,187. c. Dalam hal ini ppm adalah ppm volume, maka ditulis ppmv. d. Pada kondisi normal (1 atm, 25°C) maka konversi 1 ppm gas H_2S menjadi $\mu g/Nm^3$ adalah: 1 ppmv = $(1000 \mu g/Nm^3)( )(24,45)/(34) = 1.309 \mu g/Nm^3$. e. Hukum Gas Ideal, PV = nRT dengan menganggap compressibility factor = 1, maka density gas pada kondisi normal, yakni pada suhu 25 °C dan tekanan 1 atm dapat dihitung sebagai berikut: PV = nRT 1 . V = 1 x 0,082 x (273,15 + 25) = 24,45 m^3/kgmol Maka konversi 1 ppm gas H_2S menjadi $\mu g/Nm^3$ adalah:	

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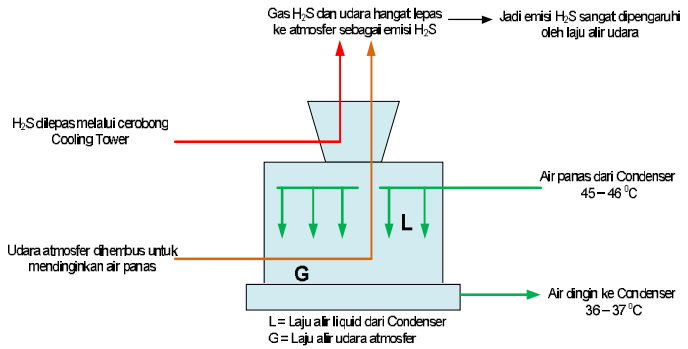
			1 ppmv = (1000 µg/Nm^3)( )(24,45)/(34) = 1.309 µg/Nm^3. Density gas H_2S (1 atm, 25 ^oC) = 0,000001309 kg/Nm^3 f. Pada suatu saat, suatu sumur dapat saja mencapai kondisi ekstrim, yakni ketika kadar NCG sangat rendah sekitar 0,1%wt maka kadar H_2S dapat mencapai 14% mol. Namun keadaan ini jarang terjadi dan dalam kondisi normal, kadar H_2S sekitar 6,7%mol. Maka dari itu dalam perhitungan ANDAL mengunakan angka kadar H_2S normal yakni 6,7%mol.	
10.	Tabel 1-14. Perkiraan emisi gas H2S saat uji produksi sumur. a. Ini perkiraan atau pengukuran? b. H2S flowrate = 153 mg/s itu data dari mana? c. Baku mutu emisi H2S = 35 mg/Nm3 itu dari mana? d. Jika 35 mg/Nm3 H2S adalah nilai baku mutu, mengapa digunakan untuk menghitung laju alir gas H2S selama 1 tahun untuk PLTP? Hasilnya apakah hanya 20,6 kg H2S/tahun? Bagaimana menghitungnya? e. Jika 35 mg/Nm3 terhadap 0,45 Nm3/s steam flowrate maka hasilnya adalah 77,78 mg/s = 2452,8 kg/tahun. f. Harusnya estimasi emisi H2S dari PLTP berdasarkan kadar H2S yang dihasilkan dari PLTP setelah dikurangi oleh alat penangkap H2S, misal scrubber atau deSOx.	1-38	a. Pada saat uji produksi dilakukan pengukuran mass flow rate steam dan karakteristik uap (suhu, tekanan, komposisi kimia dsb). b. Cara menghitung H_2S flow rate yang berupa HP steam dari sumur RD-I2 dengan basis Mass flow rate steam = 32,7 kg/s (terukur). Perhitungan emisi gas H_2S saat uji produksi sumur telah disempurnakan dan disajikan secara rinci dalam Tabel – 1.1. Perkiraan emisi gas H_2S saat uji produksi sumur. c. Baku Mutu emisi H_2S mengacu pada Permen LH No.21 Tahun 2008, Lampiran V tentang Baku Mutu Emisi Sumber Tidak Bergerak Bagi PLTP, ditetapkan kadar maksimum H_2S adalah 35 mg/Nm^3. d. BAPEDAL pernah menetapkan berlakunya Baku Mutu berdasarkan beban limbah. Cara ini adalah paling obyektif, karena selain mengukur kualitasnya (C) juga sekaligus mengukur kuantitasnya (Q). Maka beban emisi pada periode waktu tertentu dapat ditentukan: Beban emisi gas H_2S (kg) = Emisi gas (mg/Nm^3) x Laju alir volume gas (Nm^3/s) x Lama waktu paparan (s) : 1.000.000 (kg/mg). Berdasarkan formula tersebut maka beban emisi H_2S ternyata masih berada dibawah beban emisi standar, yang dapat ditunjukkan dalam tabel berikut:	

<table>
<tr><th>No.</th><th>Saran/Masukan</th><th>Hal</th><th>Tanggapan</th><th>Hal</th></tr>
<tr><td></td><td></td><td></td><td>
<table>
<tr><th>Diskripsi</th><th>Satuan</th><th>Data lama</th><th>Data Baru</th><th>BML</th></tr>
<tr><td>Laju alir volume gas</td><td>Nm^3/s</td><td>8,86</td><td>8,86</td><td>8,86</td></tr>
<tr><td>Emisi gas</td><td>mg/Nm^3</td><td>342</td><td>866</td><td>35</td></tr>
<tr><td>Laju alir massa H_2S</td><td>mg/s</td><td>3.029</td><td>7.678</td><td>310</td></tr>
<tr><td>Lamanya waktu paparan</td><td>s</td><td>864.000</td><td>864.000</td><td>31.536.000</td></tr>
<tr><td>Beban emisi H_2S</td><td>kg</td><td>2.617</td><td>6.634</td><td>9.781</td></tr>
</table>
Oleh karena itu emisi H_2S pada saat uji produksi sumur bukan tergolong DPH.

e. Perhitungan beban emisi H_2S pada saat uji produksi sumur menggunakan rumus di atas dan hasilnya dapat disajikan dalam tabel tersebut di atas. Nilai 0,45 Nm^3/s merupakan laju alir NCG sehingga untuk menghitung laju alir gas harus ditambah dengan steam yang lepas ke atmosfir, sehingga total laju alir gas keluar AFT menjadi 8,86 Nm^3/s.

f. Emisi gas H_2S dari PLTP = laju alir massa H_2S (mg/s) dibagi dengan laju alir total volume gas keluar dari Cooling Tower (Nm^3/s). Kemudian Total laju alir volume gas = {(laju alir NCG + Laju alir udara Cooling Tower)}(Nm^3/s). Evaporation losses relative kecil sehingga boleh dianggap sama dengan nol.

Emisi gas H_2S PLTP = 32 mg/Nm^3 padahal Baku Mutu emisi adalah 35 mg/Nm^3. Oleh karena itu pada PLTP tidak perlu dipasang Gas Treatment Unit, baik berupa DeSOx ataupun Scrubber.
</td><td></td></tr>
<tr><td>11.</td><td>a. Mengapa emisi gas H2S dalam formula di halaman ini dibagi juga dengan laju udara?
b. Laju udaranya dari mana?
c. Dalam tabel 1-24, kadar H2S desain PLTP disebutkan 3% X NCG?
d. Bagaimana jika kadar NCG nya tidak 0,2%, apakah kadar H2S tetap 3%?
e. Emisi H2S = 27 mg/Nm3 setelah dibagi dengan laju alir udara, dasarnya apa menentukan laju alir udara itu?
f. Rendahnya emisi H2S bukan karena usaha mengurangi tetapi mengencerkannya dengan udara, apakah ini bisa dilakukan secara legal?
g. Laju alir H2S tetap tinggi yaitu 346,3 Ton/tahun!</td><td>1-53 & 1-54</td><td>a. Emisi H_2S dari Cooling Tower = laju alir H_2S (mg/s) dibagi dengan {Laju alir NCG (Nm^3/s) + Laju alir udara (Nm^3/s)}. Secara ringkas laju alir fluida dalam Cooling Tower dapat disajikan secara sederhana sebagai berikut:</td><td></td></tr>
</table>

No.	Saran/Masukan	Hal	Tanggapan	Hal
	h. Apakah jika disebarkan oleh 4 cerobong cooling tower terus menjadi rendah kadar H2S di udara ambien dengan lokasi cerobong yang saling berdekatan?		 b. Udara berasal dari atmosfer yang disedot mengunakan Fan Cooling Tower sehingga dalam Cooling Tower terjadi permindahan panas antara udara dingin dengan air hangat dari Condenser. c. Semula kadar H_2S didisain 3%mol x NCG karena belum adanya kepastian hasil eksplorasi. Namun setelah tersedia hasil eksplorasi, maka kadar H_2S HP steam untuk disain PLTP ditetapkan sebesar 6,71% mol x NCG, sedangkan kadar NCG ditetapkan sebesar 1% berat steam. d. Hasil eksplorasi menyimpulkan bahwa sebagian besar steam Rantau Dadap memiliki kadar NCG tergolong *Low to Modeate,* yakni sekitar 1%wt, sedangkan kadar H_2S rata-rata HP steam = 6,71 %mol. Tentu saja kadar H2S dapat lebih tinggi atau lebih rendah dari nilai tersebut, namun basis disain tetap mengacu pada jenis steam yang *Low to Modeate.* e. Laju alir udara ditentukan oleh Ratio Liquid to Gas (L/G Ratio) karena perpindahan panas berlangusng antara air panas dengan udara dingin. Semakin tinggi laju alir udara akan semakin kecil emisinya, sebaliknya semakin kecil laju alir udara akan semakin besar emisinya. f. Selama ini cara seperti ini telah dilakukan di berbagai negara produsen panasbumi termasuk Indonesia. Maka dari itu di Indonesia juga belum ada aturan yang melarang pelepasan NCG melalui Cooling Tower, sehingga tidak dapat dinilai legalitas dari kegiatan tersebut.	

No.	Saran/Masukan	Hal	Tanggapan	Hal
			g. Beban emisi gas H_2S berdasar data lama = 346,3 ton/tahun (= 1 ton/hari), sedangkan berdasarkan data baru dapat mencapai 3.530,4 ton/tahun (10 ton/hari). Beban emisi tersebut masih jauh lebih kecil dibandingkan emisi gas H_2S kulang minyak yang berkisar antara 30 – 100 ton/hari. h. Dispersi gas H_2S di udara ambien akan lebih baik bila dibandingkan dengan sebaran gas melalui 1 cerobong. Namun tujuan utama penyebaran melalui 4 cerobong sebenarnya agar *heat transfer* berlangsung lebih efisien.	
12.	a. Tertulis: "Pelepasan NCG ke atmosfer tersebut menimbulkan emisi gas H2S sebesar 32 mg/Nm3". b. Emisi H2S itu 32 mg/Nm3 ataukah 27 mg/Nm3? Lihat hal 1-54, Tabel 1-24. c. Jika itu emisinya maka akan menghasilkan laju H2S sebesar = 13.184 mg/detik = 0,0132 kg/detik atau sekitar 47,5 kg/jam = 1.139 kg/hari = 416 ton/tahun. d. Jumlah ini sangat berpotensi mencemari lingkungan air, tanah dan bangunan karena sifat korosifnya serta kebauannya. e. Jika Gambar 1-19 hal 1-58 memberikan besaran emisi (CO2 + H2S) = 14 kg/detik, maka emisi CO2 = 14 – 0,0132 kg/detik = 13,9868 kg/detik = 441.088 ton/tahun CO2. f. Teknologi pengurungan H2S dan CO2 apa yang akan dilakukan untuk pengelolaan ini?	1-57 & 1-58	a. Emisi gas H_2S PLTP yang benar adalah 27 mg/Nm^3. b. Emisi gas H_2S PLTP yang benar adalah 27 mg/Nm^3. c. Sebagai pedoman menggunakan Baku Mutu emisi yakni 35 mg/Nm^3 dan beban emisi sekitar 1 ton/hari tergolong rendah bila dibandingkan dengan kegiatan Pembangkit lain yang menggunakan bahan bakar batubara atau minyak solar. d. Dampak yang perlu dikendalikan adalah sebaran bau gas H_2S yang dapat menimbulkan bau di sekitar PLTP. Lokasi PLTP jauh dari permukiman penduduk, sehingga bau gas H_2S praktis berdampak terhadap karyawan. Dampak terhadap tanah dan air akibat konversi H_2S menjadi H_2SO4 mungkin terlalu kecil, karena dispersi gas berada dalam satuan sangat kecil yakni mikrogram. e. Emisi CO2 bukan termasuk dalam lingkup ANDAL. f. SERD akan mengendalikan emisi gas H_2S PLTP hingga di bawah Baku Mutunya. Emisi gas H_2S sebesar 27 mg/Nm_3 cukup ideal untuk operasi PLTP bila mengacu Baku Mutu emisi H_2S = 35 mg/Nm^3. Namun sebaran bau dapat menimbulkan dampak terhadap ketidak nyamanan lingkungan. Oleh karena itu selama di sekitar PLTP tidak terdapat permukiman penduduk, maka dampak bau H_2S dapat diminimalkan.	
13.	a. Ringkasan dampak penting hipotetik sebaiknya diberikan dalam tabel matriknya, dan juga diberikan matrik dampak potensialnya. b. DPH Tahaap Operasi untuk Kualitas Udara sebaiknya ditambahkan CO2, walaupun ini bukan polutan tetapi pemerintah berkomitmen untuk menguranginya karena potensi perubahan iklim yang ditimbulkannya.	1-62	a. Saran diakomodasikan. Akan disajikan satu tabel dengan DPH dan dampak potensial. b. CO_2 bukan merupakan parameter kualitas udara sehingga dalam KA ANDAL emisi CO_2 tidak dapat dimasukkan sebagai DPH karena CO_2	

No.	Saran/Masukan	Hal	Tanggapan	Hal
			memang bukan merupakan lingkup ANDAL. Oleh karena itu KLH tidak pernah mengatur CO_2 sebagai parameter lingkungan. Kajian khusus dapat saja dilakukan guna mengkaji Beban emisi CO_2 dan daya serap hutan terhadap CO_2. Disini terdapat korelasi antara luas hutan dengan beban emisi CO_2. Kajian tersebut lebih bersifat kuantitatif, sementara ANDAL lebih menekankan aspek kualitas lingkungan.	
14.	c. Batas ekologis dari parameter polusi udara (persebaran H2S) ditetapkan 1,1 km. Dimana perhitungan dispersinya?	1-64	Batas ekologis berdasarkan pemodelan sebaran H2S adalah 1,5 km. Dokumen sudah diperbaiki.	
15.	a. Model atau perhitungan persebaran polutan sumber garis menggunakan apa? b. Adakah proses perhitungannya dalam dokumen ini? Di mana lokasinya/ halaman berapa atau lampiran berapa? c. Asumsi-asumsinya seperti apa? d. Berapa emisi yang dimasukkan dalam perhitungannya? e. Rona awal konsentrasi debu sebesar 116 ug/m3 itu data dari mana? Lihat data rona lingkungan untuk kualitas udara di tabel 2-6, hal 2-7, TSP tertera di situ paling tinggi adalah 78 ug/m3.	3-5	a. Pemodelan sumber garis menggunakan persamaan Gauss b. Perhitungan dilakukan dengan bantuan MS Excel c. Asumsinya antara lain: arah angin tegak lurus jalan, 3 kendaraan mobilisasi alat dan bahan pada saat yang sama d. Laju emisi input adalah 0,1363 g/ms e. Rona awal adalah 67-78 ug/m^3	
16.	a. Untuk kebisingan disebutkan ronanya antara 41-59 dBA; ini data dari mana? b. Lihat Tabel 2-8 hal 2-8, kebisingan tertingginya 49 dBA.	3-7	Rona awal untuk prakiraan dampak kebisingan (mobilisasi) adalah rona awal tingkat kebisingan di Desa Sukarami, Desa Tunggal Bute sebesar 45-49 dBA. Dokumen sudah diperbaiki	
17.	Perubahan kualitas udara dari operasi PLTP a. Di sini disebutkan bahwa lepasnya emisi gas H2S dan CO2 ke atmosfer dapat menimbulkan dampak lingkungan; tetapi CO2 tidak termasuk parameter yang disimpulkan sebagai DPH. b. Tabel 3-8 memuat laju alir massa H2S yaitu sebesar 13,25 g/s; mengapa berbeda dengan yang ada dalam tabel 1-24 hal 1-54 yang menyebutan laju alir H2S = 10.980 mg/s = 10,98 g/s? c. Juga Tabel 3-8 memuat exit air flow = 449 m3/s, sedangkan dalam tabel 1-24 hal 1-53 menulis laju alir udara = 412 Nm3/s. d. Dari mana menentukan kecepatan emisi H2S = 133 g/s untuk memprediksi konsentrasi H2S ini? e. Bukankah laju aliran massa H2S = 13,25 g/s? f. Baku mutu H2S udara ambien = 28 ug/m3 itu sumbernya dari mana? Jika dalam Tabel 2-7 hal 2-7 tertulis BML H2S (kepMen LH No. 50 Tahun 1996 tetang Kebauan) sebesar 0,02 ug/Nm3, bagaimana dengan ini? g. Mengapa menggunakan model Calpuff? Calpuff model ini mana data inputnya? Asumsi-asumsinya apa?	3-32 & 3-33	a. Untuk CO2 karena tidak merupakan polutan, hanya disampaikan potensinya saja b. Hasil perhitungan terakhir laju alir massa H2S adalah 13,25 g/s. Data di Tabel I-24 hal. I-54 sudah diperbaiki c. Laju alir udara adalah 449 m3/s, Tabel I-24 hal. I-54 sudah diperbaiki d. Laju emisi H2S adalah 13,25 g/s. Kesalahan sudah diperbaiki f. Baku mutu H2S berdasarkan KepMenLH No. 50 Tahun 1996 adalah 0,02 ppm, yang ekivalen dengan 28 ug/m3 g. Pertimbangan penggunaan Calpuff adalah salah satu model yang direkomendasi untuk pemodelan sebaran polutan, selain Aermod dan ADMS. Selain itu juga Calpuff memiliki kemampuan prediksi farfield. Input dan asumsi model dapat dilihat pada Lampiran	

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18.	Kualitas udara dari Pengoperasian PLTP a. Mengapa memasang alat monitoring dan melakukan monitoring berkalan H2S masuk dalam RKL, bukankah itu kegiatan yang masuk dalam RPL? b. Mengamankan area PLTP dengan permukiman sekitar, bagaimana caranya dalam kasus ini? Mengapa tidak ditentukan batasnya sekarang dalam RKL? c. Memasang exhaust fan agar kecepatan gas H2S lebih tinggi kurang optimal dalam RKL karena tinggi cerobong rendah sedangkan areanya complex terrain. Dengan plume yang tinggi akibat fan yang besar justru emisi H2S terbawa ke tempat permukiman. Apakah sudah dibuktikan dengan modelnya? d. Mengapa ada sumber emisi diberikan di sini? Bukankah ini kualitas udara?	RKL 2-14	a. RKL RPL akan diperbaiki sesuai saran. b. Lokasi PLTP dan wellpad dengan pemukiman terdekat adalah 6 km. Area PLTP dan wellpad dibatasi oleh pagar dan security gate. c. Hasil pemodelan Calpuff menunjukkan jarak terjauh cakupan konsentrasi 28 ug/m3 adalah 1,5 km, sedangkan permukiman berada pada jarak 6 km.	
19.	Kualitas udara dari Pemboran sumur produksi a. Diberikan indikatornya adalah Emisi H2S, Permen LH No. 21 Tahun 2008. b. Mengapa tidak ada pemantuan emisinya?	RPL 3-12	a. Sudah ditambahkan b. Sudah ditambahkan	
20.	Kualitas udara dari Operasi PLTP a. Diberikan indikatornya adalah Emisi H2S, Permen LH No. 21 Tahun 2008 dan emisi gas dari cooling tower.. b. Mengapa tidak ada pemantuan emisinya? c. Mengapa ada pengukuran TSP di sini?	RPL 3-7 & 3-8	a. Sudah ditambahkan b. Sudah diperbaiki c. Sudah diperbaiki	
D.	**Prof. Dr. Dody Prayogo, MPSt (Pakar Sosial)**			
1.	Penyajian dokumen cukup baik dan jelas. Terdapat sejumlah perbaikan dibandingkan dengan dokumen KA-2 lalu.	Umum	Terima kasih	
2.	1. Sangat baik sudah diurai kebutuhan lahan dan penggunaan lahan eksisiting, terlihat banyak peruntukan kebun kopi yang akan bersinggungan dengan kegiatan geotermal, terdapat sekitar 31 ha lahan kebun kopi yang akan diakuisisi. Akan sangat baik (melengkapi penjelasan tabel 1-5) jika dipaparkan peta menjelaskan dimana masing-masing lokasi dimaksud. 2. Juga tidak dijelaskan bagaimana pemilikan lahan, apakah seluruh lahan kebun kopi ini milik negara, atau ada sebagaian lahan milik penduduk. 3. Jelaskan bagaimana rencana pembebasan lahan, jelaskan skema kompensasi terhadap tanaman kopi dan tanaman lainnnya para petani. (Lihat masukan KA-2, tidak/belum diakomodasi). Jika pembebasan lahan sudah selesai dilakukan, tegaskan saja dalam dokumen, kiranya tidak perlu dibahas dalam dokumen. Artinya, kegiatan dan dampak pembebasan lahan tidak tercakup dalam amda ini (Hal. 1-20).	1-12	1. Sebagian areal kebun kopi di sini berlokai di dalam kawasan hutan, untuk lahan kopi yang berada di dalam areal hutan, dilakukan kompensasi dan areal hutannya akan diajukan IPPKH ke pemerintah 2. Sesuai dengan status lahan, areal perkebunan kopi berada di areal hutan lindung. Sedangkan untuk status kepemilikan lahan yang berada di dalam areal hutan tetap menjadi milik negara selama areal tersebut belum dirubah peruntukkannya 3. Pembebasan lahan milik masyarakat di luar areal hutan lindung sudah selesai dilakukan pada tahap eksplorasi, sehingga tidak menjadi dampak. 4. Hanya bagian kecil areal kebun kopi (total 9,5 Ha) lahan milik masyarakat yang dibebaskan. Masyarakat masih memiliki lahan kebun kopi lain yang lebih luas.	

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	4. Kemudian jika lahan tanaman penduduk sudah dikompensasi, kemana (di lokasi mana) mereka meneruskan perkebunan kopinya saat ini?			
3.	Apakah sebaran gas H2S akan menjangkau kawasan pemukiman, sebaiknya dijelaskan dengan peta kawasan arah dan luasan sebaran H2s dan tinjukan dimana lokasi pemukiman penduduk, terutama yang terdekat dengan fasilitas pengolahan geotermal. (Lihat masukan KA-2). Bisa digunakan pemodelan peta 3-1 (hal. 3-36) dioverlay dengan peta pemukiman penduduk.	1-24	a. Lokasi PLTP dan wellpad dengan pemukiman terdekat adalah 6 km. Area PLTP dan wellpad dibatasi oleh pagar dan security gate. b. Hasil pemodelan Calpuff menunjukkan jarak terjauh cakupan konsentrasi 28 ug/m3 adalah 1,5 km, sedangkan permukiman berada pada jarak 6 km.	
4.	Penerimaan tenaga kerja tahap konstruksi cukup jelas, namun tidak dijelaskan berapa prakiraan tenaga kerja lokal dapat diserap, sebaiknya ada kebijakan memberikan kuota proporsi (%) dan jenis pekerjaan tertentu kepada warga lokal (KTP setempat) sesuai kemampuan mereka. Kebijakan kuota ini penting diberlakukan terhadap kontraktor utamanya tahap konstruksi. (Lihat masukan KA-2 lalu)	1-20	Rekrutmen tenaga kerja semaksimal mungkin berasal dari tenaga kerja lokal/daerah setempat, apabila dapat memenuhi kualifikasi yang diperlukan.	
5.	Jelaskan berapa rata-rata luas lahan hak milik dan lahan garapan warga (responden), sebaiknya dengan data hasil survey, karena hampir 90% pekerjaan penduduk adalah petani. Rata-rata luas pemilikan lahan ini cenderung akan berubah sejalan dengan akuisisi lahan dan kompensasi perkebunan kopi masyarakat. (lihat masukan KA-2 lalu).	2-85 (Rona Awal)	Lihat jawaban E #2.	
6.	1. Sangat baik dipaparkan peta "Kegiatan lain sekitar" menjelaskan pemukiman dan perkebunan kopi terletak pada kawasan pengolahan dan fasilitas pendukung dan cukup jauh dari well pad. 2. Gangguan lalu-lintas dan kerusakan jalan potensial terjadi pada jalan desa kawasan pemukiman, khususnya tahap konstruksi. Apakah pemrakarsa akan memperlebar dan memperbaiki jalan desa eksisting, jika ada perlu disinggung dalam rona awal ini.	2-96	1. Terima kasih 2. Jalan eksisting sebagai akses sudah diperlebar dan dikeraskan dengan macadam. Untuk selanjutnya, jalan ini akan dilakukan perawatan oleh PT SERD.	
7.	Dampak pembebasan lahan tidak perlu dilingkup dalam analisis karena kegiatan pembebasan lahan sudah dilakukan (tidak dicakup).	Pelingkupan dan Analisis Dampak	Kegiatan pembebasan lahan sudah tidak dilingkup..	
8.	Analisis tentang "terbukanya Kesempatan Kerja" belum bisa menegaskan dampak positif dimaksud, karena pemrakarsa tidak bisa menjamin dengan kebijakan adanya sistem kuota. Dalam banyak kasus, para kontraktor membawa tenaga kerja mereka sendiri hingga tenaga unskill (helper) dari kampung masing-masing. Oleh sebab itu dalam analisis ini rekrutmen tenaga kerja hanya bisa dipastikan menjadi dampak positif signifikan jika ada kepastian warga lokal mendapat kuota dan prioritas kerja di tahap konstruksi. Pada tahap operasi hanya sedikit saja tenaga lokal yang dapat diserap, biasanya tenaga security dan helper, dengan jumlah terbatas. Implikasinya, pastikan dalam RKL ada prioritas dan kebijakan kuota dalam rekrutmen tenaga kerja bagi warga lokal.	3-2	PT SERD telah memiliki mekanisme untuk menampung atau mengakomodasi peluang kerja dan telah diimplementasikan pada saat eksplorasi secara efektif. Pada saat tahap konstruksi dan operasi, mekanisme ini akan tetap dilakukan.	

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9.	Gangguan lingkungan akibat: a) menurunnya kualitas udara (debu), b) munculnya kebauan, c) ganguan kebisingan, dan d) kerusakan jalan dan gangguan lalu-lintas, adalah juga dampak sosial dilihat dari akseptor dampak (subyek terdampak). Pada beberapa kasus di Jawa Barat, dampak ini justru menimbulkan konflik (pemblokiran dan pengrusakan) terhadap prasarana pemrakarsa, sehingga dampak ini harus dimasukan sebagai dampak sosial. Implikasinya, dalam RKL dan RPL harus dimasukan agenda mengelola dan memantau penduduk yang potensial terdampak: apa dan bagaimana pemrakarsa harus mengelola dan memantau penduduk yang terganggu dengan dampak ini.	3-5-9	PT SERD telah berkomitmen yang tertuang dalam dokumen RKL-RPL untuk mengelola dan memantau dampak lingkungan maupun dampak terhadap masyarakay yang diprakirakan terjadi dari kegiatan pengembangan panas bumi Rantau Dedap.	
10.	Perubahan persepsi harus dilihat secara obyektif, yakni ada perubahan persepsi menjadi negatif dan positif; keduanya harus masuk dalam analisis. Perlu dilihat apa kekuatiran dan harapan warga masyarakat terdekat terhadap pembangunan ini. Jika harapan terhadap rekrutmen tenaga kerja warga lokal tidak terpenuhi maka akan berubah menjadi persepsi negatif dan penolakan. Hal demikian berlaku pada tahap konstruksi dan operasi. Analisis hal 3-33-37 bisa digunakan menjelaskan dampak gangguan lingkungan "kebauan" sebagai dampak sosial.	3-25	Gangguan lingkungam berupa kebauan yang mungkin terjadi dari kegiatan operasional PLTP terhadap kesehatan masyarakat merupakan dampak sekunder. Diharapakan dengan melakukan pengelolaan terhadap sumber dampak dan dampak primer, dampak sekunder (persepsi negatif masyarakat) dapat dicegah.	
11.	Masukan dampak "gangguan lingkungan", yakni: a) gangguan debu (tahap konstruksi), b) kerusakan jalan dan gangguan lalu-lintas, c) gangguan kebauan (H2S) khususnya di kawasan pemukiman terdekat, d) gangguan kebisingan, keseluruhannya sebagai dampak sosial. Pemrakarsa harus mengelola dampak ini terhadap masyarakat.	RKL-RPL	PT SERD telah memiliki "*grievance mechanism*" untuk menampung dan memberikan solusi atas setiap keluhan masyarakat. Mekanisme ini sudah dilaksanakan pada tahap eksplorasi.	
12.	Buat Pusat Pengaduan Gangguan Lingkungan, yakni pusat bagi masyarakat jika mereka merasakan gangguan bisa tepat menyampaikan keluhannya. Untuk itu perlu lembaga, nama orang, alamat, no. telepon yang diinformasikan ke masyarakat.	RKL-RPL	PT SERD telah memiliki "*grievance mechanism*" untuk menampung dan memberikan solusi atas setiap keluhan masyarakat. Mekanisme ini sudah dilaksanakan pada tahap eksplorasi.	
13.	Buat Tim Respon Cepat untuk merepon keluhan atau laporan gangguan lingkungan, sekaligus memastikan ada-tidaknya atau benar-tidaknya ada dampak lingkungan.	RKL-RPL	PT SERD telah memiliki SOP Tim Respon Cepat untuk menanggulangi dalam hal timbulnya gangguan lingkungan	
14.	Buat forum atau media komunikasi jika muncul masalah dapat dibahas bersama, unsurnya bisa dilibatkan kecamatan/desa, perusahaan dan kelompok dan tokoh masyarakat yang relevan.	RKL-RPL	Di dalam organisasi PT SERD ada yang berperan sebagai government & community relation, yang secara kontinu melakukan stakeholder engagement. Dengan demikian, dengan segera bisa dibentuk Tim Ad-hoc penanggulangan masalah.	
E.	**Prof. Dr. Ir. Djoko Darwanto Gitokarsono (Pakar Radiasi Elektromagnetik)**			
1.	**TANGGAPAN TERHADAP ANDAL PADA TAHAP KONSTRUKSI** Pipa uap panas bumi tergelar sangat panjang antara Wellpad Wellpad ke Pusat Pembangkit (Power Plant) dan terbuat dari logam konduktif.		Saran diterima dan menjadi perhatian PT SERD dalam melakukan kegiatan konstruksi dan operasi pengembagan panas bumi Rantau Dedap	

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	Sehubungan daerah Indonesia merupakan area dengan kepadatan sambaran petir yang tinggi, maka upaya mengatasi masalah petir harus dilakukan dengan baik, yang meliputi bahaya sambaran petir langsung dan bahaya induksi elektrostatis pada pipa uap panas bumi. 1.1. Sambaran Petir langsung Petir dapat secara langsung menyambar bangunan di area power plant, yang meliputi bangunan gedung power plant dan bangunan pendukung area power plat. Penangkal Petir Eksternal (External Lightning Protection) harus mengacu kepada Standard Internationan maupun National seperti IEC, VDE, NFPA dan PUIL, yang pada intinya adalah sistem penangkal petir eksternal konvensional dan bukan sistem radio-active maupun ESE Early Streamer Emission. Berdasar kenyataan dilapangan, denagn banyaknya sistem ESE yang dipasang dan banyak menimbulkan masalah, maka Penangkal Petir yang dipasang harus benar benar berdasar Standard, dimana pemasangan penangkal petir jenis ESE Early Streamer Emission harus dilarang. 1.2. Penangkal Petir Internal (Internal Lightning Protection) Sambaran petir langsung maupun tidak langsung, induksi elektromagnetik dan propagasi gelombang berjalan yang terjadi dapat menyebabkan "Plant Trip" dan sistem Black Out. Denga demikian maka Penangkal Petir Internal pada power Plant harus dipasang, yang meliputi grounding system yang benar, pemasangan arrester pada power line, instrument & control cable. 1.3. Induksi Muatan Elektrostatis pada Pipa Uap Dengan panjangnya pipa uap panas bumi yang menghubungkan Wellpad dengan power plant, maka induksi muatan elektrostatis dari awan bermuatan pada pipa uap panas bumi yang terbuat dari logam akan sangat besar. Induksi muatan elektrostatis pada pipa uap panas bumi yang sangat besar akan menjalar menuju pusat pengumpul uap di dekat pembangkit listrik (Power Plant) akan menyebabkan dampak serius pada peralatan instrumentasi kontrol di power plant, dengan konsekwensi Plant trip, sehingga perlu dilakukan langkah yang benar			

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	mengatasi hal ini. Bahaya pengaliran induksi muatan elektrostatis pada pipa uap, daat diatasi dengan "Grounding" penghubungan pipa uap ke elektroda pentanahan. Berdasar karakteristik pengaliran arus induksi awan petir, maka penghubung pentanahan yang benar adalah menggunakan Pelat tipis yang lebar yang disebut dengan Skin Effect Grounding. Akan tetapi dengan adanya Proteksi Korosi (Corrosion protection) pipa uap, grounding pipa uap harus dikoordinasikan dengan "Cathodic protection" yang akan dipasang.			
2.	**TANGGAPAN TERHADAP ANDAL PADA TAHAP KOMISIONING** 1) Harus dipastikan bahwa Plant Area dan Power Plant building telah dilengkapi dengan External Lightning Protection yang berdasar Standard National dan International. Tidak diperkenankan penggunaan external lightning protection system ESE Early Streamer Emission yang tidak berdasar Standard harus dilarang, dikarenakan sangat berbahaya kepada personil dan power plant building. 2) Pada saat komisioning harus dilakukan pengujian Arrester baik Power Line arrester maupun Instrument, Control Arrester. Harus dilakukan pemeriksaan Internal Grounding System apakah memang sudah benar dipasang.		Saran diterima.	
3.	**TANGGAPAN TERHADAP ANDAL PADA TAHAP PENGOPERASIAN** 1) Dipastikan bahwa semua komponen instalasi Penangkal Petir Eksternal dan Internal terpasang telah memenuhi ketentuan standard internasional IEC, NFPA atau Nasional SNI 2) Dilakukan pengukuran Radiasi Radio Active di area Power Plant secara periodik untuk memastikan ada tidaknya dampak kepada kesehatan masyarakat dan operator power plant.		Saran diterima.	
F.	**Dr. Ir. Agus Priyono Kartono, M.Si. (Pakar Biodiversity)**			
1.	Dokumen ANDAL, RKL-RPL ini masih perlu penyempurnaan, terutama data dan informasi yang diperoleh selama melakukan studi. Hal-hal umum yang perlu ditambahkan dan dijelaskan lebih lanjut adalah: 1. Situasi dan kondisi setiap tipe ekosistem (sub-montana, montana, alpin)		1. Sudah ditambahkan. 2. Sudah ditambahkan 3. Sudah ditambahkan.	

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	saat ini, serta luasan areal yang diperkirakan terdampak. 2. Nilai-nilai kuantitatif hasil studi flora fauna (jumlah individu, frekuensi perjumpaan) yang ditemukan selama pengamatan pada setiap unit contoh dan setiap tipe ekosistem. Jika hanya kualitatif, bagaimana cara menghitung indeks keanekaragaman Shannon? 3. Penyajian hasil pengamatan vegetasi dan satwaliar sebaiknya diarahkan berdasarkan tipe ekosistem sehingga dapat diinterpretasikan secara baik. 4. Ketegasan tentang hasil Studi Kelayakan sebagai dasar dalam penyusunan ANDAL. 5. Deskripsi kegiatan perlu diperjelas dan berikan informasi serta data yang relevan. 6. Pengumpulan data fauna darat antara lain dilakukan melalui pengamatan pada transek dan penggunaan *camera trap*, tetapi mengapa hasilnya hanya berupa daftar jenis yang dijumpai? Apakah tidak ada perjumpaan langsung maupun tidak langsung (jejak, feses, sarang, dan sebagainya) sehingga tidak dapat dicatat jumlah individu setiap jenis yang ditemukan?. 7. Di Sumatra seharusnya tidak ada surili (*Presbytis comata*), yang ada adalah simpai (*Presbytis melalophos*), surili hanya tersebar di Jawa Barat dan Jawa Tengah bagian barat. Selain itu, di Sumatera juga seharusnya tidak ada kijang kuning (*Muntiacus atherodes*), yang ada adalah kijang gunung (*Muntiacus montanus*) dan kijang muncak (*Muntiacus muntjak*). 8. Mengapa jumlah jenis burung (Aves) yang ditemukan hanya 7 jenis dan Herpetofauna hanya 1 jenis; sedangkan mamalia ada 21 jenis? 9. Pada RKL-RPL, agar dituliskan secara tegas apa yang menjadi indikator dan bagaimana upaya yang dilakukan agar indikator tersebut tercapai. 10. Pengelolaan lingkungan flora akan dilakukan dengan revegetasi dengan jenis yang sama. Apa maksudnya? Mengapa tidak diarahkan pada restorasi?		4. Ketegasan tentang hasil Studi Kelayakan sebagai dasar dalam penyusunan ANDAL. 5. Sudah ditambahkan. 6. Sudah ditambakan. Pencatatan jumlah jenis dilakukan hanya pada pertemuan langsung pada mamalia arboreal, selebihnya membutuhkan pengamatan lebih mendalam untuk penentuan populasi. 7. Dalam terminologi ingris *Sumatran Surili* (*Presbytis melalophos*). Terminologi Surili diganti dengan Simpai agar lebih komunikatif. 8. Sudah diperbaiki 9. Indikator dampak telah diperbaiki 10. Maksudnya adalah rehabilitasi akan diusahakan menggunakan spesies pioneer local. Kurangnya panduan restorasi menjadi kesulitan, namun konsep restorasi akan berusaha dilakukan.	
	I. PENDAHULUAN			
2.	Agar dicermati penggunaan kata dalam penyusunan kalimat, terutama kata '*akan*'. Mengingat bahwa kegiatan studi ini telah dilakukan maka perlu ditegaskan hal apakah yang digunakan sebagai dasar pekerjaan teknis lainnya?	1-1 sd 1-2	Terima kasih untuk koreksinya. Kata "akan" telah dihilangkan dalam dokumen	
3.	Agar ditegaskan apakah sudah dilakukan pengajuan perpanjangan masa berlaku surat Kesesuaian Tata Ruang dari Bappeda Kota Pagar Alam,	1-3	Surat perpanjangan keterangan kesesuain Tata Ruang telah diperpanjang dan dilampirkan dalam dokumen ANDAL.	

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	Bappeda Kabupaten Lahat, dna BKPRD Kabupaten Muara Enim?			
4.	Mohon agar dicermati tentang pemberian nama/legenda pada Peta Rencana Pola Ruang. Benarkah ada istilah Hutan Suaka Alam Laut?	1-5	Peta bersumber dari Peta RTRW yang dikeluarkan oleh Bappeda Provinsi Sumsel dan Bappeda Kab. Muara Enim	
5.	Mohon agar konsisten dalam penggunaan tanda baca untuk desimal, apakah menggunakan tanda koma ataukah titik.	1-12	Saran diakomodasikan dan secara keseluruhan dokumen telah disesuaikan	
6.	▪ Agar diberikan spesifikasi dan dimensi *stack Atmospheric Flash Tank* (AFT) ▪ Mohon agar diberikan informasi tentang jenis-jenis senyawa atau unsur garam yang terkandung dalam *Brine*. Hal ini karena beberapa jenis senyawanya dapat mengganggu pertumbuhan vegetasi hutan.	1-15	▪ (*Atmospheric Flash Tank* (AFT) adalah tangki yang berfungsi untuk ekspansi (flashing) steam saat uji produksi. Akibat flashing ini maka terjadi pemisahan fluida cair dan uap. Kemudian uap dilepas ke atmosfer, yang di dalamnya terdapat NCG. Agar Exit gas velocity mencapai 8 m/s maka diameter Stack adalah 1,2 m dengan tinggi 5 m. ▪ Brain berkadar TDS (*Total Dissolved Solid*) rata-rata 3.500 ppm sehingga brain tersebut dikembalikan lagi ke reservoir melalui sumur injeksi dan dilarang untuk dibuang ke sungai. TDS tersebut terutama tersusun atas garam khlorida dan sulfat.	
7.	▪ Mohon agar dapat disajikan tingkat kebisingan (dB) yang ditimbulkan oleh peralatan yang digunakan. ▪ Informasikan pula tentang rambatan gelombang dan getarannya hingga mencapai jarak tertentu (dB=0)	1-17	• Peralatan, lokasi kerja, dan fasilitas kerja dirancang untuk memenuhi baku mutu yang berlaku (Kepmen LH No. 8/1995 dan Permenaker No. Per.13/Men/X/2011).	
8.	Mohon agar disajikan hasil studi khusus tentang keanekaragaman hayati (biodiversitas) pada kawasan hutan lindung alami.	1-21	Hasil studi biodiversity telah dimasukkan ke dalam dokumen pembahasan rona lingkungan untuk komponen flora dan fauna terestrial	
9.	Mohon agar dijelaskan dasar penggunaan batas pencemaran udara yang dipantau (terutama gas H_2S) adalah 1,1 km. Apakah berdasarkan hasil penelitian orang lain, berdasarkan perhitungan oleh Tim Studi Andal, ataukah yang lainnya. Hal ini karena sangat mempengaruhi perlintasan burung, terutama jenis dilindungi seperti elang, punai, dan burung hantu.	1-64	Nilai Batas pencemaran udara didasarkan atas nilai ambang batas emisi, ambien, dan kebauan. Sedangkan persebaran ini dilakukan pemodelan persebaran kualitas udara (*air dispersion model*).	
	II. DESKRIPSI RONA LINGKUNGAN HIDUP AWAL			
10.	▪ Mohon agar semua sumber pustaka disajikan dalam Daftar Pustaka, termasuk Molles 2005. ▪ Agar disebutkan sumber yang digunakan untuk mengklasifikasikan tinggi atau rendahnya tingkat keanekaragaman hayati.	2-46	Saran telah diakomodasikan.	Daftar pustaka
11.	▪ Agar disajikan kerapatan vegetasinya dan bukan hanya kerapatan relatif (KR%), frekuensi relatif (FR%), dan dominansi relatif (DR%). ▪ Penyajian hasil pengamatan dalam bentuk Tabel 2-20 kurang informatif dan sangat KUALITATIF sehingga sulit diketahui jenis-jenis mana yang benar-benar terancam punah karena tidak ditemukan adanya regenerasi. Oleh karena itu, sebaiknya sajikan tabel kontingensi antara kerapatan setiap jenis vegetasi dengan tingkat pertumbuhannya. ▪ Tambahkan kolom tentang status perlindungan jenis berdasarkan PP No.: 7 Tahun 1999. ▪ Jelaskan mengapa nama ilmiah masih banyak yang menggunakan sp.	2-48	Masukan sudah disajikan dalam dokumen.	

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	(spesies belum teridentifikasi), apakah tidak dilakukan identifikasi di Lembaga terkait seperti Litbang Kehutanan atau bahkan LIPI?			
12.	▪ Mohon agar kalimat ditulis secara cermat dan tegas, misal: mengapa masih digunakan kelas Amphibia, padahal kata selanjutnya dituliskan Herpetofauna? Atau mungkin maksudnya kelas Aves? ▪ Mohon agar disajikan hasil pengamatan teritorialnya, baik bagi primata maupun mamalia lainnya.	2-59	Masukan telah diperbaiki dalam dokumen.	
13.	Pada Tabel 2-27 masih terdapat beberapa jenis yang telah dilindungi berdasarkan PP No. 7 Tahun 1999, tetapi belum dituliskan sebagai jenis dilindungi. Untuk itu agar dicermati kembali penulisannya.	2-61	Dokumen telah diperbaiki.	Tabel 2-27
	III. PRAKIRAAN DAMPAK PENTING			
14.	Mohon agar dijelaskan perlakuan yang akan diberikan terhadap 17.587 batang pohon yang ditebang dalam rangka penyiapan lahan.	3-21	Kayu-kayu dari penebangan pohon di area hutan lindung akan digunakan sebagai material untuk konstruksi bangunan, konstruksi jalan atau untuk keperluan lain di area PT SERD.	
15.	▪ Di wilayah Sumatera seharusnya tidak ada surili, yang ada adalah simpai (*Presbytis melalophos*). Surili hanya ada di Jawa Barat dan wilayah Jawa Tengah bagian barat. ▪ Di wilayah Sumatera juga seharusnya tidak ada kijang kuning (*Muntiacus atherodes*), tetapi yang ada di Sumatera adalah kijang gunung (*Muntiacus montanus*) dan kijang muncak (*Muntiacus muntjak*). ▪ Mohon agar nama ilmiah jenis-jenis satwa dituliskan secara benar dan menggunakan data terbaru, misalnya: *Cervus unicolor*, sekarang *Rusa unicolor*; *Cuan alpinus* seharusnya *Cuon alpinus*.	3-24	Keselahan penulisan nama ilmiah sudah diperbaiki.	
16.	Mohon agar diberikan kesimpulan identifikasi dampak kegiatan penyiapan lahan terhadap fauna darat; apakah termasuk negatif penting (–P) ataukah yang lainnya.		Dampaknya adalah negatif penting (-P) karena telah menghilangkan habitat flora dan fauna.	
17.	▪ Mohon agar ditambahkan uraian dan keterangan tentang apa yang dimaksud dengan "**pulihnya kondisi terestiral flora**". – Apakah kekayaan jenisnya, produktivitasnya, ataukah fungsi dan jasa ekosistemnya. ▪ Terdapat pernyataan bahwa "peningkatan vegetasi penutup selanjutnya akan mampu meningkatkan kesinambungan dan memberikan habitat bagi hewan". – Hewan ataukan binatang atau satwaliar? Mana yang benar? – Apakah hewan perlu habitat tertentu?		Tujuan utama adalah pulihnya tutupan hutan dengan spesies pioneer lokal, harapan kedepan spesies vegetasi klimaks akan pulih kembali. Penggunaan istilah "hewan", "binatang" atau "satwa liar" telah diperbaiki.	
18.	Pada sub-sub bab **3.3.1.2. Pulihnya Terestrial Fauna** – Apa yang dimaksud dari sub-sub judul ini (pulihnya terestrial fauna? – Ukuran apa yang digunakan untuk menyatakan bahwa "terestrial fauna" sudah pulih?		Kalimat sudah diperbaiki, tujuan utamanya adalah pulihnya habitat terrestrial fauna	

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	RKL-RPL			
19.	▪ Pada Tabel Rencana Pengelolaan Lingkungan Hidup, terutama pada sumber dampak kegiatan penyiapan lahan terhadap flora darat dan fauna darat maka: – Mohon dibedakan antara indikator keberhasilan pengelolaan lingkungan hidup dengan upaya yang perlu dan harus dilakukan. – Agar dicermati kembali inditor apa yang digunakan sehingga dapat menunjukkan keberhasilan pengelolaan. ▪ Meminimalisir penebangan pohon-pohon besar dan bertajuk lebar, serta membuka lahan sesuai dengan perencanaan **bukanlah indikator** keberhasilan, tetapi merupakan upaya pengelolaan.	2-8	Telah diperbaiki sesuai dengan saran.	
20.	▪ Pada Tabel Rencana Pemantauan Lingkungan Hidup, terutama pada sumber dampak kegiatan penyiapan lahan terhadap flora dan fauna darat memiliki indikator yang sama persis dengan Rencana Pengelolaan Lingkungan Hidup. Mohon dicermati kembali.	3-4	Telah diperbaiki sesuai dengan saran.	
21.	▪ Semoga saran/masukan/tanggapan ini bermanfaat. Mohon maaf atas segala kesalahan dan kekurangan. Sekian dan terima kasih atas kepercayaan yang diberikan.		Terima kasih.	
G.	**Prof. Dr. Linawati Hardjito, MSc (Pakar Kualitas Air)**			
1.	Ada pemasangan pipa kah ? tidak ada uji hrostatis test ?	Umum	Ada pemasangan pipa dan hidrostatik test.	
2.	Ada rencana kegiatan untuk pengelolaan limbah B3 diserahkan ke pihak ke tiga atau dimanfaatkan untuk kepentingan sendiri dan atau di landfill, tapi identifikasi dampak potensial terhadap air tanah belum dicakup, tolong klarifikasi kenapa tidak dicakup? Dimana rencana landfillnya ? harusnya dicakup dampak terhadap kualitas tanah dan air tanah. Gambar 1-3. Pengolahan limbah cair domestik. Apakah grey water dan black water disatukan ? digambar tidak ada pemisahan. Jumlah pekerja ada 2110 (hal I-20) , apakah kolam anaerob memadai untuk pengelolaan. Seharusnya dipisahkan antara grey dan black water.	I-17	Tidak ada limbah B3 yang di landfill. Narasi dalam dokumen akan disesuaikan. Grey water dan black water akan dikelola melalui septic tank. Jumlah pekerja 2.110 orang adalah kumulatif selama masa konstruksi proyek (sekitar 30 bulan).	
3.	Tabel 1-11, kebutuhan air bersih di supply dari mana ? apakah air sumur atau sungai belum ada informasi. Kebutuhan air pemboran dinyatakan dari air sungai.	I-28	Kebutuhan air bersih diambil dari air permukaan (sungai).	
4.	Air pemboran dari sungai cawang kiri, asahan, bagaimana untuk sumber air bersih karyawan 2110 orang.	I-34	Kebutuhan air bersih dari permukaan. Jumlah pekerja 2.110 orang adalah kumulatif selama masa konstruksi proyek (sekitar 30 bulan).	
5.	Serpih bor akan dimanfaatkan untuk kontruksi pond, batako, konblok atau dikelola ditempat penimbunan. Ada kemungkinan mengandung logam berat	I-35, I-57	Serpih bor geothermal tidak termasuk limbah B3 sehingga bisa langsung dimanfaatkan untuk konstruksi jalan dan bangunan atau dimanfaatkan	

No.	Saran/Masukan	Hal	Tanggapan	Hal
	Sb, As, Ba, B, Cd, Cu, Pb, Hg, Ni, Se, Zn . Perlu dicakup dampak kegiatan kususnya penimbunan serbok bor terhadap kualitas tanah dan air tanah. Sebelum dimanfaatkan perlu dilakukan uji TCLP. Bekas lumpur bor, akan dikumpulkan, dikeringkan dan dicampur dengan media tanam lainnya untuk pembibitan tanaman, revegetasi. Perlu disajikan karakter /kandungan lumpur bor bekas untuk memastikan tidak membawa pulutan ke tanah, air permukaan dan air tanah. Kalau data belum ada, bisa disajikan data sejenis untuk lumput bor dan serbuk bor		untuk pembuatan konblok dan batako. Uji TCLP telah dilakukan di Lapangan Panas bumi lain, memang menunjukkan bahwa serpih bor bukan tergolong limbah B3. Serpih bor tersusun atas unsur tanah, sehingga didominasi oleh senyawa silikat, kalsium dan magnesium. Lagam berat mungkin ada dalam jumlah sangat kecil (*trace*). Lumpur bor water base mengunakan bahan bentonit (kalsium) dan tambahan barit (Barium). Dengan demikian bekas lumpur bor juga bukan tergolong limbah B3.	
6.	Gambar 1-20, kenapa black dan grey water tidak dipisahkan.	I-59	Lihat jawaban G #2.	
7.	Tabel 2-12, kualitas air permukaan parameter BOD, COD , DO tidak memenuhi baku mutu, dikatakan kondisi alami. Alami nya seperti apa ? apakah banyak daun-daun berjatuhan di sungai ?	2-36	Karena area sampling terletak di kawasan hutan, yang salah satunya disebabkan oleh banyaknya serasah daun di badan sungai yang menimbulkan tingginya nilai BOD, COD dan turunnya nilai DO.	
8.	Tabel 2-14. Kualitas air bagus, apakah titik sampling sudah mewakiliki calon lokasi landfill B3 ?	2-38	Tidak ada rencana membangun landfill B3.	
9.	Tabel 2-16, sampling tanah. Tolong ditambahkan parameter polutan(logam berat) dan titik samplingnya mewakili calon lokasi landfill, supaya ronanya jelas, karena dinyatakan dalam dokumen serbuk bor dan lumpur bor kemungkinan mengandung logam berat Sb, As, Ba, B, Cd, Cu, Pb, Hg, Ni, Se, Zn (hal 1-35). Ini penting supaya tidak menjadi pihak yang dipersalahkan kalau dikemudian hari ditemukan polutan di tanah dan air tanah.	2-41	Lihat jawaban G #5.	
10.	Tabel 2.-28 biota perairan ditambahkan indeks dominansi	2-65	Nilai indeks keseragaman dan keanekaragaman cukup mewakili komunitas biota air.	
11.	Perkiraan dampak penting terhadap kualitas air tolong ditambahkan kualitas air tanah, karena ada rencana landill B3 ? dan juga prakiraan dampak penting terhadap kualitas tanah.	3-17	Lihat jawaban G #8.	
12.	Evaluasi holistik. Tolong dicek lagi apakah kualitas tanah dan air tanah menjadi penting ? karena rencana lanfill B3 ?	4-1	Lihat jawaban G #8.	
13.	Gambar 4.1. tolong di cek lagi apakah kualitas tanah dan air tanah seharusnya dimasukkan ?	4-4	SERD tidak berencana membangun landfill B3. Selain itu, lokasi kegiatan proyek jauh dari pemukiman penduduk dan SERD tidak menggunakan air tanah.	
14.	Tolong direvisi sesuai komentar saya di dok ANDAL, rencana pengelolaan dan monitor harus terukur	RKL-RPL	Saran diakomodasikan dan dicantumkan dalam dokumen RKL-RPL.	RKL-RPL
15.	Tahap kontruksi tidak ada dampak terhadap timbulan sampah dan kualitas air, effluent IPAL akan masuk resapan, tapi sampah dari 2110 orang bagaimana ? air permukaan BOD melebihi baku mutu dinyatakan kondisi alami. Apakah tidak ada kaitan timbulan sampah dan BOD ? lokasi jauh ya	2-3	Tidak ada dampak terhadap timbulan sampah dan kualitas air karena jumlah pekerja sebanyak 2.110 orang adalah jumlah kumulatif. Saat ini dilokasi proyek tidak ada kegiatan yang menimbulkan timbulan	

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	Pengelolaan sampah domestik ada TPS dan kerjasama dengan pihak ke tiga untuk dibawa ke TPA		sampah. Saat ini hanya ada kegiatan pemeliharaan peralatan, dan kantor. Pengelolaan limbah padat dan cair domestik di tahap konstruksi dan operasi telah dicantumkan dalam dokumen RKL RPL.	
16.	Bahasa yang digunakan untuk bentuk pengelolaan tidak jelas. Misal perubahan kualitas air permukaan dan biota air, bentuk pengelolaan melakukan pengelolaan dampak erosi dan sediemntasi. Masih belum jelas.	2-7	Saran telah diakomodasikan.	
17.	Bagaimana pengelolaan dampak landfill ?	2-10	Tidak ada landfill.	
H.	**Afrike Wahyuni Saputri dan Reshinta Hantariningtyas (Asdep Tata Ruang dan KSE, Kementerian Koordinasi Bidang Perekonomian)**			
1.	Bab 1.1.2 Kesesuaian lokasi kegiatan dengan tata ruang Dalam dokumen, rencana kegiatan mengacu pada Perda 18/1992 tentang RTRW Kabupaten Muara Enim, Perda RTRW tersebut sudah tidak berlaku, dan seharusnya mengacu pada Perda No. 13 Tahun 2012 tentang RTRW Kab. Muara Enim, yang disebutkan pada Pasal 15 ayat 6 bahwa lokasi PLTP di Kecamatan Semende Darat Laut, Kec. Semende Darat Tengah, dan Kec. Semende Darat Ulu. Mohon klarifikasi apakah lokasi rencana kegiatan ini berada di kecamatan-kecamatan tersebut. Dalam dokumen rencana kegiatan di Kota Pagar Alam mengacu pada Perda Nomor 14 Tahun 2003 tentang RTRW Kota Pagar Alam. Perda tersebut sudah tidak berlaku dan seharusnya mengacu pada Perda No.7 Tahun 2012 tentang RTRW Kota Pagar Alam.	I-3	RTRW sudah disesuaikan di dokumen sesuai saran.	
2.	Mohon klarifikasi, pada judul dokumen disebutkan bahwa kegiatan ini disebutkan bahwa kegiatan iniberada pada Kabupaten Muara Enim, Kabupaten Lahat dan Kota Pagar Alam, Provinsi Sumatera Selatan diperjelas pada bab 1.1.2. paragraf pertama menjelaskan adanya jalan akses menuju lokasi kegiatan yang terletak di wilayah Kab. Lahat sedangkan pemrakarsa (konsultan) presentasi menjelaskan bahwa kegiatan ini berlokasi di Kab. Muara Enim dan Kota Pagar Alam. Jika jalan akses yang berada pada Kab. Lahat merupakan bagiaan dari kegiatan ini maka perlu dibahas dan dikaji juga Analisis Dampak Lingkungannya.		Lokasi kegiatan PLTP dan wellpads termasuk ke dalam wilayah Kabupaten Muara Enim dan Kota Pagar Alam. Namun wilayah studi, termasuk dengan Kabupaten Lahat, khususnya di Kecamatan Kota Agung, karena lokasi jalan akses ada di dalam wilayah ini.	
3.	Dalam dokumen ini disebutkan bahwa renacna kegiatan ini mengacu pada Perda 14/2006 tentang RTRW Provinsi Sumatera Selatan. Perda RTRW tersebut sudah habis masa berlakunya pada tahun 2012. Mohon klarifikasi peta pola ruang Provinsi Sumatera Selatan yang digunakan pada dokumen ini bersumber dari mana, dan apakah rencana kegiatan ini telah sesuai dengan rencana RTRW provinsi Sumatera Selatan yang sedang disusun dan mohon update statusnya di Kementerian Agragia dan Tata Ruang. Namun apabila melihat Perda 14/2006 tentang RTRW Provinsi Sumatera Selatan yang lama pada Pasal 26 disebutkan bahwa panas bumi di Kab. Ogan Komering Ulu Selatan, Kab.Muara Enim, dan Kota Pagar Alam.		Menurut Perda Sumatra Selatan No. 14 Tahun 2006 adalah sebagai berikut: ● Pasal 8: jangka waktu RTRW adalah 15 tahun, atau akan berakhir tahun 2021 ● Pasal 26: panas bumi (geothermal) terdapat di Kabupaten Ogan Komering Ulu Selatan, Muara Enim dan Kota Pagar Alam	

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I.	**Yuda Bagus (Ditjen Ketenagalistrikan, Kementerian ESDM)**			
1.	Seharusnya dalam dokumen tidak hanya sistem manajemen K3LL tetapi juga harus ada K2 (Keselamatan Ketenagalistrikan)sesuai dengan undang-undang Nomor 30 Tahun 2009 tentang Ketenagalistrikan, yang mencakup keselamatan kerja, keselamatan umum, keselamatan lingkungan dan keselamatan instalasi. Keselamatan kerja → harus dilengkapi APD Keselamatan Umum → harus ada tanda bahaya pada instalasi listrik dan juga pagar pembatas Keselamatan lingkungan → harus sesuai baku mutu sesuai dengan perundang-undangan yang berlaku Keselamatan Instalasi → Peralatan harus ada alat proteksi agar tidak tersentuh langsung oleh makhluk hidup dan juga keandalan peralatan bekerja secara baik.	I-14 Andal I-2 RKL-RPL	Sudah tercakup di dalam sistem manajemen K3LL PT SERD.yang disesuaikan dengan K2 (Keselamatan Ketenagalistrikan)	
J.	**Ditjen Ketenagalistrikan, Kementerian ESDM**			
1.	Berdasarkan RUPTL PT. PLN (Persero) 2015-2024 atau 2016 – 2025 bahwa proyek percepatan pembangunan pembangkit tahap 2 di Provinsi Sumatera Selatan salah satunya PLTP Rantau Dedap 2 x 110 MW, seharusnya PT. SERD membahas dan berkoordinasi dengan PT. PLN terkait rencana kapasitas pembangkit yang telah disusun oleh PT PLN supaya tidak terjadi perbedaan menjadi 250 MW.	Umum	Pencapaian kapasitas listrik sampai dengan 250 MW akan dilakukan secara bertahap.	
2.	Penanganan gas pada dampak lingkungan operasional PLTP yang tertulis di dokumen hanya parameter H_2S saja tetapi juga harus mencantumkan parameter NH_3 karena keduanya merupakan parameter wajib pada emisi PLTP sesuai PermenLH No.21 Tahun 2008 tentang Baku Mutu emisi sumber tidak bergerak bagi usaha dan/atau kegiatan pembangkit thermal.	Umum	Saran telah diakomodasikan. Parameter H2S dan NH3 menjadi parameter yang dipantau	
3.	PermenLh nomor 21 Tahun 2008 juga mengatur penanganan kondisi tidak normal atau kondisi darurat agar tidak membahayakan keselamatan/kesehatan manusia dan tidak menimbulkan pencemaran lingkungan, seharusnya penanganan kondisi darurat perlu dituliskan dalam dokumen.	Umum	Saran telah diakomodasikan. PT SERD telah mempunyai SOP untuk penanganan kondisi darurat (*emergency respon*)	
4.	Terdapat inkonsistensi penulisan pada tabel 1-5 tertulis area pembangkit berlokasi di dekat wellpad B, sedangkan di hal 1-2 dan peta bahwa PLTP berlokasi di sekitar wellpad E.	I-13	Saran telah diakomodasikan.	
5.	Terdapat inkonsistensi penulisan pada hal I-24 lokasi PLTP berada di areal 4 Ha, sedangkan di hal 1-2 tertulis 7 Ha.	I-24	Saran telah diakomodasikan.	
6.	Lay out tata letak dari PLTP tidak terlihat jelas dan lokasi GI pembangkit (Switchyard) juga belum tercantum pada *layout*.	I-26	Saran telah diakomodasikan.	
7.	Indonesia memiliki aturan sendiri mengenai Bahan Berbahaya dan Beracun yang diatur PP 74 Tahun 2001, sebaiknya bahan kimia yang digunakan	I-34	Peraturan terbaru mengenai pengololaan limbah B3 adalah PP 101/2014.	

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	untuk kegiatan pemboran sumur produksi dan sumur injeksi untuk mengetahui apakah termasuk B3 atau bukan, agar mengacu pada PP tersebut dan bukan pada US-EPA.			
8.	Belum terdapat penjelasan mengenai pengelolaan lingkungan kegiatan gardu induk pembangkit (*Switchyard*) untuk pengukuran medan magnet dan medan listrik, berdasarkan SNI 04-6950-2003 tentang Saluran Udara Tegangan Tinggi (SUTT) dan Saluran Udara Tegangan Ekstra Tinggi (SUTET) nilai ambang batas medan listrik dan medan magnet.	I-55	Kajian AMDAL PT SERD hanya mencakup hingga switchyard. Selebihnya merupakan tanggung jawab PLN.	
9.	Pengukuran kualitas udara dan kebisingan di bab Rona lingkungan agar dilengkapi dengan peta sampling.		Peta sampling rona lingkungan telah dilengkapi dalam dokumen.	
K.	**Rinu Manurung, S.Sos., MML. dan Niken Raras Kusumastuti (Ditjen Bina Pembangunan Daerah, Kementerian Dalam Negeri)**			
1.	Kewenangan penyelenggaran urusan pemerintahan bidang ESDM, sesuai Lampiran Undang-Undang No. 23 tahun 2014 tentang Pemerintahan Daerah, dalam sub urusan energi baru terbarukan disebutkan bahwa untuk penerbitan izin pemanfaatan langsung panas bumi lintas daerah kabupaten/ kota dalam 1 (satu) daerah provinsi merupakan kewenangan Pemerintah Provinsi. Oleh karena itu, agar pemrakarsa berkoordinasi dengan pemerintah Provinsi Sumatera Selatan dalam hal perizinan untuk rencana kegiatan pengembangan ini, agar tidak terjadi kesalahan wewenang dalam penerbitan perizinan		Pemanfaatan panas bumi untuk pembangkit listrik merupakan jenis pemanfaatan tidak langsung yang perizinannya diberikan oleh pemerintah pusat. Namun dalam pelaksanaan pengawasan mau pun pelaporan rutin, pihak pemerintah daerah dilibatkan.	
2.	Kesesuaian lokasi kegiatan agar mengacu pada Perda RTRW terbaru yaitu Perda RTRW Kabupaten Lahat No. 11 tahun 2012, Perda RTRW Kabupaten Muara Enim No. 13 tahun 2012 dan Perda RTRW Kota Pagar Alam No. 7 tahun 2012. Untuk Perda RTRW Provinsi Sumatera Selatan saat ini sedang dalam proses penetapan perda, setelah dikeluarkan Surat Keputusan Menteri Dalam Negeri tentang hasil evaluasi atas Rancangan Perda RTRW tersebut.	1-2	Telah diperbaiki mengikuti paraturan RTRW yang terbaru. Khusus untuk Perda RTRW Provinsi Sumsel tetap menggunakan Perda yang lama, karena Perda baru di tetapkan secarea resmi	
3.	Lokasi rencana kegiatan sebagian besar berada pada kawasan hutan lindung. Namun dalam dokumen belum dijelaskan mengenai berapa luas lahan yang berada pada kawasan hutan lindung tersebut, jika dilihat dari peta-peta yang dilampirkan justru lebih banyak dan bagaimana proses peizinannya untuk penggunaan kawasan hutan lindung tersebut. Dan hal ini agar menjadi perhatian pemrakarsa mengenai dampak yang ditimbulkan terhadap kelestarian ekosistem hutan lindung tersebut.	1-3	Informasi mengenai luasan lahan di kawasan hutan lindung ada di Tabel 1-7. Pengelolaan terhadap pelestarian ekosistem tercantum di IPPKH.	
4.	Dari Tabel 1-8 mengenai rencana penerimaan tenaga kerja pada tahap konstruksi, agar dapat ditambahkan spesifikasi pendidikan dan keterampilan yang dibutuhkan sesuai dengan posisinya. Dan mengingat kebutuhan tenaga kerja cukup besar, agar dapat menjadi perhatian pemrakarsa dalam penerimaan tenaga kerja lokal, terlebih karena lokasi kegiatan yang berada pada 3 (tiga) wilayah kabupaten/ kota, sehingga prosentase penerimaan	1-20	Telah ada mekanisme penerimaan tenaga kerja lokal baik melalui kontraktor mau pun perusahaan yang telah dilakukan sejak tahap eksplorasi.	

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	tenaga kerja untuk 3 (tiga) kabupaten/ kota tersebut agar menjadi perhatian serius dari pemrakarsa supaya tidak menimbulkan konflik dalam proses penerimaan tenaga kerja.			
5.	Mengingat lokasi kegiatan berada dalam 3 (tiga) wilayah kabupaten/ kota di Provinsi Sumatera Selatan, maka perlu dilakukan koordinasi menyeluruh antar instansi terkait di daerah untuk menghindari permasalah kepentingan antar daerah dan perlu dilakukan sosialisasi kepada masyarakat setempat terutama masyarakat terkena dampak.		Saran diterima dan menjadi perhatian PT SERD dalam melakukan kegiatan sosialiasi	
6.	Dalam matriks Rencana Pengelolaan Lingkungan Hidup (RKL) dan Rencana Pemantauan Lingkungan Hidup (RPL) agar melibatkan SKPD terkait di ditingkat provinsi maupun kabupaten/ kota, baik dalam hal pengawasan maupun pelaporannya, sehingga memudahkan SKPD terkait dalam melakukan pembinaan dan pengawasan.		Saran diterima. Dalam pengawasan dan pelaporan SKPD yang terkait telah dicantumkan dalam dokumen RKL-RPL	
L.	**Jabonor (Ditjen Perhubungan Darat, Kementerian Perhubungan)**			
1.	Untuk angkutan baik pengangkut Limbah B3 maupun alat berat harus mempunyai izin penyelenggaraan angkuan dari Kementerian Perhubungan.	1-17	Pengangkutan limbah B3 akan dilakukan sesuai dengan peraturan perundangan.	
2.	Status jalan dan kelas jalan belum dicantumkan sehingga akan diketahui daya dukung jalan untuk menentukan jenis kendaraan yang digunakan untuk mobilisasi material.	2-93	Status jalan dan kelas jalan adalah jalan negara, jalan provinsi, jalan kabupaten, dan jalan proyek.	
3.	Dampak gangguan transportasi diusulkan sebagai kategori dampak penting.	3-8	Telah dilakukan kajian lalu lintas dalam AMDAL bahwa dampak gangguan lalu lintas bukan merupakan dampak penting. Namun dampak yang ditimbulkan akan tetap dikelola dan dipantau.	
M.	**Budi Prakosa (APMI)**			
1.	Tabel 1-2 rencana kegiatan dan komponen kegiatan; jumlah Wellpad ada 8 dan pada setiap wellpad maksimal terdapat 6 sumur. Namun pemboran 3-6 sumur produksi diperkirakan sudah mencukupi kebutuhan produksi steam. Dengan demikian kebutuhan sumur produksi maksimal diperkirakan sekitar 48 sumur produksi.	1-2	Jumlah sumur produksi akan disesuaikan dengan kebutuhan suplai *steam*.	
2.	Tabel 1-4 rencana pengembangan lapangan panas bumi Rantau Dedap; rencana pemboran 12 sumur di wellpad RD-C, RD-I, RD-L dan RD-M. 2 sumur injeksi di RD-B1 dan RD-B2; 5 sumur contingency di RD-N dan RD-X. Make up pada tahun 14 setelah COD 4 sumur dan 3 sumur make up tahun ke 24 setelah COD. Sehingga total rencana 26 sumur.	1-10	Jumlah sumur *make up* akan disesuaikan dengan kebutuhan.	
3.	Tabel 1-5 ringkasan rencana kegiatan pemboran 26 sumur termasuk 2 sumur injeksi di wellpad RD-E dan 2 sumur eksplorasi akan difungsikan sebagai sumur injeksi di Wellpad RD-B1 dan RD-B2, Tabel 1-12 diulang rencana pemboran 26 sumur. Mohon klarifikasi dari data tabel tersebut diatas berapa "rencana pemboran" sumur yang akan dibor pada kegiatan pengembangan lapangan Rantau Dedap ini?	1-12 1-30	Jumlah sumur akan disesuaikan dengan kebutuhan suplai *steam* dan injeksi.	

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4.	Mobilisasi alat dan material; peralatan dan material yang akan dikirim terdiri dari...5 item diulang pada halaman 1-23, sementara untuk peralatan pemboran hanya disebutkan pipa bor dan pipa selubung (casing) mohon ditinjau kembali?	1-22	Dokumen akan dilengkapi dengan mobilisasi peralatan pemboran.	
5.	Gambar 1-5 kegiatan pemboran pada Lapangan Panas Bumi Sumur produksi panas bumi memiliki kedalaman sekitar 1.500 – 3.000 meter. Pemboran sumur ini dapat dilakukan secara vertikal dan dapat juga dengan arah tertentu (*directional well*). Pertanyaannya berapa kapasitas/HP drilling rig yang akan digunakan dalam kegiatan pemboran ini dan juga peralatan penunjangnya? Antara lain seperti: mud logging unit, cementing unit, directional, wireline logging, solid control.	1-32	Kapasitas rig adalah 1.500-2.000 HP telah dilengkapi dengan peralatan penunjang pemboran seperti *mud logging unit, cementing unit, directional, wireline logging, solid control*, dll.	
6.	Penanganan gas; berapa Ppm kandungan H_2S yang direkam pada saat pemboran sedang berlangsung? Peralatan apa saja untuk mengantisipasi adanya paparan gas H_2S tersebut dan apakah telah dilakukan sosialsiasi kepada masyarakat sekitar mengingat hal ini belum disebutkan dalam; Penanganan keselamatan dan kesehatan kerja serta lindungan lingkungan. Mohon juga dilampirkan Flow Chart Emergency Response Plan beserta contact person dalam dokumen ANDAL ini.	1-14	Pemboran akan dilengkapi dengan peralatan H2S service untuk memantau secara *online* kadar gas H2S dan personel H2S service untuk mengatasi keadaan darurat H2S. Flow chart Emergency Response Plan sudah dilengkapi di dokumen ANDAL.	
7.	Penanganan limbah padat; mohon dicantumkan tabel volume perkiraan lumpur bor dan serpih bor yang digunakan ataupun dihasilkan per trayek sumur, demikian juga bahan kimia yang akan digunakan serta MSDSnya juga dilampirkan.	1-15	Secara teoritis, setiap lubang sumur akan menghasilkan 300 m3 serpih bor. Jumlah bahan kimia yang digunakan akan disesuaikan dengan kondisi sumur. MSDS bahan kimia telah tersedia.	
8.	Jadwal rencana kegiatan; tahap kegiatan konstruksi 2018-2020 selama 2 tahun, kegiatan ini termasuk pemboran sementara ada rencana tahun ke 14 dan ke 20 akan dilakukan pemboran 3 dan 4 sumur. Sehingga pemboran 2 tahun 26-7-2 = 17 sumur termasuk 2 sumur injeksi. Dari analisis 6 sumur eksplorasi (Tabel 1-3 halaman 1-9) perolehan kapasitas dan kualitas steam apakah target dapat dicapai tahap-1; 92 MW dan tahap selanjutnya 250 MW?	1-61	Target 92 MW telah diestimasi berdasarkan studi kelayakan proyek.	
9.	Perpipaan Dari beberapa tabel rencana kegiatan di atas tidak menemukan adanya kegiatan perpipaan apakah kegiatan ini tidak termasuk pada kegiatan konstruksi tetapi masuk dalam pembangunan power plant, mengingat juga tidak disebutkan ukuran pipa dan jenisnya serta pemasangannya di atas atau ditanam untuk menghubungkan dari sumur-sumur yang ada di wellpad masing-masing ke PLTP mohon klarifikasinya.	Gambar 1-13	Ukuran pipa telah dilengkapi. Pipa dipasang di atas permukaan tanah.	
10.	Sumber air dan kebutuhanya dan curah hujan menurun (Gambar 2-1 halaman 2-3)	1-34 2-3	Telah ada perhitungan debit air yang dibutuhkan untuk kegiatan pemboran, domestik dan power plant.	

No.	Saran/Masukan	Hal	Tanggapan	Hal
	Sumber air yang akan digunakan baik untuk pemboran, hidrotatik tes maupun injeksi belum disebutkan berapa debitnya khususnya musim kemarau dan apakah hanya dari Sungai Cawang Kiri dan Sungai Asahan dari Rantau Dedap diperkirakan mencukupi kebutuhan, mohon klarifikasi.			
11.	Tabel 1-15 perkiraan jumlah tenaga kerja tahap operasi dan konstruksi Tabel 1-8 Pada posisi: insinyur...36...pada keterangan terlatih, semi terlatih...mohon klarifikasi dan disebutkan kualifikasinya.	1-43	Telah dilengkapi.	
N.	**Yulita S (Direktorat Kesehatan Lingkungan, Kementerian Kesehatan)**			
1.	Disebutkan Rumah Sakit terdekat untuk rujukan Fasilitas gawat darurat disesuaikan dengan jenis pekerjaan dan kondisi lingkungan. Adanya SOP evaluasi jika terjadi kebakaran/bencana, pengelolaan limbah medis dapat bekerjasama dengan RS yang sudah mendapat izin kelola limbah medis seperti incinerator.	I-14	SERD telah memiliki SOP penanganan gawat darurat.	
2.	Gangguan kesehatan kesehatan masyarakat Debu akibat mobilitas kendaraan kendaraan mulai beroperasi di atas jam 9 pagi.	I-63	Mobilisasi kendaraan berat akan dikoordinasikan dengan instansi terkait.	
3.	Sumber air masyarakat dari mata air dan sumur gali, karena ada pembukaan lahan yang luas perlu diukur debit air sumur penduduk karena ketersediaan air disyaratkan: kualitas, kuantitas, kontinuitas dan keterjangkauan.	2-90	Kegiatan proyek SERD tidak memerlukan lahan terbuka yang luas dan tidak mengakibatkan dampak negative pada sumber air yang digunakan oleh masyarakat, karena lokasinya sangat jauh dari pemukiman.	
O.	**Tonny Wuryanto, S.Hut. (Direktorat Pemolaan dan Informasi Konservasi Alam, Ditjen Konservasi Sumber Daya Alam dan Ekosistem,Kementerian Lingkungan Hidup dan Kehutanan)**			
1.	Ditambahkan Nama Kawasan Hutan Lindung dan Luas Kawasan Hutan Lindung yang digunakan untuk Wilayah Kerja Panas Bumi tersebut.	1-2	Nama kawasan: Hutan Lindung Bukit Jambul Gunung Patah	
2.	Lokasi Pengusahaan Panas Bumi untuk PLTP Rantau Dedap berada di kawasan Hutan Lindung, maka diperlukan kehati-hatian dalam mengusahakan dan pengembangan supaya fungsi Hutan Lindung sebagai sistem penyangga kehidupan untuk mengatur tata air, mencegah banjir, mengendalikan erosi, mencegah intrusi air laut dan memelihara kesuburan tanah..		Saran telah diakomodasikan.	
3.	Tidak ada Hutan Suaka Alam Laut hanya Kawasan/ Hutan Suaka Alam	Peta 1-2	Legenda dalam peta sesuai dengan dokumen aslinya.	
4.	Rencana pembangunan jalan baru dan jalan eksisting di kawasan Hutan Lindung perlu diantisipasi dampak negatif berupa pembukaan lahan dan pembalakan liar. Disarankan untuk dibangun portal dan pos jaga serta dilakukan pejagaan untuk meminimalisir akses keluar masuk piha-pihak yang tidak berkepentingan.	1-24	Saran telah diakomodasikan.	
5.	Terdapat beberapa spesies dilindungi yang berhasil diidentifikasi antara lain Harimau Sumatera, Siamang, Surili, Landak, Rusa Sambar, Trenggiling, Kucing Kuwuk, Kangkareng Perut Putih, Tapir, Kambing Hutan Sumatera,	3-24, 25	Saran telah diakomodasikan.	

No.	Saran/Masukan	Hal	Tanggapan	Hal
	Beruang Madu, Ajak, maka perlu: - Perlu kehati-hatian untuk proses penanganannya apabila menjumpai satwa liar dan dilindungi tersebut dan tidak dilakukan perburuan yang bisa mengakibatkan ancaman pidana. - Upaya pencegahan dan penanganan terhadap konflik satwa liar dapat bekerjasama dengan Balai Konservasi Sumber Daya Alam Sumatera Selatan. - Melibatkan Polhut dari Balai KSDA Sumatera Selatan pada saat pelaksanaan kegiatan pembangunan/ konstruksi di lapangan. - Pengerjaan pembangunan proyek/ konstruksi di lapangan hanya dilakukan pada siang hari dengan pertimbangan bahwa sebagian besar satwa liar baik yang dilindungi maupun tidak dilindungi merupakan satwa nocturnal.			
6.	Meminimalisir kegiatan penebangan pohon dan hanya dilakukan pada area yang akan dipergunakan.	3-21	Saran diterima.	
P.	**Irzal Azhar (Dit. KKH, KLHK)**			
1.	Kolom metoda pengumpulan dan analisa data D.2 → memakai camera trap Saran: untuk peningkatan habitat tidak memakai camera trap.	RKL-RPL 3-8	*Camera trap* merupakan salah satu metode pemantauan selain pengamatan langsung, jaring, wawancara, dll.	
2.	Kolom indikator/parameter C.1 → mengacu kepada PP 7/199 Ditambahkan list CITES untuk fauna.	RKL-RPL 3-13	Telah ditambahkan.	
3.	Lengkapi status konservasi → list CITES belum lengkap, endemik.	2-61 2-62	Telah ditambahkan.	
4.	Peta 2-10, tidak ada panthera bengalensis, harusnya panthera tigris		Telah diperbaiki.	
5.	Pada tabel → berbalik atua tidak berbalikny dampak Kegiatan rehabilitasi diusahakan sama dengan rona awal. Kadang-kadang karena terbuka memudah IAS (Invasive Asing Species) berkembang.	3-25	Kalimat sudah dikoreksi sesuai dengan saran. Saran mengenai rehabilitasi diterima.	
6.	Ada koridor? Perlu dibuat koridor satwa karena ada habitat yang hilang seluas 125 ha dan memotong jalur habitat satwa liar untuk home rangenya.		Akan disesuaikan dengan kondisi di lapangan.	
Q.	**Sriwati (Direktorat Pengukuhan dan Penatagunaan Kawasan Hutan, KLHK)**			
1.	Dalam kehutanan (hutan lindung) tidak dikenal istilah "membebaskan lahan" diganti "menggunakan lahan" kepastian lahan/kawasan yang digunakan di Kabupaten Muara Enim, Kabupaten Lahan dan Kota Pagar Alam di Provinsi Sumatera Selatan: ● Dibuat tabel luas penggunaan kawasan hutan lindung per kabupaten tidak menyebut gelondongan. ● Nama hutan lindung yang digunakan Contoh: hutan lindung bukit dingin	1.2.1.4 1-19	Istilah "membebaskan lahan" diganti dengan "menyediakan" di bagian 1.2.1.4. ● Tabel 1-9 yang berisi detil kebutuhan lahan telah dilengkapi dengan informasi kawasan kabupaten. ● Nama hutan lindung yang digunakan adalah Hutan Lindung Bukit Jambul Gunung Patah. ● Seluruh peta telah dilengkapi dengan sumber data spasial dan sesuai dengan kaidah perpetaan.	

No.	Saran/Masukan	Hal	Tanggapan	Hal
	Hutan lindung Muasa Musi, dan sebagainya ● Sumber peta menggunakan peta kawasan hutan Peta RBI; rencana lokasi kegiatan. ● Membuat peta/lampiran peta/menggambarkan peta sesuai kaidah perpetaan Permen Kepala Badan Informasi Geospasial No. 15 Tahun 2014 tentang Pedoman Teknis Ketelitian Peta Dasar. AMDAL pra syarat untuk menerbitkan izin pinjam pakai kawasan hutan, mengapa dalam Tabel 1-7, sudah mencantumkan IPPKH di Kementerian Kehutanan telah selesai.		● Tabel 1-7 telah diperbaiki.	
2.	Sebagian besar lahan hutan lindung yang "dibebaskan". "Perlu klarifikasi kebun kopi milik siapa?" masyarakat legal atau ilegal? Status kepemilikan. Perlu inverisasi kebun masyarakat.		Lahan hutan lindung yang digunakan proyek akan dilakukan proses pinjam pakai.	
R.	**Yuli Utami (Ditjen Pengendalian DAS dan Hutan Lindung, KLHK)**			
1.	Data topografi wilayah kajian kurang jelas/tidak konsisten hal. 2-8: daerah kajian adalah daerah datar dengan lereng 3-8%.	2-8	Saran telah diakomodasikan.	
2.	Menyebutkan bahwa wilayah kajian terdiri dari 3 satuan geomorfologi: ● Morfologi perbukitan curam dengan lereng 25-40% ● Morfologi perbukitan landai dengan lereng 15-20% ● Morfologi pendataran 0-8%	2-11	Saran diterima. Deskripsi morfologi telah dilengkapi sesuai saran di bagian 2.1.1.6.	
3.	Sementara wilayah kajian berada pada 1000-2600 m dpl areal pada ketinggian tersebut biasanya mempunyai lereng yang tinggi. Hal ini lebih dikuatkan dengan peta lereng yang menunjukkan luasnya wilayah yang berwarna merah dan merah muda, wilayah yang curam dan sangat curam. Saran: luas masing-masing lereng dihitung dengan cermat, karena hal ini sangat penting untuk menghitung erosi saat ini maupun erosi pada saat kegiatan dilakukan.	2-11	Seluruh informasi morfologi sesuai dengan paparan dan peta di bagian 2.1.1.6.	
4.	Jenis tanah, tidak diuraikan jenis tanah apa saja yang ada di daerah kajian dengan luasannya karena sangat penting untuk menghitung erosi.	2-40	Informasi detil mengenai karakteristik tanah dapat dilihat di bagian 2.1.1.10 di Tabel 2-10.	
5.	Memperhatikan lokasi kajian yang berada pada ketinggian 1000-2600 mdpl, dengan curah hujan 10 tahunan yang sangat tinggi: 2660 mm/th, tanah andosol yang sifatnya peka terhadap erosi, maka saya menduga erosinya cukup tinggi, namun data/perhitungannya: Sungai Endikat sebelum 7 sesudah 54 Sungai Endikat kiri sebelum 8 sesudah 38 ● Nilai ini rendah sekali, cara menghitungnya tidak jelas. ● Menghitung erosi di sungai? Bagaimana? Yang dihitung/diukur di sungai adalah sedimentasi bukan erosi. ● Dalam menghitung erosi suatu wilayah, tidak ditotal/dijumlahkan tetapi dihitung dengan erosi rata-rata tertimbang.	3-13	● Perhitungan erosi dengan detil dapat dilihat di 3.1.3.1. ● Terima kasih untuk koreksinya. Perbaikan telah dilakukan di dokumen. ● 115 Ha adalah wilayah hutan lindung telah diterbitkan izin pinjam pakai sementara wilayah APL yang telah dibebaskan hanya 9,5 Ha. Jika dilihat dari skala WKP, sekitar 31.545 Ha merupakan wilayah HL. Dengan demikian, sebagian besar wilayah proyek dilakukan di wilayah hutan lindung dengan potensi gangguan aktivitas lain sangat kecil sehingga tidak berdampak ke erosi dan sedimentasi.	

No.	Saran/Masukan	Hal	Tanggapan	Hal
	● Meskipun di wilayah kajian terdapat hutan lindung ±115 ha, tapi sebagian besar dari 35.460 ha adalah APL, jadi nilai erosi saat ini dan setelah kegiatan estimasinya lebih besar (pada tahap penyiapan lahan, pembukaan lahan, pengupasan lahan).			
6.	Di daerah ini ada yang termasuk di daerah resapan air, mohon agar daerah ini dijaga.	2-1	Saran diterima.	
7.	Data debit di DAS Lemalang = 315,8 m^3/det, edangkan di anak sungai 3 m^3/det, sedangkan di halaman 3.16 data debit limpasan 9,5 m^3/s dan pada saat kegiatan 95,33 m^3. ● Data ini tidak konsisten ● Perlu menghitung Qmax dan Qmin pada kondisi saat ini dan prakiraan Qmax sehingga dapat dinilai bagaimana kondisi tata air akibat adanya kegiatan ini.	2-24	Yang dimaksud dengan debit DAS Lemalang merupakan debit total. Yang dimaksud dengan debit limpasan di kalimat tersebut adalah debit limpasan air permukaan yang masuk ke sungai, sehingga berbeda dengan debit anak sungai.	
8.	Nilai sedimentasi belum dihitung Nilai aktual = dilakukan di laboratorium Nilai produksi sedimentasi = erosi x SDR Erosi adalah non point source SDR adalah Sediment Delivery Ratio yang nilainya tergantung luas DAS. Saran: perhitungan erosi dan aliran permukaan diulang! Dan dilakukan lebih cermat.		Terima kasih untuk informasinya.	
9.	Pengelolaan lingkungan untuk pengendalian erosi dan sedimentasi apakah benar akan membangun saluran irigasi yang dilengkapi dengan sedimen trap seperti pada gambar di halaman 2.6 Saran: ● Pembuatan gully plug (bangunan terjunan) ● Bangunan pengendali sedimen (sedimen trap) ● Dam penahan sederhana ● Pada areal yang baru terbuka ditanami tanaman pionier, mengingat kesuburan tanah di wilayah kajian rendah (kandungan C rendah, N rendah, pH rendah), setelah kondisi tanah membaik baru ditanam pohon-pohon. Untuk indikator keberhasilan pengelolaan LH adalah Permenhut 61 Tahun 2014 dan Keputusan Dirjen RUPS P04 Tahun 2009 (bukan SK Dirjn RRL No. 41/1998).	RKL 2-6	Terima kasih untuk masukannya. Saran diterima.	
10.	● Pengendalian laju aliran permukaan secara negatif. ● Indikator keberhasilan LH adalah Permenhut 61 Tahun 2014 dan Kep Dirjen RUPS P. 04 Tahun 2009 Karena di dokumen RKL, indikatornya adalah mengendalikan laju erosi sesuai Kep Dirjen RRL No. 041 Tahun 1998	RKL 2-7	Terima kasih untuk masukannya. Saran diterima.	

No.	Saran/Masukan	Hal	Tanggapan	Hal
	Demikian juga dengan pengendalian kualitas air khususnya parameter TSS atau sedimentasi.			
11.	RPL ● Pemantauan erosi dan sedimentasi → indikator parameter sama dengan di RKL. ● Metoda pemantauan sedimentasi: mengambil sampel air secara langsung dan dianalisis di laboratorium. ● Metode pemantauan erosi dengan menghitung Erosi = sedimen / SDR Sedimen diukur di laboratorium sebagaimana butir b SDR: Sedimen Delivery ratio ● Pengawas apa bisa di tambah Ditjen PDASHL	3-3	Terima kasih untuk sarannya.	
S.	**Faisal M (Direktorat Kemitraan Lingkungan, Dirjen Perhutanan Sosial dan Kemitraan Lingkungan, KLHK)**			
1.	Bagaimana dengan penggunaan hutan lindung, walaupun masih diperbolehkan menurut P. 16/Menhut-II/2014 tetapi harus memiliki ijin dan tidak merubah bentang alam secara keseluruhan.	I-3	PT SERD telah memiliki IPPKH untuk kegiatan eksplorasi.	
2.	Selain SOP K3LL yang biasa dilakukan PT. juga perlu ada alat peringatan dini dan jalur evakuasi bencana, ini tidak saja diwilayah ekolistik tapi di wilayah masyarakat rawan bencana.	I-14	SERD telah memiliki SOP evakuasi bencana alam untuk karyawan mau pun masyarakat.	
3.	Penanganan limbah padat harus dikelompokkan berdasarkan jenis limbahnya tidak harus semua diangkut ke TPA, dan jika ada limbah B3 harus dikelola sesuai dengan jenis limbahnya dan tidak boleh dikirim ke TPA.	I-15	Saran diakomodasikan dan telah tercantum dalam dokumen	
4.	Informasi dan sosialisasi dengan masyarakat sekitar.	2-75	Sosialiasi dengan masyarakat sekitar telah dilakukan sebelum studi AMDAL dilakukan, dan akan terus dilakukan melalui berbagai media.	
5.	Tingkat kehati di lokasi bernilai tinggi terutama pada hutan lindung alami, sehingga perlu perlakuan khusus untuk memperoleh masalah.	2-46	Telah dilakukan studi biodiversitas dan cara antisipasi.	
6.	Perlu ada tanggapan dari masyarakat terhadap proyek yang dimaksud terutama pada 4 desa yang berdampak langsung dan apa upaya PT untuk merespon persepsi masyarakat.	2-90	PT SERD telah memiliki SOP penanganan keluhan masyarakat (*grievance mechanism*) serta program CSR.	
7.	Batas sosial, dimana adat istiadat masyarakat setempat, tentunya PT harus ada upaya-upaya berkoordinasi secara sosial dan religius guan menghindari konflik sosial.	2-87	Saran diterima.	
8.	Gangguan transportasi Lalu lintas jalan tidak berdampak tetapi kerusakan jalan penduduk perlu diperhatikan agar tidak berdampak secara sosial.	3-8	Saran diterima.	
9.	Kuisioner Hanya dua orang yang diwawancara apa ini bisa mewakili persepsi masyarakat (4 Desa).		Kuesioner yang dilampirkan hanya sebagai contoh kuesioner yang sudah terisi pada saat survey.	

No.	Saran/Masukan	Hal	Tanggapan	Hal
10.	Kesehatan masyarakat Mengingat daerah sekitar operasional perusahaan hanya ada puskesmas pembantu, apa mungkin jikalau PT dapat menaikkan status puskesmas tersebut melalui peningkatan kapasitas peralatan dsb, toh nanti peralatan puskesmas juga bisadigunakan oleh karyawan PT.		PT SERD akan menyediakan klinik untuk karyawannya dan bekerjasama dengan puskesmas terdekat.	
11.	Jika ada CSR perusahaan bisa diarahkan ke CSR bidang lingkungan dan kehutanan dengan tujuan masyarakat dapat malakukan pelestarian LHK atau jika daerah setempat memiliki sumber energi yang terbatas apa memungkinkan PT dapat memberikan kontribusi energi listrik bagi massyarakat sekitar.		Transmisi dan distribusi listrik merupakan kewenangan PLN.	
T.	**Munawar (Dit. Penatagunaan Tanah, Kementerian ATR/BPN)**			
1.	Terkait kebutuhan lahan untuk kegiatan pengusahaan panas bumi untuk PLTP di Sumatera Selatan oleh PT SERD seluas 124,5 ha (115 ha merupakan kawasan hutan dan 9,5 ha berupa APL), mengingat lahan yang berada di APL telah dibebaskan dari masyarakat maka agar segera ditindak lanjuti dengan proses administrasi pertanahannya.	1-19	Lihat Tabel 1-7. Untuk lahan masyarakat yang di APL telah selesai dilakukan pembebasan lahan	
2.	Khusus untuk kebutuhan lahan di APL seluas 9,5 ha untuk pembangunan fasilitas pendukung: ● Agar diperjelas dan dirinci lagi fasilitas pendukung apa saja yang akan dibangun. ● Lokasi fasilitas-fasilitas pendukung secara detil dalam satuan wilayah administasi desa, kecamatan ataupun kabupaten/kota. ● Rencana fasilitas-fasilitas pendukung terebut agar diplot dalam peta rencana kegiatan. ● Agar dilakukan kajian dan analisis sosial dengan penggunaan tanah terbaru, termasuk jumlah penduduk yang terkena dampak.	1-14	Lahan di APL seluas 9,5 Ha digunakan untuk fasilitas jalan dan *camp*.	
3.	● Kajian kesesuaian dengan tata ruang agar disesuaikan lagi dengan Perda RTRW yang digunakan dalam sub pokok bahasan 1.1.2 disebutkan kajian kesesuaian rencana kegiatan dengan RTRW Provisi Sumatera Selatan menggunakan Perda No. 14 Tahun 2006, sementara lampiran peta RTRW yang digunakan adalah RTRW Provinsi Sumatera Selatan 2012-2032 (sumber/nomor perda tidak disebutkan). ● Demikian juga untuk kajian dan lampiran peta RTRW Kabupaten Muara Enim dan Kota Pagar Alam (tidak dilampirkan).	1-2	Telah diperbaiki.	
4.	Peta-peta yang digunakan untuk analisa dan kajian agar dilampirkan dalam dokumen serta peta-peta tersebut agar disesuaikan dengan kaidah/prinsip kartografi baik untuk skala, legenda, layout maupun sumber data/petanya.		Semua peta di dokumen telah sesuai dengan kaidah kartografi	
U.	**Dita Arif Yuwana (Pusat Sumber Daya Air Tanah dan Geologi Lingkungan (PAG), Kementerian ESDM)**			
1.	Dijelaskan penanggung jawab kegiatan dan anggota tim penyusun.	I-9	Setiap anggota tim penyusun dokumen dan pemrakarsa memiliki	

No.	Saran/Masukan	Hal	Tanggapan	Hal
	Termasuk Ahli Geologi dalam Tim Penyusun, dikarenakan diperlukan kompetensi kegeologian dalam penyusunan.		kompetensi keilmuan, termasuk dalam bidang geologi.	
2.	Dijelaskan/ditambahkan di dalam tabel 1-26; parameter untuk erosi dan sedimentasi, serta parameter untuk perubahan laju air permukaan.	I-62	Saran telah diakomodasikan.	
3.	Peta-peta maupun gambar yang disajikan agar lebih jelas da tajam gambarnya.	II-10	Saran telah diakomodasikan.	
4.	Perlu ditambahkan pola DAS (Daerah Aliran Sungai) di Wilayah tersebut untuk menjelaskan arah aliran air dari zona imbuhan sampai zona lepasannya secara regional di Rona Awal (Peta DAS). Agar ada konsentrasi tangkapan dipembahasan metodologi III-12 (gambar 3-3) dengan (Peta 2-5).	II-25	Saran telah diakomodasikan.	Peta Das
5.	Dijelaskan di daerah tangkapan, kondisi eksisting masih berupa hutan atau sudah sebagian dimanfaatkan untuk perkebunan rakyat khusus di jalur-jalur tapak, pipa dan sekitarnya. Karena terkait dengan kemungkinan berkurangnya debit ataupun peningkatan kerentanan gerakan tanah.	II-11	Saran telah diakomodasikan.	
6.	Perlu ditambahkan erosi dan sedimentasi; sera laju limpasan air permukaan sebagai dampak penting ketika operasi. Melihat kasus longsor pipa panas bumi di Pengalengan akibat longsor yang mengakibatkan kerugian lingkungan.	IV-2	Sesuai dengan kajian dampak penting, dampak erosi dan sedimentasi serta laju limpasan air permukaan pada tahap operasi tidak termasuk dampak penting.	
7.	Terdapat ketidak konsistenan jumlah dampak penting yang dikelola dengan dampak penting yang dipantau (di Tahap Konstruksi).	2-3 RKL dengan 3-2	Saran telah diakomodasikan.	
8.	a. Dijelaskan lokasi pengelolaan, jumlah titik beserta koordinatnya b. Dijelaskan lebar dan panjang konstruksi batu, saluran irigasi yang akan dibangun c. Dijelaskan kerapatan/jarak antar pohon untuk menahan sedimentasi/erosi	2-6 RKL	a. Lokasi pengelolaan akan dilakukan b. PT SERD membangun saluran drainase, bukan saluran irigasi karena tidak berada dalam wilayah pertanian, telah diperbaiki c. Karapatan antar pohon akan disesuaikan dengan kebutuhan dan luasan areal yang akan ditanam	
9.	Jelaskan lokasi sumur resapan dan biopori beserta jumlah dan koordinatnya. Peletakan harus benar agar sumur/biopori tidak menjadi pemicu longsor di kelerengan.	2-7 RKL	Tidak ada sumur resapan mau pun biopori di lokasi proyek.	
10.	a. Frekuensi perubahan erosi dan sedimen, serta perubahan limpasan Air permukaan, pemantauan tiap empat bulan dan dijelaskan lokasi koordinat dan jumlah titik pantau b. Jelaskan metode Petak Kecil, karena tidak dijelaskan di dalam Andal dan disinggung di RPL c. Jelaskan *cacthpond* lokasinya kordinatnya.		a. Pemantauan erosi dan sedimentasi dilakukan sepanjang proyek berlangsung. b. Metode dijelaskan dalam dokumen. c. Lokasi catchpond adalah pada drainase sebelum air limpasan dialirkan ke badan penerima.	
V.	**Dwi Prabowo YS, S.Si, M.Sc., Ph.D (Dit. KPHL, KLHK)**			
1.	• Penentuan nilai K pada studi ini hanya menggunakan parameter tekstur tanah. • Seharusnya penentuan nilai K harus mengikuti prosedur standar menggunakan nomogram nilai K dengan parameter: - Tekstur tanah (3 fraksi)	3-11 s.d 3-16	K = Indeks kepekaan tanah terhadap erosi (erodibilitas), memang dipengaruhi oleh tekstur tanah (terutama kadar debu + pasir halus, bahan organic, struktur dan permeabilitas tanah (Hardjowigeno, 2003). Penghitungan telah mengikuti prosedur standar.	

No.	Saran/Masukan	Hal	Tanggapan	Hal
	- Bahan organik - Permeabilitas tanah - Struktur tanah.			
2.	● Data hujan untuk perhitungan nilai R (erosivitas hujan) alur perhitungan erosi dari nilai I (Intensitas hujan) → dalam perhitungan debit puncak → tidak disebutkan darimana sumbernya. durasi/periode pengukuran juga tidak disebutkan. ● Saran: Untuk menyebutkan sumber data pengukuran dari stasiun mana? Lokasi koordinat? Elevasi? Durasi hujan yang digunakan berapa tahun?		Indeks erosivitas dihitung dengan rumus matematis yang digunakan oleh Levain (DHV, 1989 dalam Asdak, 1995): R = 2.21 * P1.36 dimana: R = Indeks Erosivitas Curah hujan P = Curah hujan Bulanan (cm) Berdasarkan data curah hujan, rata-rata curah hujan bulanan tertinggi terjadi pada bulan November dengan intensitas sebesar 355 mm (35.5 cm). Dari intensitas curah hujan tersebut diperoleh nilai Erosivitas hujan sebesar 283,6. Sumber data curah hujan yang digunakan berasal dari Stasiun Pos Hujan Pagar Alam yang juga digunakan sebagai sumber data curah hujan di rona awal. Ini merupakan stasiun pengukuran curah hujan dengan data terlengkap yang berlokasi dekat dengan proyek. Durasi hujan yang digunakan 10 tahun.	
3.	Penentuan faktur C (koefisien run off) → tidak jelas apakah untuk skoring?		Penentuan faktor C sudah sesuai dengan prosedur standar.	
4.	Rencana pengelolaan lingkungan hidup ● Penurunan laju erosi dan sedimentasi ● Penurunan laju limpasan permukaan ● Saran: pemilihan jenis tanam untuk kegiatan RHL harus menggunakan jenis-jenis endemik. ● Ketika dalam tahap persiapan lahan, jenis-jenis endemik harus diindetifikasi. Anakan tanaman dari jenis endemik tersebut harus diamankan (dengan membangun fasilitas persemaian/pemeliharaan bibit), sehingga dapat ditanam kembali dalam kegiatan RHL.	RKL-RPL 2-22	Saran telah diakomodasikan.	
5.	Pemantauan lingkungan ● Pemantauan debit dan sedimen hendaknya dilakukan secara reguler (time series) pada lokasi outlet yang sama. ● Penentuan outlet sedemikian rupa sehingga catchment areanya adalah didominasi oleh area yang mengalami perubahan lingkungan karena kegiatan konstruksi. ● Pemantauan debit secara reguler hendaknya menggunakan AWLR	RKL-RPL 3-3	Pemantauan debit sungai akan dilakukan secara reguler.	

No.	Saran/Masukan	Hal	Tanggapan	Hal
	(Automatic Water Level Recorder)			
W.	**Faisal M Taqin (Dit. Kemintraan Lingkungan, KLHK)**			
1.	Bagaimana dengan penggunaan hutan lindung, walaupun masih diperbolehkan menurut P. 16/Menhut-II/2014 tetapi harus memiliki izin dan tidak merubah bentang alam secara keseluruhan.	1-3	Untuk kegiatan pengembangan panas bumi, penggunaan area hutan akan menggunakan IPPKH.	
2.	Selain SOP K3LL yang biasa dilakukan PT juga perlu ada alat peringatan disini dan jalur evakuasi bencana, ini tidak saja di wilayah eksisting tapi di wilayah masyarakat.	1-14	Perusahaan telah memiliki mekanisme penanganan bencana bagi perusahaan mau pun masyarakat.	
3.	Penanganan limbah padat harus dikelompokan berdasarkan jenis limbahnya tidak harus semua diangkut ke TPA dan jika non Limbah B3 harud dikelola sesuai dengan jenis limbahnya dan tidak boleh dikirim ke TPA.	1-15	Saran diterima. Telah dicantumkan dalam dokumen	
4.	Informasi dan sosialisasi dengan mayarakat sekitar.	2-75	Saran diterima dan telah dilakukan sosialisasi	
5.	Tingkat kehati di lokasi bernilai tinggi terutama pada hutan lindung alami, sehingga perlu perlakuan khhusus untuk memproteksi masalah.	2-46	Saran diterima.	
6.	Perlu ada tanggapan dari masyarakat terhadap proyek yang dimaksud, terutama pada 4 desa yang berdampak langsung dan apa upaya perusahaan untuk merespon persepsi masyarakat.	2-90	Telah dilakukan konsultasi publik.	
7.	Dampak sosial, dimana adat istiadat masyarakat setempat, tentunya perusahaan harus ada upaya-upaya berkontribusi secara sosial dan religius guna menghadapi konflik sosial.	2-87	Perusahaan telah memiliki mekanisme penanganan masalah sosekbud.	
8.	Gangguan transportasi Lalu lintas jalan tidak berdampak tetapi kerusakan jalan penduduk perlu diperhatikan agar tidak berdampak secara sosial.	3-8	Pengelolaan gangguan transportasi telah dicantumkan dalam RKL RPL.	
9.	Kuesioner Hanya 2 orang yang diwawancara, apakah ini bisa mewakili persepsi masyarkat (4 desa berdampak penting).		Dua contoh kuesioner yang dilampirkan dalam dokumen merupakan perwakilan dari semua responden yang diwawancarai.	
10.	Kesehatan masyarakat Mengingat daerah sekitar operasional perusahaan hanya ada puskesmas pembantu, apa memungkinkan jika perusahaan dapat menaikan status puskesmas tersebut melalui peningkatan kapasitas peralatan dan sebagainya, karena nanti peruntukan puskesmas juga bisa digunakan oleh karyawan perusahaan.		Cek jawaban S #10.	
11.	Jika ada CSR perusahaan bisa diarahkan ke CSR bidang lingkungan dan kehutanan dengan tujuan masyarakat dapat membantu kelestarian LHK atau juka daerah setempat memiliki sumber energi yang tersimpan apa memungkinkan perusahan dapat memberikan instalasi energi listrik bagi masyarakat.		Saran dipertimbangkan.	
X.	**Agus Hartono dan R. Ramayani (Dirjen Perkebunan, Kementerian Pertanian)**			
1.	Tahap pra konstruksi	1-19	Rincian telah diperbaiki.	Tabel 1-7.

No.	Saran/Masukan	Hal	Tanggapan	Hal
	Kompensasi lahan PT. SERD telah membebaskan lahan seluas ± 79,50 ha terdiri 70 ha areal hutan (IPPKH) dan 9,5 ha lahan milik penduduk. Yang terdapat pada tabel 69,4 → areal hutan ; 9,5 → APL. Proses pengembangan = 35,5 hutan → total 115 ha dari luasan lahan 35,5 ha Hutan lindung = APL = Mohon rincian.			
2.	Penyiapan lahan Lokasi terdampak 1. Perkebunan kopi 2. 9-10 desa 3. Pertanian Bagaimana desa-desa yang penduduk bermukim secara permanen dan sedang giat-gianya melaksanakan aktivitas seperti pertanian tanaman pangan, perkebunan kopi ataupun kegiatna lainnya yang berbatasan/bersinggungan bahkan terkena dampak langsung maupun tidak langsung dengan lokasi tersebut: 1. Apakah akan direlokasi desa/lahan tersebut. 2. Kalau tidak direlokasi apakah ada jaminan keamanan. 3. Bagaimana dengan nasib petani/pekebun yang kehilangan mata pencahariannya, apakah diberikan jaminan/kesempatan kerja. 4. Apakah diberikan ganti rugi baik untuk desa maupun lokasi tersebut yang sesuai/layak. 5. Dalam hal pembebasan lahan perlu dilakukan dengan pendekatan-pendekatan sosial budaya agar dikemudian hari tidak ada konflik/gangguan usaha terhadap proyek tersebut. 6. Pembebasan tanaman kopi yang telah berubah peruntukannya dari hutan lindung menjadi tanaman kopi perlu diperkuat dengan surat-surat perubahan status lahan agar dikemudian hari tidak terjadi konflik. 7. Pengembalian lahan Lahan pengusahaan panas bumi akan dikembalikan kepada negara dan/atau dijual kepada pihak ketiga apabila sudah tidak diperlukan lagi? Perlu diketahui bahwa lahan yang terkena dampak sebagian besar 70 ha didalam lahan pinjam pakai yang tidak bisa dijual belikan.	1-20	1. Tidak ada kegiatan relokkasi desa terkait dengan pembebasan lahan 2. Real masyarakat yang berada di APL yang dibebaskan seluas 9,5 Ha yang digunakan oleh PT SERD untuk keperluan jalan akses dan Camp. 3. Tidak ada petani yang kehilangan mata pencaharian sebagai petani kopi 4. Kegiatan pembebasan lahan di APL sudah selesai dilakukan pada tahap eksplorasi. Sedangkan pada tahap konstruksi dan operasi, PTSERD akan meminta IPPKH untuk lahan hutan yang akan digunakan sebagai areal proyek 5. Dari kegiatan pembebasan lahan yang sudah selesai dilakukan tidak muncul konflik/gangguan terhadap keberadaan proyek 6. Perubahan status lahan hutan yang sudah menjadi lahan perkebunan masyarakat menjadi tanggung jawab pemda setempat untuk merubahan status lahan dari areal hutan menjadi APL 7. Lahan yang berstatus hutan lindung akan dikembalikan ke negara	

KEMENTERIAN LINGKUNGAN HIDUP DAN KEHUTANAN
DIREKTORAT JENDERAL PLANOLOGI KEHUTANAN DAN TATA LINGKUNGAN
DIREKTORAT PENCEGAHAN DAMPAK LINGKUNGAN USAHA DAN KEGIATAN
Gedung A Lt 6 Jl. DI Pandjaitan Kav 24, Kebon Nanas – Jakarta Timur 13410
Telepon (021) 85904925; Faksimile 85906168

Nomor : Un. 399 /PDLUK/PAUT/PLA.4/9/2016 14 September 2016
Lampiran : -
Hal : Undangan Presentasi

Yth.
VP Relation& SHE
PT. Supreme Energy Rantau Dedap (SERD)
Menara Sentraya Lantai 23
Jl. Iskandasyah Raya No 1A, Kebayoran Baru
Jakarta 12160

Dalam rangka pelaksanaan rapat Tim Teknis Komisi Penilai AMDAL Pusat untuk penilaian dokumen ANDAL, RKL-RPL, rencana kegiatan Pengusahaan Panas Bumi untuk PLTP Rantau Dedap dengan Kapasitas 250 MW (Pergeseran Lokasi *Power Plant* dan Penambahan Tapak Pemboran) yang berlokasi di Kabupaten Muara Enim, Kabupaten Lahat, dan Kota Pagar Alam, Provinsi Sumatera Selatanoleh PT. Supreme Energy Rantau Dedap (SERD), bersama ini di harapkan kehadiran Saudara untuk mempresentasikan dokumen tersebut dalam rapat Tim Teknis Komisi Penilai AMDAL Pusat yang akan diselenggarakan pada:

Hari/tanggal : Selasa, 27 September 2016
Waktu : 09.00 WIB – selesai
Tempat : Ruang rapat Fokker Lantai 2
Club Eksekutif Persada
Jl Raya Protokol Halim Perdana Kusuma
Jakarta Timur

Mengingat pentingnya acara ini, diharapkan agar Saudara dapat hadir tepat pada waktunya.

Atas perhatian dan kerjasama Saudara diucapkan terima kasih.

Direktur Pencegahan Dampak Lingkungan
Usaha dan Kegiatan,
Selaku
Sekretaris Komisi Penilai AMDAL Pusat

Ir. Ary Sudijanto, M.SE.
Nip. 19681011 199403 1 001

Tembusan:
Direktur Jenderal Planologi Kehutanan dan Tata Lingkungan (sebagai laporan);.

KEMENTERIAN LINGKUNGAN HIDUP DAN KEHUTANAN
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Nomor : Un. 400 /PDLUK/PMDS/PLA.4/9/2016 14 September 2016
Lampiran : Satu set dokumen
Hal : Undangan Rapat Tim Teknis

Yth.
Bapak/Ibu (Daftar terlampir)

Di
Tempat

Sehubungan dengan telah diterimanya dokumen ANDAL, RKL-RPL, rencana kegiatan Pengusahaan Panas Bumi untuk PLTP Rantau Dedap dengan Kapasitas 250 MW (Pergeseran Lokasi *Power Plant* dan Penambahan Tapak Pemboran) yang berlokasi di Kabupaten Muara Enim, Kabupaten Lahat, dan Kota Pagar Alam, Provinsi Sumatera Selatanoleh PT. Supreme Energy Rantau Dedap (SERD), maka bersama ini kami mengundang Bapak/Ibu selaku Anggota Tim Teknis Komisi Penilai AMDAL Pusat untuk dapat hadir dan memberikan Saran, Pendapat, Tanggapan dalam penilaian dokumen tersebut dengan berfokus pada proses pelingkupan dan metode Studi sesuai bidang keahliannya. Selanjutnya Rapat Tim Teknis Komisi Penilai AMDAL Pusat akan dilaksanakan pada:

Hari/tanggal : Selasa, 27 September 2016
Waktu : 09.00 WIB – selesai
Tempat : Ruang rapat Fokker Lantai 2
Klub Eksekutif Persada Purnawira Halim
J l. Raya Protokol Halim Perdana Kusuma
Jakarta Timur 13610

Mengingat terbatasnya waktu dalam memberikan tanggapan hasil penilaian dokumen tersebut, maka untuk Saran, Pendapat, Tanggapan yang bersifat tertulis, dapat kami terima selambat-lambatnya pada tanggal 27 September 2016 dan disampaikan kepada Sekretariat Komisi Penilai AMDAL Pusat Kementerian Lingkungan Hidup dan Kehutanan melalui fax: 021.85906168-85904925 dalam format word atau diemailkan ke alamat: amdal.komisi@gmail.com

Mengingat pentingnya acara tersebut di atas, kami mohon kehadirannya tepat pada waktunya. Atas perhatian dan kerjasamanya diucapkan terima kasih.

Direktur Pencegahan Dampak Lingkungan
Usaha dan Kegiatan,
Selaku
Sekretaris Komisi Penilai AMDAL Pusat

Ir. Ary Sudijanto, M.SE.
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Tembusan:
Direktur Jenderal Planologi Kehutanan dan Tata Lingkungan (sebagai laporan);

Lampiran Undangan
Nomor : Un. 400/PDLUIC/PANTI/PLA.4/9/2016
Tanggal : 14 September 2016

Daftar Undangan Anggota Tim Teknis

Pakar:

1. Ir. Pri Utami, M.Sc (Pakar Geothermal)
2. Prof. Dr. Dipl-Ing. Ir. Reynaldo Zoro (Pakar Listrik Arus Kuat)
3. Dr. Agus Guntoro (Pakar Geologi)
4. Dr. Ir. Arie Herlambang, MS (Pakar Hidrologi)
5. Prof. Dr. Ir. Kardono, M.Eng (Pakar Udara)
6. Prof. Dr. Dody Prayogo, MPS.t (Pakar Sosial)
7. Prof. DR. Ir. Djoko Darwanto Gitokarsono (Pakar Radiasi Elektromagnetik)
8. Dr. Ir. Agus Priyono Kartono, M.Si (Pakar Kehutanan *Biodiversity*)
9. Prof. Dr. Linawati Hardjito, Msc (Pakar Kualitas Air)

Pusat:

1. Direktur Jenderal Penataan Ruang, Kementerian Agraria dan Tataruang
2. Direktur Jenderal Penataan Agraria, Kementerian Agraria dan Tataruang
3. Deputi Koordinasi Bidang Infrastruktrur dan Pengembangan Wilayah Bidang Perekonomian, Kementerian Perekonomian
4. Direktorat Jenderal Bina Pembangunan Daerah, Kementerian Dalam Negeri
   up. Direktur Sinkronisasi Urusan Pemerintahan Daerah I
5. Direktur Jenderal Ketenagalistrikan, Kementerian Energi dan Sumber Daya Mineral
   u.p Direktur Teknik dan Lingkungan Ketenagalistrikan
6. Direktorat Jenderal Energi Baru Terbarukan dan Konservasi Energi Kementerian Energi dan Sumber Daya Mineral
   up. Direktur Panas Bumi
7. Direktorat Jenderal Kesehatan Masyarakat, Kementerian Kesehatan
   up. Direktorat Kesehatan Lingkungan
8. Direktorat Jenderal Perhubungan Darat, Kementerian Perhubungan
   u.p. Direktorat Lalu Lintas;dan
   up. Direktorat Angkutan.
9. Direktur Jenderal Sumber Daya Air, Kementerian PU dan Perumahan Rakyat
   up. Direktur Sungai, Danau dan waduk
10. Direktur Jenderal Perkebunan, Kementerian Pertanian
11. Direktorat Jenderal Konservasi Sumber Daya Alam Hayati dan Ekosistem, Kementerian Lingkungan Hidup dan Kehutanan
    up. Direktur Pemolaan dan informasi Konservasi Alam;dan
    up. Direktur Konservasi Keanekaragaman Hayati
12. Direktur Jenderal Planologi Kehutanan dan Tata Lingkungan Kementerian Lingkungan Hidup dan Kehutanan
    up. Direktur Rencana Pengguna dan Pembentukan Wilayah Pengelolaan Hutan, Kementerian Lingkungan Hidup dan Kehutanan
    Up. Direktur Pengukuhan dan Penatagunaan Kawasan Hutan
13. Direktur Jenderal Pengendalian DAS dan Hutan Lindung, Kementerian Lingkungan Hidup dan Kehutanan
14. Direktur Jenderal Perhutanan Sosial dan Kemitraan Lingkungan, Kementerian Lingkungan Hidup dan Kehutanan
15. Kepala Pusat Sumber Daya Air Tanah dan Geologi Lingkungan, Badan Geologi, Kementerian Energi dan Sumber Daya Mineral
16. Ketua Asosiasi Pemboran Minyak, Gas dan Panas Bumi Indonesia

17. Direktur Pemulihan Kerusakan Lahan Akses Terbuka, Kementerian Lingkungan Hidup dan Kehutanan
18. Direktur Pengendalian Pencemaran Udara, Kementerian Lingkungan Hidup dan Kehutanan
19. Direktur Verifikasi Pengelolaan Limbah B3 dan Limbah Non B3, Kementerian Lingkungan Hidup dan Kehutanan
20. Direktur Pencegahan Dampak Lingkungan Usaha dan Kegiatan, Kementerian Lingkungan Hidup dan Kehutanan

Direktur Pencegahan Dampak Lingkungan
Usaha dan Kegiatan,
Selaku
Sekretaris Komisi Penilai AMDAL Pusat

Ir. Ary Sudijanto, M.SE.
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PT Supreme Energy Rantau Dedap
Selasa, 27 September 2016
Club Eksekutif Persada, Jakarta


RAPAT TIM TEKNIS PENILAI AMDAL
Pembahasan Dokumen ANDAL, RKL&RPL
Rencana Kegiatan Pengusahaan Panas Bumi
PLTP Rantau Dedap Kapasitas 250 MW
PT Supreme Energy Rantau Dedap
Selasa, 27 September 2016
Club Eksekutif Persada, Jakarta

DAFTAR HADIR

NAMA RAPAT: Rapat Tim Teknis Pembahasan Dokumen ANDAL, RKL-RPL, rencana kegiatan Pengusahaan Panas Bumi untuk PLTP Rantau Dedap dengan Kapasitas 250 MW (Pergeseran Lokasi *Power Plant* dan Penambahan Tapak Pemboran) yang berlokasi di Kabupaten Muara Enim, Kabupaten Lahat, dan Kota Pagar Alam, Provinsi Sumatera Selatan, OlehPT. Supreme Energy Rantau Dedap (SERD).

Tanggal Rapat : Selasa, 27 September 2016

NO.	NAMA	JABATAN/INSTANSI	ALAMAT/TELEPHONE	PROVINSI/KAB. KOTA	TANDA TANGAN
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4.	Faisal M. Jasin	Dir. Kemitraan Lingk	08111870312	~~Bekasi~~ Jkt	[signature]
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8.	R. Ramayan	→	0857[illegible]115481	[illegible]	[signature]
9.	Afrike W-S	Asdep TARU & KSE KEMENKO EKON	08119242028	JKT	[signature]
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NAMA RAPAT: Rapat Tim Teknis Pembahasan Dokumen ANDAL, RKL-RPL, rencana kegiatan Pengusahaan Panas Bumi untuk PLTP Rantau Dedap dengan Kapasitas 250 MW (Pergeseran Lokasi *Power Plant* dan Penambahan Tapak Pemboran) yang berlokasi di Kabupaten Muara Enim, Kabupaten Lahat, dan Kota Pagar Alam, Provinsi Sumatera Selatan, OlehPT. Supreme Energy Rantau Dedap (SERD).

Tanggal Rapat : Selasa, 27 September 2016

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9.	Sriwati	Ditkuh	081587776837	Jabar	
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NAMA RAPAT: Rapat Tim Teknis Pembahasan Dokumen ANDAL, RKL-RPL, rencana kegiatan Pengusahaan Panas Bumi untuk PLTP Rantau Dedap dengan Kapasitas 250 MW (Pergeseran Lokasi *Power Plant* dan Penambahan Tapak Pemboran) yang berlokasi di Kabupaten Muara Enim, Kabupaten Lahat, dan Kota Pagar Alam, Provinsi Sumatera Selatan, OlehPT. Supreme Energy Rantau Dedap (SERD).

Tanggal Rapat : Selasa, 27 September 2016

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8.					
9.					
10.					

DAFTAR HADIR KONSULTAN

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Tanggal Rapat : Selasa, 27 September 2016

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2.	A. Kosasih	Anggota	085862528853	Jkt	
3.	Ricky Suhsmo	Anggota	08122123949	Jkt	
4.	Lalita Fitranti	Anggota	081314411521	Jkt	
5.	[illegible]	Anggota	081380161880	Jkt	
6.	Rafeldy Novian	Anggota	081287676368	Jkt	
7.	Guntur Pragustiandi	Anggota	087898993424	Sumsel/PIG	
8.	Rully Armanto	Anggota	081278018 17	PPLH UNSRI	
9.					
10.					

DAFTAR HADIR PEMRAKARSA

NAMA RAPAT: Rapat Tim Teknis Pembahasan Dokumen ANDAL, RKL-RPL, rencana kegiatan Pengusahaan Panas Bumi untuk PLTP Rantau Dedap dengan Kapasitas 250 MW (Pergeseran Lokasi *Power Plant* dan Penambahan Tapak Pemboran) yang berlokasi di Kabupaten Muara Enim, Kabupaten Lahat, dan Kota Pagar Alam, Provinsi Sumatera Selatan, OlehPT. Supreme Energy Rantau Dedap (SERD).

Tanggal Rapat : Selasa, 27 September 2016

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5.	ASHARRY SOFYAN	SERD	081115099 5		
6.	FADLIS BARNAJI	SERD	08111625217		
7.	Ralph Höllmann	SERD	0812 112 4371		
8.	HERWIN AZIS	SERD	081355239493		
9.	YOZA JAMAL	SERD	0811 8499260		
10.	M. Arief. T	SERD			

Appendix 6

EIA Technical Commission Meeting Results and Minutes of Meeting

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m Wakil dari Direktorat Konservasi Keanekaragaman Hayati Direktorat lender

meninjau kembali perhitungan besaran untuk masing-masing dampak disesuaikan dengan

meninjau kembali perhitungan besaran untuk masing-masing dampak disesuaikan dengan

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Pemrakarsa Pimpinan Rapat,

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Ary Sudijanto

Direktur Pencegahan

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Pusat

SUMMARY OF COMPILATION OF SUGGESTIONS AND FEEDBACKS FROM TECHNICAL TEAM COMMISSION OF CENTRAL AMDAL EVALUATION COMMITEE FOR HEARING OF ANDAL AND RKL & RPL DOCUMENT FOR DEVELOPMENT OF 250 MW GEOTHERMAL ENERGY IN DISTRICT OF MUARA ENIM, DISTRICT OF LAHAT AND MUNICIPALITY OF KOTA PAGAR ALAM, SOUTH SUMATERA BY PT SUPREME ENERGY RANTAU DEDAP (SERD)

JAKARTA, 27 SEPTEMBER 2016

No.	Suggestion/Feedback	Hal	Response	
A.	**Ir. Pri Utami, M.Sc (Geothermal Expert)**			
1.	Explanation of the amount and status of each well in the document must synchronize across all chapters of the documents. To include: • Amount of Wells • Status of Wells • Identification of Injection Wells and Production Wells		Table 1-2, Wellpads for explorations are B, C and I, meanwhile wellpad E has been prepared, despite no drilling to occur. From the 8 wellpads, 2 wellpads (B & E) has been designated as injection wells, while the other 6 wellpads C, I, L , M, N and X are designated as production wells. Every wellpad is capable of containing a maximum of 6 wells considering the area.	
2.	To revise the General Description of the Activity (1.1.3)	1-10	Issue has been addressed	
3.	A more systematical explanation of Environmental, Health and Safety handling (I-14) is needed. To include: a. Handling of impact from drilling and production test, and impact of power plant b. Elaborate handling of drilling cutting and drilling mud waste starting from drilling process c. To elaborate contingency plans as needed d. Elaborate gas emission during production test e. Elaborate on revegetation plan	1-14	Issue on SHE handling will be addressed	
4.	Chapter II Description of Environmental Baseline Need to recognize phisiography and geomorphology as a sub-chapter of geology. Need to elaborate on geological condition for the ANDAL document. Geothermal manifest and thermal hazard has to be included as an impact.		Environmental baseline chapter has been elatborated. Phisiography and geomorphology will be included on the chapter regarding geology. Hydrothermal alterations and manifestation hazards will be monitored.	

5.	Chapter I: RKL-RPL General: appreciation for the list of terms		
6.	RKL-RPL Manifestation of Geothermal energy has not been elaborated accross oprational stages.		Manifestations within the area will be monitored perdiodically. (once a year or once in two years). Monitoring will not only consider composition but also the physical formation.
7.	Erosion and landslide must be included as a potential impact		Erosion and landslide impact has been included in the document. Within the geotechnical study results, PT SERD has provided mitigation and monitoring efforts.
B.	**Dr. Ir. Arie Herlambang, MS (Hidrology expert)**		
1.	• Document is neat and well prepared. Legends have been revised and improved. • Water runoff and change in surface water quality is an important impact. To add hydrological study will strengthen the document. • The size of the catch or catchpond pond is calculated based on the potential of runoff water, how long the retention time for the catch pond? where is it positioned on the map • During construction and heavy rain, the potential for an increase in TSS is high. How is this associated with the project and how will it be managed. • A clear picture of the Geothermal Powerplant process needs to be included. Combine pictures 1.12, 1.13, 1.14, 1.15, 1.17 and 1.18		• Well noted • Hydrological study has been included in chapter 3 of impact forecast. The monitoring and management plan is included in the RKL-RPL • The drainage system follows access roads and project opening areas. • The assessment of TSS impact has been included in the ANDAL document Chapter 3 Impact Forecast. •
2.	Hidrologi: Perform baseline study as necessary to include most affected catchment area, include : surface and ground water, as well as potential impact from the activity.		Baseline study has accomodated all the necessary parameters for the affected catchment areas.
3.	Hydrogeologi: Give existing conditions to the hydrogeological condition in the area as well as impact to ground water. Give an overlay of the groundwater area with the geothermal potential area.		Based on the geotechnical survey, no significant impact is expected towards ground water. Overlay map has been included in the ANDAL document.
4.	Surface Water Quality: A description of surface water quality including: a discussion on water		A description of surface water quality has been included and a sampling map has been added Map 2-8.

	debit, water quality and changes in water quality. The water quality within the project area is still in good condition.		
5.	Kualitas air sumur dangkal: A discussion of groundwater, a map of the water level the ground water, is to be included in the hydrogeological study.		Geothermal development activities will only monitor the quality of groundwater in the population wells because the activities are not directly related to ground water. Thus, monitoring of groundwater is not necessarry. A hydrology map has been indluced in the document.
6.	Increase in surface water runoff rate. In the methodology to cover issues of surface water runoff. Provide location, maps, etc.		The impact has been accomodated in the chapter 3 of the ANDAL document.
7.	Water Quality: Give a description of water and steam and their processes in relation to power plant energy generation. Explain the potential of change in water quality before and after injection.		Water Quality and steam used for the power plan has a chemical composition of neutral pH of 6-7, chloride of 1500 ppm and low gas composition in the steam. Description and potential impacts of water quality or changes have been included.
	Methodology: Include a methodology of monitoring of shallow ground water elevation as well as monitoring and management activities.		Methodology for shallow ground water elevation monitoring has been included. Survey plans and monitoring activities have been included.
C.	**Prof. Dr. Ir. Kardono, MEng (Pakar Kualitas Udara)**		
1.	Description about the 250 MW plan is to be elaborated. Explain how 2x46 MW will be further developed into 250 MW. What are implications towards H2S		Details of 2x46 MW and 250 MW development has been added and impacts regarding H2S has been included. Very low NCG 0,09% wt with H_2S maksimum 15,8% mol.
	Add content ofTabel 1-2. From the KA ANDAL into the document		Added.
	Elaborate on how the 24,3 MW can be developed into 92 MW and how this will impact the target of 250 MW.		Explanation on the development of wells into the desired target MW is added. Phase -1 : Development of 92 MW Phase 2 : Development of 250 MW
	What are H2S concentration in steam (or within NCG). What are the numbers during exploration. Show calculations behind the results of the concentrations.		There are currently 3 types of steam at Rantau Dedap site. Very low • NCG of 0,09% - H2S of 15,8% mol • Low to moderate NCG 1%wt berkadar H_2S maksimum 6,71% mol. • High NCG 2% berkadar H_2S maksimum 5%mol. %mol = %vol Further calculations have been included.

	What is the function of the Gas removal system.		Steps and function of the gas removal system has been added.
	Pekerjaan pengupasan dan pengurugan tanah termasuk perataan, apakah tidak ada dampak pada kualitas udara maupun kebisingan?		Kegiatan dianggap tidak berdampak penting karena kegiatan terletak jauh dari pemukiman.
	Show conversion method of 1 ppm to µg/Nm3 of H2S		Conversion has been added. ppmv = $(mg/m^3)(273.15 + °C) / (12.187) (MW)$ ppmv = $(mg/m^3)(24,45)/(MW)$
	How are estimates of H2S gasdetermined. Flowrate, threshold, etc. How are they determined.		Justificatin for H2S gases estimates are added. It is based on international convention and government regulations.
	What are confinement methods for H2S and H2O		SERD akan mengendalikan emisi gas H_2S PLTP hingga di bawah Baku Mutunya. Emisi gas H_2S sebesar 27 mg/Nm_3 cukup ideal untuk operasi PLTP bila mengacu Baku Mutu emisi H_2S = 35 mg/Nm^3. Namun sebaran bau dapat menimbulkan dampak terhadap ketidak nyamanan lingkungan. Oleh karena itu selama di sekitar PLTP tidak terdapat permukiman penduduk, maka dampak bau H_2S dapat diminimalkan
	A summarry of the hypothetical significant impact is to be added.		A table on hypothetical significant impact is added
	CO2 should be included in the hypothetical significant impact.		CO2 is not governed by KLH as an environmental paramter, thus is not a significant impact int eh ANDAL document. A separate study on the CO2 can be done however does not reflect environmental quality.
	Elaborate on the dispersion model used.		Description on the Guassean and Calpuff model has been added.
D.	**Prof. Dr. Dody Prayogo, MPSt (Pakar Sosial)**		
	Document has been presented well		Well noted.

	Elborate on overal land status. What were they during exploration phase.		Land status has been included. Land status in the area is Other Use Teritorry, much of the land is used for cultivation.
	Does the H2S dispersion cover nearby settlements.		Nearest settlement area to the project is far enough about 6 km. The area between Powerstation and the wellpads are guarded by security gates.
	Elaborate on hiring of manpower. How are local people given the chance for empoyment.		The project will recruit as maximum as possible from local hire as long as the qualifications are suitable.
	Job opportunity for local people mechanism.		PT SERD already has in place a mechanism to accomodate the need for local hire.
	Environmental disturbances such as air, odour, noise etc. May lead to conflict. What are measures that PT SERD will take to avoid such instances.		PT SERD is commited to preventing such instances and have included the monitoring and management efforts in the RKL-RPL document
	Company must put in place a grievance mechanism in order to accomodate community grievances.		PT SERD has developed and implemented a grievance mechanism.
	Develop an Emergency Response Team and a communication forum between company and community.		PT SERD has developed an Emergency Response Team as well as the SOP to go along with it. Within PT SERD team is a relations department that serves as a forum for discussion between company and community.
E.	**Prof. Dr. Ir. Djoko Darwanto Gitokarsono (Radiation & Elektromagnetic expert)**		
	The pipes used in the project is made of conductive material. What are the chances of electric shock considering Indonesia's tendencies. Please consider		Suggestion is well received. PT SERD will put into account issues regarding electric shocks/currents that may cause harm.
F.	**Dr. Ir. Agus Priyono Kartono, M.Si. (Biodiversity expert)**		
	To add into the document quantitative data of the flora and fauna survey. To separate results based on ecosystem types. Impact indicators must be updated. Elaborate on the efforts of revegetation, why not aim towards restoration.		Quantitative data has been added, impact indicators have been updated and types of ecosystem have been differentiated. Rehabilitation will be done using local species. However, restoration concept will be implemented.

G.	**Prof. Dr. Linawati Hardjito, MSc (Water Quality Expert)**		
	Will there be a third party involvement for management of hazardous waste? Will it be put into landfill. Where does the clean water source come from.		No hazardous waste will be placed in a landfill. Clean water source come from surface water (rivers).
H.	**Afrike Wahyuni Saputri dan Reshinta Hantariningtyas (Asdep Tata Ruang dan KSE, Kementerian Koordinasi Bidang Perekonomian)**		
	Please refer to the latest spatial planning document		Latest spatial planning document has been considered.
	Please clarify and finalize the naming of the document		Document name will be uniformed and finalized.
I.	**Yuda Bagus (Ditjen Ketenagalistrikan, Kementerian ESDM)**		
	PT SERD should not only put into account safety health and environment but also electric power safety.		
J.	**Ditjen Ketenagalistrikan, Kementerian ESDM**		
	Based on the RUPTL PT. PLN (Persero) 2015-2024 or 2016 2025, PT SERD plans to develop 250 MW worth of energy, how does this connect to the current potential.		250 MW will be developed gradually.
	The AMDAL documents does not describe substation activities.		PT SERD's AMDAL only covers up to the switchyard. The rest of the facility will be covered in PLN's AMDAL.
K.	**Rinu Manurung, S.Sos., MML. dan Niken Raras Kusumastuti (Ditjen Bina Pembangunan Daerah, Kementerian Dalam Negeri)**		
	Please update the spatial planning reference.		Spatial planning reference updated.

	Elaborate land area into a table.		Table I-7 has been included to accomodate land area details.
	Involve and activele socialize activities to communities of Pagar Alam, Muara Enim and Lahat.		PT SERD will continuously reach out to the community.
L.	**Jabonor (Ditjen Perhubungan Darat, Kementerian Perhubungan)**		
	Company has to prepare the proper permits to manage hazardous waste. Untuk angkutan baik pengangkut Limbah B3 maupun alat berat harus mempunyai izin penyelenggaraan angkuan dari Kementerian Perhubungan.		The proper permits to handle hazardous waste according to government regulation will be obtained accordingly.
M.	**Budi Prakosa (APMI)**		
	Table I-2 regarding the plan and component of the project activity states that there are 8 wellpads with 6 wells at max in each pad. It is said that only 3-6 productions wells are enough to produce the desired steam production, is a 48 production wells development plan needed? How does this affect make up wells.		Yes, results are not guranteed and the amount of wells will be adjusted according to steam supply needs. Make up wells will be adjusted according to needs.
	Elaborate the complete list of drilling eqiupment materials that will be mobilized at site.		Document has included mobilization of drilling equipments.
	How is water used for the project? Please elaborate on the debit.		Calculations for water debit needed for drilling, domestic use and power plant has been included.
N.	**Yulita S (Directorate of Public Health, Ministry of Health)**		
	Does the company have an SOP to deal with medical emergencies? Include it in the document.		PT SERD has a Medical Emergency Response SOP.

	Explain how water used will affect the community's water supply due to the large land needed.		PT SERD Project will not need a massive opening of land and will not utilize water from the community (since the community is far from the project area).
O.	**Tonny Wuryanto, S.Hut. (Directorate of Management and Information Nature Conservation, DG Natural Resources Conservation and Ecosystems, Ministry of Environment and Forestry)**		
	Add and use the correct name for the Protection Forest area.		Name of Protection Forest area: Hutan Lindung Bukit Jambul Gunung Patah
	PT SERD has to carefully manage activities as to not cause wildlife conflict within the area.		Advice is well noted.
	PT SERD has to minimize logging of area used.		Advice is well noted.
P.	**Irzal Azhar (Dit. KKH, KLHK)**		
	The method of data collection mentions the use of camera traps. Refrain from using camera traps to prevent habitat loss.		Camera traps is form of monitoring data most suitable besides direct observation. Camera Trap is a non-lethal data collecting method (not an actuall trap).
	Add CITES as a reference for fauna.		CITES has been added as a reference.
	Include management of invasive species in the document.		Invasive species management has been included.
Q.	**Sriwati (Directorate of Inauguration and Stewardship of Forest Areas, KLHK)**		
	Please use another term for freeing/acquisition of the land to using of land		Terms will be adjusted.

R.	**Yuli Utami (Ditjen of Watershed Control and Protection Forest, KLHK)**		
	Clasify the area of study as three different categories namely: Hills with steep slopes of 25-40% Sloping hills with a slope of 15-20% Morfologi of 0-8%		Terms and catergories have been updated.
	Type and characteristics of soil needs to be elaborated		Detailed information on soil characteristic can be found in 2.1.1.10 in table 2-10
	Erosion calculation, area of study and efforts towards erosion potential needs to be included.		Calculation anddetails on erosion can be found in 3.1.3.1.
S.	**Faisal M (Directorate of Environmental Partnership, Director General of Social Forestry and Environmental Partnership, KLHK)**		
	How does PT SERD operate within protection forest area. What permit does PT SERD have.		PT SERD has the IPPKH for exploration activities within forestry area.
	Does PT SERD have SOP for natural disasters and emergency situations for the community?		PT SERD has SOP for emergency and natural disaster situations for bot Community and its employees.
	PT SERD needs to look into developing community health in the area utilizing local health clinics.		PT SERD will provide a clinic for employees and will coordinate and work together with
T.	**Munawar (Dit. Land Management, Ministry of ATR/BPN)**		
	Please elaborate on the area needed for the project.		Detailed project area needed has been included in table I-7.
	Make sure that all maps and legends are according to proper rules of cartography		Rules of cartography has been put into account into the maps.

U.	**Dita Arif Yuwana (Center for Groundwater Resources and Environmental Geology (PAG), Ministry of Energy and Mineral Resources)**		
	Please include the list of names and credibility of the document composers.		The list of experts and their credibility have been added into the document.
	Please explain the location of infiltration wells and biopore as well as its coordinates.		There are no infiltration wells nor biopres within the project area.
V.	**Dwi Prabowo YS, S.Si, M.Sc., Ph.D (Dit. KPHL, KLHK)**		
	Which formula was used for the indeks of erosion?		Erosion Indeks was calculated using Levain's mathematical formula (DHV, 1989 in Asdak, 1995): $R = 2.21 * P1.36$ dimana: R = Rainfall Erosion Indeks P = Monthly Rainfall data (cm)
W.	**Faisal M Taqin (Dit. Environmental Inteligence, KLHK)**		
	How are issues on social impacts particularly customary issues within the area.		PT SERD has a mechanism to accomodate and address customary issues.
	Community has to be informed of progress and issues regarding the project.		PT SERD conducts socialization and public consultations as needed.
	Information on employment opportunity for community has to be socialized.		PT SERD has the proper selection method and criteria and will be implemented and socialized accordingly.
X.	**Agus Hartono dan R. Ramayani (Director General of Plantation, Ministry of Agriculture)**		
	What are PT SERD's efforts towards relocation of village and villagers relocation due to land aquisition?		PT SERD does not inted to rellocate the community.

	What happens to the protection forest area that is not utilized.		Unused protection forest areas will be returned to the ownership of the government.

KEMENTERIAN LINGKUNGAN HIDUP DAN KEHUTANAN
DIREKTORAT JENDERAL PLANOLOGI KEHUTANAN DAN TATA LINGKUNGAN
DIREKTORAT PENCEGAHAN DAMPAK LINGKUNGAN USAHA DAN KEGIATAN
Gedung A Lt 6 Jl. DI Pandjaitan Kav 24, Kebon Nanas – Jakarta Timur 13410
Telepon (021) 85904925; Faksimile 85906168

Nomor : Un. 399 /PDLUK/PAUT/PLA.4/9/2016 14 September 2016
Lampiran : -
Hal : Undangan Presentasi

Yth.
VP Relation& SHE
PT. Supreme Energy Rantau Dedap (SERD)
Menara Sentraya Lantai 23
Jl. Iskandasyah Raya No 1A, Kebayoran Baru
Jakarta 12160

Dalam rangka pelaksanaan rapat Tim Teknis Komisi Penilai AMDAL Pusat untuk penilaian dokumen ANDAL, RKL-RPL, rencana kegiatan Pengusahaan Panas Bumi untuk PLTP Rantau Dedap dengan Kapasitas 250 MW (Pergeseran Lokasi *Power Plant* dan Penambahan Tapak Pemboran) yang berlokasi di Kabupaten Muara Enim, Kabupaten Lahat, dan Kota Pagar Alam, Provinsi Sumatera Selatanoleh PT. Supreme Energy Rantau Dedap (SERD), bersama ini di harapkan kehadiran Saudara untuk mempresentasikan dokumen tersebut dalam rapat Tim Teknis Komisi Penilai AMDAL Pusat yang akan diselenggarakan pada:

Hari/tanggal : Selasa, 27 September 2016
Waktu : 09.00 WIB – selesai
Tempat : Ruang rapat Fokker Lantai 2
Club Eksekutif Persada
Jl Raya Protokol Halim Perdana Kusuma
Jakarta Timur

Mengingat pentingnya acara ini, diharapkan agar Saudara dapat hadir tepat pada waktunya.

Atas perhatian dan kerjasama Saudara diucapkan terima kasih.

Direktur Pencegahan Dampak Lingkungan
Usaha dan Kegiatan,
Selaku
Sekretaris Komisi Penilai AMDAL Pusat

Ir. Ary Sudijanto, M.SE.
Nip. 19681011 199403 1 001

Tembusan:
Direktur Jenderal Planologi Kehutanan dan Tata Lingkungan (sebagai laporan);.

KEMENTERIAN LINGKUNGAN HIDUP DAN KEHUTANAN
DIREKTORAT JENDERAL PLANOLOGI KEHUTANAN DAN TATA LINGKUNGAN
DIREKTORAT PENCEGAHAN DAMPAK LINGKUNGAN USAHA DAN KEGIATAN
Gedung A Lt 6 Jl. DI Pandjaitan Kav 24, Kebon Nanas – Jakarta Timur 13410
Telepon (021) 85904925; Faksimile 85906168

Nomor : Un. 400 /PDLUK/PNDS/PLA.4/9/2016 14 September 2016
Lampiran : Satu set dokumen
Hal : Undangan Rapat Tim Teknis

Yth.
Bapak/Ibu (Daftar terlampir)

Di
Tempat

Sehubungan dengan telah diterimanya dokumen ANDAL, RKL-RPL, rencana kegiatan Pengusahaan Panas Bumi untuk PLTP Rantau Dedap dengan Kapasitas 250 MW (Pergeseran Lokasi *Power Plant* dan Penambahan Tapak Pemboran) yang berlokasi di Kabupaten Muara Enim, Kabupaten Lahat, dan Kota Pagar Alam, Provinsi Sumatera Selatanoleh PT. Supreme Energy Rantau Dedap (SERD), maka bersama ini kami mengundang Bapak/Ibu selaku Anggota Tim Teknis Komisi Penilai AMDAL Pusat untuk dapat hadir dan memberikan Saran, Pendapat, Tanggapan dalam penilaian dokumen tersebut dengan berfokus pada proses pelingkupan dan metode Studi sesuai bidang keahliannya. Selanjutnya Rapat Tim Teknis Komisi Penilai AMDAL Pusat akan dilaksanakan pada:

Hari/tanggal : Selasa, 27 September 2016
Waktu : 09.00 WIB – selesai
Tempat : Ruang rapat Fokker Lantai 2
Klub Eksekutif Persada Purnawira Halim
J l. Raya Protokol Halim Perdana Kusuma
Jakarta Timur 13610

Mengingat terbatasnya waktu dalam memberikan tanggapan hasil penilaian dokumen tersebut, maka untuk Saran, Pendapat, Tanggapan yang bersifat tertulis, dapat kami terima selambat-lambatnya pada tanggal 27 September 2016 dan disampaikan kepada Sekretariat Komisi Penilai AMDAL Pusat Kementerian Lingkungan Hidup dan Kehutanan melalui fax: 021.85906168-85904925 dalam format word atau diemailkan ke alamat: amdal.komisi@gmail.com

Mengingat pentingnya acara tersebut di atas, kami mohon kehadirannya tepat pada waktunya. Atas perhatian dan kerjasamanya diucapkan terima kasih.

Direktur Pencegahan Dampak Lingkungan
Usaha dan Kegiatan,
Selaku
Sekretaris Komisi Penilai AMDAL Pusat

Ir. Ary Sudijanto, M.SE.
Nip. 19681011 199403 1 001

Tembusan:
Direktur Jenderal Planologi Kehutanan dan Tata Lingkungan (sebagai laporan);

Lampiran Undangan
Nomor : Un. 400/PDLUIC/PANTI/PLA.4/9/2016
Tanggal : 14 September 2016

Daftar Undangan Anggota Tim Teknis

Pakar:

1. Ir. Pri Utami, M.Sc (Pakar Geothermal)
2. Prof. Dr. Dipl-Ing. Ir. Reynaldo Zoro (Pakar Listrik Arus Kuat)
3. Dr. Agus Guntoro (Pakar Geologi)
4. Dr. Ir. Arie Herlambang, MS (Pakar Hidrologi)
5. Prof. Dr. Ir. Kardono, M.Eng (Pakar Udara)
6. Prof. Dr. Dody Prayogo, MPS.t (Pakar Sosial)
7. Prof. DR. Ir. Djoko Darwanto Gitokarsono (Pakar Radiasi Elektromagnetik)
8. Dr. Ir. Agus Priyono Kartono, M.Si (Pakar Kehutanan *Biodiversity*)
9. Prof. Dr. Linawati Hardjito, Msc (Pakar Kualitas Air)

Pusat:

1. Direktur Jenderal Penataan Ruang, Kementerian Agraria dan Tataruang
2. Direktur Jenderal Penataan Agraria, Kementerian Agraria dan Tataruang
3. Deputi Koordinasi Bidang Infrastruktrur dan Pengembangan Wilayah Bidang Perekonomian, Kementerian Perekonomian
4. Direktorat Jenderal Bina Pembangunan Daerah, Kementerian Dalam Negeri
   up. Direktur Sinkronisasi Urusan Pemerintahan Daerah I
5. Direktur Jenderal Ketenagalistrikan, Kementerian Energi dan Sumber Daya Mineral
   u.p Direktur Teknik dan Lingkungan Ketenagalistrikan
6. Direktorat Jenderal Energi Baru Terbarukan dan Konservasi Energi Kementerian Energi dan Sumber Daya Mineral
   up. Direktur Panas Bumi
7. Direktorat Jenderal Kesehatan Masyarakat, Kementerian Kesehatan
   up. Direktorat Kesehatan Lingkungan
8. Direktorat Jenderal Perhubungan Darat, Kementerian Perhubungan
   u.p. Direktorat Lalu Lintas;dan
   up. Direktorat Angkutan.
9. Direktur Jenderal Sumber Daya Air, Kementerian PU dan Perumahan Rakyat
   up. Direktur Sungai, Danau dan waduk
10. Direktur Jenderal Perkebunan, Kementerian Pertanian
11. Direktorat Jenderal Konservasi Sumber Daya Alam Hayati dan Ekosistem, Kementerian Lingkungan Hidup dan Kehutanan
    up. Direktur Pemolaan dan informasi Konservasi Alam;dan
    up. Direktur Konservasi Keanekaragaman Hayati
12. Direktur Jenderal Planologi Kehutanan dan Tata Lingkungan Kementerian Lingkungan Hidup dan Kehutanan
    up. Direktur Rencana Pengguna dan Pembentukan Wilayah Pengelolaan Hutan, Kementerian Lingkungan Hidup dan Kehutanan
    Up. Direktur Pengukuhan dan Penatagunaan Kawasan Hutan
13. Direktur Jenderal Pengendalian DAS dan Hutan Lindung, Kementerian Lingkungan Hidup dan Kehutanan
14. Direktur Jenderal Perhutanan Sosial dan Kemitraan Lingkungan, Kementerian Lingkungan Hidup dan Kehutanan
15. Kepala Pusat Sumber Daya Air Tanah dan Geologi Lingkungan, Badan Geologi, Kementerian Energi dan Sumber Daya Mineral
16. Ketua Asosiasi Pemboran Minyak, Gas dan Panas Bumi Indonesia

17. Direktur Pemulihan Kerusakan Lahan Akses Terbuka, Kementerian Lingkungan Hidup dan Kehutanan
18. Direktur Pengendalian Pencemaran Udara, Kementerian Lingkungan Hidup dan Kehutanan
19. Direktur Verifikasi Pengelolaan Limbah B3 dan Limbah Non B3, Kementerian Lingkungan Hidup dan Kehutanan
20. Direktur Pencegahan Dampak Lingkungan Usaha dan Kegiatan, Kementerian Lingkungan Hidup dan Kehutanan

Direktur Pencegahan Dampak Lingkungan
Usaha dan Kegiatan,
Selaku
Sekretaris Komisi Penilai AMDAL Pusat

Ir. Ary Sudijanto, M.SE.
Nip. 19681011 199403 1 001


PT Supreme Energy Rantau Dedap
Selasa, 27 September 2016
Club Eksekutif Persada, Jakarta


RAPAT TIM TEKNIS PENILAI AMDAL
Pembahasan Dokumen ANDAL, RKL&RPL
Rencana Kegiatan Pengusahaan Panas Bumi
PLTP Rantau Dedap Kapasitas 250 MW
PT Supreme Energy Rantau Dedap
Selasa, 27 September 2016
Club Eksekutif Persada, Jakarta

DAFTAR HADI..

NAMA RAPAT: Rapat Tim Teknis Pembahasan Dokumen ANDAL, RKL-RPL, rencana kegiatan Pengusahaan Panas Bumi untuk PLTP Rantau Dedap dengan Kapasitas 250 MW (Pergeseran Lokasi *Power Plant* dan Penambahan Tapak Pemboran) yang berlokasi di Kabupaten Muara Enim, Kabupaten Lahat, dan Kota Pagar Alam, Provinsi Sumatera Selatan, OlehPT. Supreme Energy Rantau Dedap (SERD).

Tanggal Rapat : Selasa, 27 September 2016

NO.	NAMA	JABATAN/INSTANSI	ALAMAT/TELEPHONE	PROVINSI/KAB. KOTA	TANDA TANGAN
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5.	Irzal Azhar	KKH - KLHK	081281645788	Bogor	
6.	Yuli Utami	PDASHL, KLHK	081294134735	Jkt.	
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8.	R. Ramayati	"	087771115488	Jkt	
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DAFTAR HADIR

NAMA RAPAT: Rapat Tim Teknis Pembahasan Dokumen ANDAL, RKL-RPL, rencana kegiatan Pengusahaan Panas Bumi untuk PLTP Rantau Dedap dengan Kapasitas 250 MW (Pergeseran Lokasi *Power Plant* dan Penambahan Tapak Pemboran) yang berlokasi di Kabupaten Muara Enim, Kabupaten Lahat, dan Kota Pagar Alam, Provinsi Sumatera Selatan, OlehPT. Supreme Energy Rantau Dedap (SERD).

Tanggal Rapat : Selasa, 27 September 2016

NO.	NAMA	JABATAN/INSTANSI	ALAMAT/TELEPHONE	PROVINSI/KAB. KOTA	TANDA TANGAN
1.	Dita Arif Yuriana	Badan Geologi	081322222985	Bandung	
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9.	Sriwati	Ditkuh	081587776837	Jabar	
10.	Dian Ermalasari	Ditkuh	082124604500	Jabar	

DAFTAR HADIR

NAMA RAPAT: Rapat Tim Teknis Pembahasan Dokumen ANDAL, RKL-RPL, rencana kegiatan Pengusahaan Panas Bumi untuk PLTP Rantau Dedap dengan Kapasitas 250 MW (Pergeseran Lokasi *Power Plant* dan Penambahan Tapak Pemboran) yang berlokasi di Kabupaten Muara Enim, Kabupaten Lahat, dan Kota Pagar Alam, Provinsi Sumatera Selatan, OlehPT. Supreme Energy Rantau Dedap (SERD).

Tanggal Rapat : Selasa, 27 September 2016

NO.	NAMA	JABATAN/INSTANSI	ALAMAT/TELEPHONE	PROVINSI/KAB. KOTA	TANDA TANGAN
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10.					

DAFTAR HADIR KONSULTAN

NAMA RAPAT: Rapat Tim Teknis Pembahasan Dokumen ANDAL, RKL-RPL, rencana kegiatan Pengusahaan Panas Bumi untuk PLTP Rantau Dedap dengan Kapasitas 250 MW (Pergeseran Lokasi *Power Plant* dan Penambahan Tapak Pemboran) yang berlokasi di Kabupaten Muara Enim, Kabupaten Lahat, dan Kota Pagar Alam, Provinsi Sumatera Selatan, OlehPT. Supreme Energy Rantau Dedap (SERD).

Tanggal Rapat : Selasa, 27 September 2016

NO.	NAMA	JABATAN/INSTANSI	ALAMAT/TELEPHONE	PROVINSI/KAB. KOTA	TANDA TANGAN
1.	[illegible]	Ketua	08164800470	Jkt	
2.	A. Kosasih	Anggota	081586252853	Jkt	
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4.	Lalita Fitrianti	Anggota	081314411521	Jkt	
5.	[illegible]	Anggota	081380161880	Jkt	
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DAFTAR HADIR PEMRAKARSA

NAMA RAPAT: Rapat Tim Teknis Pembahasan Dokumen ANDAL, RKL-RPL, rencana kegiatan Pengusahaan Panas Bumi untuk PLTP Rantau Dedap dengan Kapasitas 250 MW (Pergeseran Lokasi *Power Plant* dan Penambahan Tapak Pemboran) yang berlokasi di Kabupaten Muara Enim, Kabupaten Lahat, dan Kota Pagar Alam, Provinsi Sumatera Selatan, OlehPT. Supreme Energy Rantau Dedap (SERD).

Tanggal Rapat : Selasa, 27 September 2016

NO.	NAMA	JABATAN/INSTANSI	ALAMAT/TELEPHONE	PROVINSI/KAB. KOTA	TANDA TANGAN
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2.	Prijardan Effendi	SERD	0811849266		
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4.	DODDY GAUZALI	SERD	08118001223		
5.	ASHARRY SOFYAN	SERD	08111509955		
6.	FADLIS BARNAJI	SERD	08111625217		
7.	Ralph Hölemann	SERD	0812 112 4371		
8.	HERWIN AZIS	SERD	081395239493		
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