

世界銀行の環境アセスメントにおける Nature positiveの最新動向

生物多様性オフセット事例紹介

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ESS6 Biodiversity Conservation and Sustainable Management of Living Natural Resources

Objective:

- Protect and conserve biodiversity and habitats
- Apply the mitigation hierarchy and the precautionary approach in the design and implementation of projects that could have an impact on biodiversity
- Promote the sustainable management of living natural resources.
- Support livelihoods of local communities including Indigenous Peoples, and inclusive economic development, through the adoption of practices that integrate conservation needs and development priorities
- ESA to assess direct, indirect and cumulative project-related impacts on and threats to habitats and the biodiversity (habitat loss, degradation and fragmentation, invasive alien species, overexploitation, hydrological changes, nutrient loading, pollution and incidental take, as well as projected climate change impacts)
- Where ESA has identified significant risks and adverse impacts on biodiversity, a Biodiversity Management Plan should be developed and implemented:
 - Apply a risk-based approach based on sensitivity and values
 - Apply mitigation hierarchy
- ESA may take the form of ESIA, SESA, or Regional ESIA

Critical Habitat

In areas of critical habitat, the Borrower will not implement any project activities that have potential adverse impacts **unless all of the following conditions are met**

- a) **No other viable alternatives** within the region exist for development of the project in habitats of lesser biodiversity value;
- b) **All due process** required under international obligations or national law that is a prerequisite to a country granting approval for project activities in or adjacent to a critical habitat has been complied with;
- c) The potential adverse impacts, or likelihood of such, on the habitat **will not lead to measurable net reduction or negative change** in those biodiversity values for which the critical habitat was designated;
- d) The project is not anticipated to lead to a net reduction in the population of any **Critically Endangered, Endangered, or restricted-range species**, over a reasonable time period;
- e) The project will not involve significant conversion or significant degradation of **critical habitats**. In circumstances where the project involves new or renewed forestry or agricultural plantations, it will not convert or degrade any critical habitat;
- f) The project's mitigation strategy will be designed to achieve **net gains** of those biodiversity values for which the critical habitat was designated; and
- g) A robust and appropriately designed, long-term biodiversity **monitoring and evaluation** program aimed at assessing the status of the critical habitat is integrated into the Borrower's management program.

Biodiversity Offset

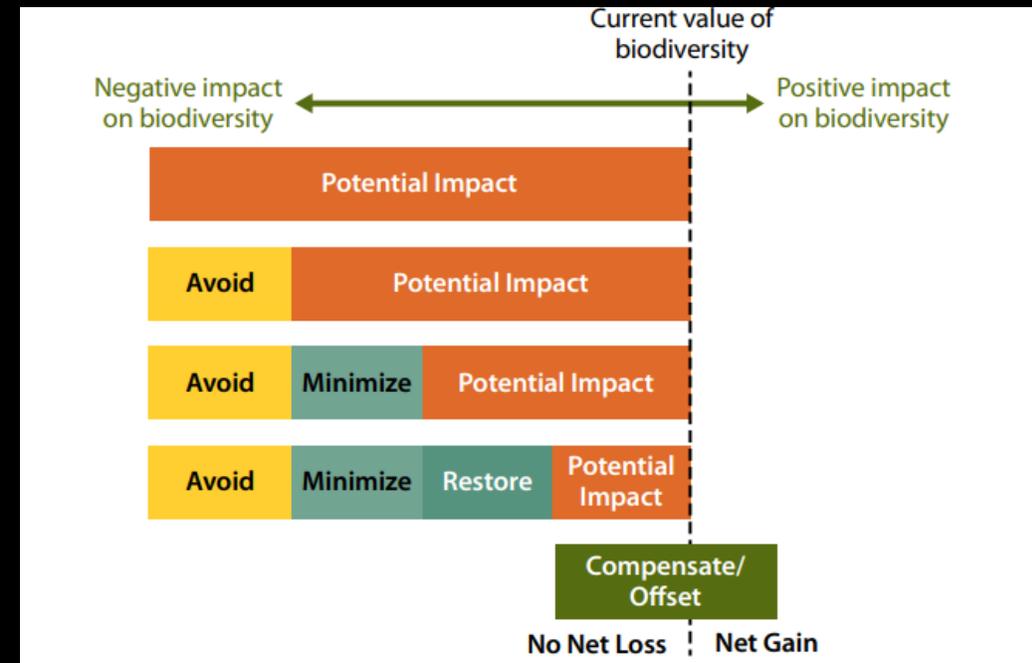
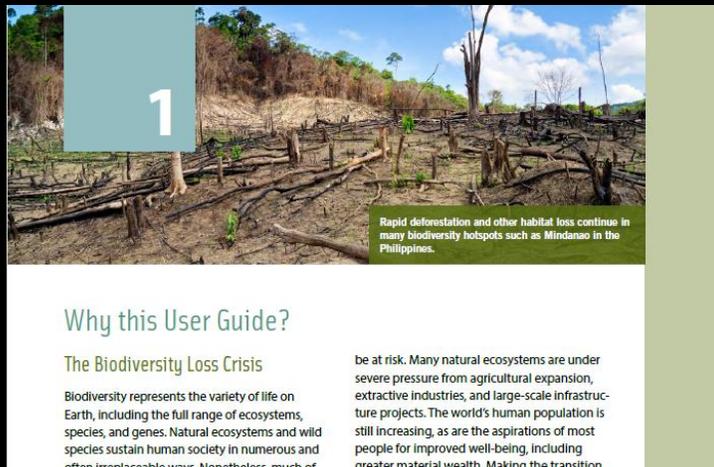
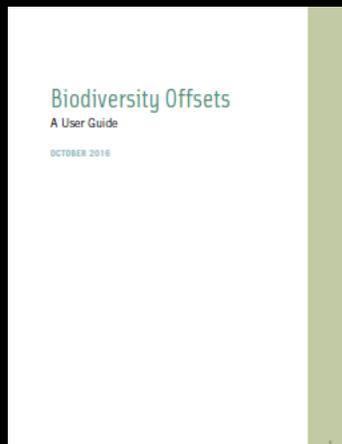
“Biodiversity offsets are measurable conservation outcomes resulting from actions designed to compensate for significant residual adverse biodiversity impacts arising from project development and persisting after appropriate avoidance, minimization and restoration measures have been taken” (ESS6 para 10, footnote 6)

- Allowed as **a last resort** to address residual impacts, after all technically and financially feasible avoidance, minimization, and restoration measures have been considered
- An initial assessment of project risks and impacts should not take into account the possibility of offsets
- Designed and implemented with the **participation of stakeholders and qualified experts** to demonstrate long-term technical and financial feasibility of the offset should be demonstrated.
- In case an offset is used as mitigation for residual adverse impacts on critical habitat, **a net gain is required.**
- **Independent experts** should be engaged to advise as to whether the proposed offset is feasible and whether, in their professional opinion, it can be reasonably expected to result in a sustainable net gain.
- **Certain residual adverse impacts cannot be offset**, particularly if the affected area is unique and irreplaceable from a biodiversity standpoint. In such cases, **the Borrower will not undertake the project** unless it is redesigned to avoid the need for such offset, and to meet the requirements of the ESS6

Offset should be applied with caution...

“Based on their location, biodiversity offsets will sometimes serve to maintain the same ecosystem services found in the original project area. However, many site-specific ecosystem services might not be sustained or replaced by an off-site biodiversity offset, due to a variety of factors (such as physical distance from the original project area or more stringent resource use restrictions within the offset area). For this reason, **the loss of ecosystem services per se will often need to be mitigated through means other than a biodiversity offset.** For example, an irrigation, mining, or other development project that cuts off a community’s access to a local fresh water source might need to assist the affected community by developing an alternative water supply, rather than through conserving a similar ecosystem through a biodiversity offset”.

(WB Biodiversity Offsets: A User Guide 2016)



Source: Adapted from the BBOP

Integration of biodiversity offset planning in ESIA can help better manage potential risks

- Ensure application of **mitigation hierarchy**
- **Provide useful data** for the design of offsets and facilitate implementation in countries with weak capacity
- Provides **well established procedures** to collect and interpret information on biodiversity and ecosystem services
- **Avoid duplicating efforts** if biodiversity assessment is done after ESIA completion

Integrating biodiversity offsets planning in ESIA process can have downsides too...

- Potentially **overload ESIA** process
- **Impractical** to incorporate offset design into EIA retroactively (e.g. a conventional EIA process has been completed, or prescriptive regulatory requirements constrain issues that can be considered in ESIA)

Overall, “biodiversity offsets can make an important contribution to the conservation and sustainable use of biodiversity and help strengthen impact assessments as a tool for sustainable development by incorporating the concept of ‘**no net loss**’. This helps deliver a **more outcome-oriented approach** and provides a **robust rationale for biodiversity offsets** through application of a **mitigation hierarchy**”

(BBOP (2009) *The Relationship between Biodiversity Offsets and Impact Assessment*. Forest Trends. <https://www.forest-trends.org/wp-content/uploads/bbop/the-relationship-between-biodiversity-offsets-and-impact-assessment-pdf.pdf>)

Impact assessment can complement biodiversity offsets in many different ways

- a) Provide **a structured approach** to the collection of information on biodiversity including important ecosystem services that may be affected
- b) Quantify** potential losses of biodiversity associated with a proposal
- c) Provide information needed to determine whether '**no net loss**' of biodiversity can be achieved
- d) Interpret the **significance of impacts** on biodiversity/ biodiversity losses
- e) Identify biodiversity impacts which require mitigation, and residual adverse impacts remaining **after mitigation** which could be offset
- f) Generate information on biodiversity distribution and status which is needed to **interpret impact significance** for different geographical contexts
- g) Generate **contextual information** on biodiversity distribution and status which is needed for planning the design of offsets and for the selection of suitable offset locations
- h) Through ESIA **stakeholder engagement** processes, provide a framework for understanding diverse stakeholder perspectives and identifying issues, impacts, concerns and opportunities that should be reflected in any consideration of offset need, role, design and implementation.
- i) Provide a standardised and widely used approach.

Resources

WB Environmental and Social Standard 6 Guidance Note

(<https://documents1.worldbank.org/curated/en/924371530217086973/ESF-Guidance-Note-6-Biodiversity-Conservation-English.pdf>)

IFC Performance Standard 6 and Guidance Note 6 (<https://www.ifc.org/en/insights-reports/2012/ifc-performance-standard-6>)

WB. 2016. Biodiversity Offsets: A User Guide

(<https://documents1.worldbank.org/curated/en/344901481176051661/pdf/110820-WP-BiodiversityOffsetsUserGuideFinalWebRevised-PUBLIC.pdf>)

BBOP. 2009. Biodiversity Offset Cost-Benefit Handbook. Washington: Forest Trends, Business and Biodiversity Offsets Program. (<https://www.forest-trends.org/publications/biodiversity-offset-cost-benefit-handbook/>)

BBOP. 2012a. Biodiversity Offset Design Handbook and Appendices. Washington: Forest Trends, Business and Biodiversity Offsets Program. (<https://www.forest-trends.org/publications/biodiversity-offset-design-handbook/>)

BBOP. 2012b. Standard on Biodiversity Offsets. Washington: Business and Biodiversity Offsets Program. (<https://www.forest-trends.org/publications/standard-on-biodiversity-offsets/>)

Case studies

Mongolia Oyu Tolgoi LLC Copper and Gold Project

\$12 billion project to develop **a copper and gold deposit** in the South Gobi desert, incl: Construction and operation of (i) **open-pit and underground mines** and related infrastructure; (ii) an ore concentrator plant; (iii) a tailings storage facility (TSF) and waste rock dumps (WRD); (iv) a road to the Chinese border for copper concentrate export; (v) a 220 kV electrical TL to the Chinese border

Abstraction of water from deep aquifers in the Gunii Hooloi basin 35-70 km northeast of the mine site
The mine will operate 24 hours per day based on two 12-hour working shifts.

The project has two phases: **Initial phase**: construction and operation of open-pit and underground mining operations at the Southern Oyu deposit and related infrastructure, to be followed by the **second phase** underground mining operations at the Hugo North deposit (expected to start in about 4 years)

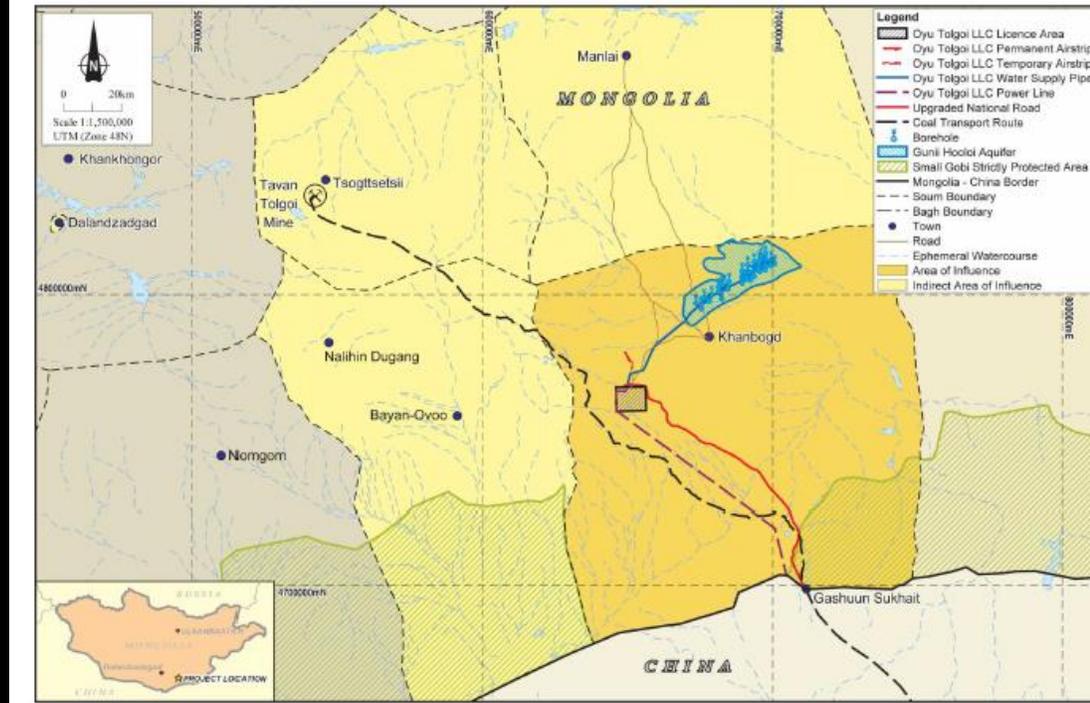
The project owner/developer: a Mongolian company, Oyu Tolgoi LLC (owned 66% by Ivanhoe Mines Ltd, a Canadian company and 34% by Erdenes Oyu Tolgoi LLC, Mongolian SOE. At the time of ESIA, Ivanhoe is 51% owned by Rio Tinto International.

IFC and EBRD are providing financing

Project location

- Sparsely populated Ömnögovi province, a mosaic of low-statured desert, steppe vegetation and scant surface waters, typical of the South Gobi region of Mongolia and neighbouring China.
- 600 km south of Ulaanbaatar, 220 km south-east of the provincial capital Dalanzadgad and 45 km west of the county capital Khanbogd
- Vast majority is open dry rangeland habitat.

Figure 1.7: Project Footprint and Area of Influence



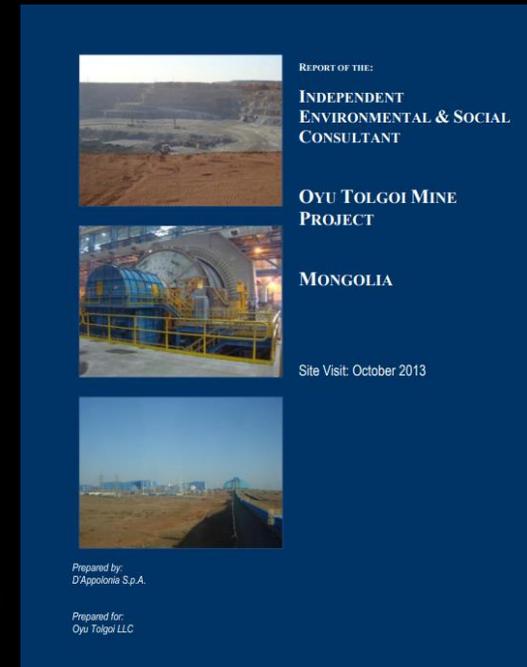
Source: ESIA Non-Technical Summary (2012)

From left: The Undai river in winter, in flood and in summer

Project Environmental and Social Impact Assessment (ESIA)

- Built on the Detailed Environmental Impact Assessments (DEIAs) conducted between 2002-11
- Prepared in 2012 per IFC PS and EBRD ESP, as an integrated assessment report
- Covered all Oyu Tolgoi Project facilities within the Mine License Area and surrounding 10 km buffer zone, and associated features.
- Assessed E&S risks and impacts in the “Project Area of Influence” incl. elements that are not planned to be funded as part of the Project, but which are integral to overall project development:
 - Local roads used regularly by the Project
 - Communities or individuals including Khanbogd county and Khanbogd country centre
- Comprehensively assessed the project impacts on the environment, biodiversity and the community
 - Project induced in-migration expected to intensify poaching and illegal hunting
 - Unsustainable grazing practice by local population expected to continue to pose threat to biodiversity and the project’s efforts to achieve no net loss/ net gain

(Source: <https://www.ot.mn/esia-management-en/>)



E&S baseline in ESIA:

- The vegetation largely comprises low-growing, drought- and cold-tolerant shrubs, perennial grasses and annual plants. Trees are absent over much of the landscape, but are locally abundant where shallow groundwater exists. The vegetation supports wild and domestic large herbivores
- Vegetation of conservation interest includes: saxaul (*Haloxylon ammodendron*), Siberian elm (*Ulmus pumila*) and granite outcrops that have distinct floral communities
- A diverse fauna with populations of global conservation significance for a number of globally and/or nationally threatened species
- Diverse bird assemblages that support important breeding populations of globally threatened species.
- At least 137 species of birds reported in ESIA, incl. several listed on the IUCN Red List
- A rich mix of small mammals (e.g., jerboas, gerbils, bats, hedgehogs), and carnivores (e.g., mustelids, wild cats, foxes, wolves)
- Globally important populations of large hoofed animals: Asiatic wild ass (IUCN Red-listed as Endangered); goitered gazelle (IUCN Red-listed as Vulnerable); argali sheep (IUCN Red-listed as Near Threatened; endangered status in Mongolia)

Taxonomic group	Biodiversity feature	Scientific name	Critical Habitat	IUCN Red List status	National Red List status	Status in unit of analysis
Plant (herb)	18 'very rare' plants incl. Mongolian Chesney	Chesneya/Chesniella mongolica	Tier 2	-	EN?	Patchily distributed throughout – assumed here to represent all 18 'very rare' plants known or predicted from the project area
Mammal (carnivore)	Snow Leopard	Panthera uncia	-	EN	EN	Very rare 'resident'
Mammal (ungulate)	Asiatic Wild Ass	Equus hemionus	Tier 1	EN	EN	Nomadic 'resident'
Mammal (ungulate)	Argali	Ovis ammon	Tier 2	NT	EN	Localised resident
Mammal (ungulate)	Goitered Gazelle	Gazella subgutturosa	Tier 2	VU	VU	Migratory 'resident'
Mammal (ungulate)	Mongolian Gazelle	Procapra gutturosa	-	LC	EN	Rare visitor from the east
Mammal (rodent)	Long-eared Jerboa	Euchoreutes naso	-	LC	VU	Likely very rare in far south Undai
Bird	Swan Goose	Anser cygnoides	-	VU	NT	Likely a regular migrant over the area
Bird	Ferruginous Duck	Aythya nyroca	-	NT	VU	Likely a regular migrant over the area
Bird	Short-toed Snake-eagle	Circaetus gallicus	Tier 2	LC	EN	Breeds
Bird	Saker Falcon	Falco cherrug	-	VU	VU	Breeds
Bird	Egyptian Vulture	Neophron percnopterus	-	EN	LC	Probably breeds
Bird	Great Bustard	Otis tarda	-	VU	VU	Regular migrant (stops over in the area)
Bird	Houbara Bustard	Chlamydotis undulata	-	VU	VU	Breeds
Bird	Relict Gull	Larus relictus	-	VU	EN	Likely a rare migrant over the area
Bird	Pallas' Sandgrouse	Syrrhaptes paradoxus	-	LC	LC	Breeds
Bird	Mongolian Accentor	Prunella koslowi	-	LC	LC	Very localised breeder
Bird	Mongolian Ground-jay	Podoces hendersoni	-	LC	VU	Breeds
Bird	Yellow-breasted Bunting	Emberiza aureola	-	VU	NT	Likely a regular migrant
Species Assemblage	Granite Outcrop Floral Communities	n/a	Tier 2	n/a	n/a	Khanbogd and other massifs
Habitat	Riverine Elm Trees	n/a	-	n/a	n/a	Mostly in Undai riverbed
Habitat	Ephemeral Lakes&Pools	n/a	-	n/a	n/a	Scattered near to hills in south
Habitat	Tall Saxaul Forest	n/a	-	n/a	n/a	Mostly in borefield and depressions
Habitat	Eastern Gobi desert-steppe	n/a	-	n/a	n/a	Major habitat type in the region -widespread
Habitat	AlashanPlateau semi-desert	n/a	-	n/a	n/a	Major habitat type in the region -widespread

Priority biodiversity features within zone of influence (Zoi)

(source: <https://www.ot.mn/esia-management-en/>)

ESIA found the project E&S impacts are mainly:

- Loss of underground and surface water, impacting herders, wildlife and groundwater-dependent vegetation
- **Biodiversity loss**
- Resettlement
- Labor influx, **triggering further biodiversity loss** and causing risks on CHS
- Ongoing impact on cultural heritage incl. impact on traditional cultures
- **Loss of c.52 ha of the ephemeral Undai river**, incl. the Bor Ovoo Spring, and c.7 ha of numerous small ephemeral water courses which flow into Budaa water course

ESIA contains construction phase ESMPs and a framework for operational phase ESMPs which will be completed and disclosed prior to IFC disbursing funds

Biodiversity Impact Assessment (BIA), Critical Habitat Assessment, Biodiversity Offset Strategy and Net Positive Impact Forecast prepared as part of ESIA by **Rapid Biodiversity Assessment Team (RBAT)**

- RBAT consists of: local and international specialists from Flora & Fauna International, Biodiversity Consultancy, Wildlife Conservation Society, Wildlife Science and Conservation Centre, World Wide Fund for Nature-Mongolia, National University
- Identified priority features impacted in the area of influence
- Determined the biodiversity values that qualify as critical habitat per IFC PS6

ESIA identified priority biodiversity features in Project Zol, and their values and risks (non-exhaustive)

Priority biodiversity feature	What maintains the biodiversity feature	Value to Oyu Tolgoi or others	Risks to Oyu Tolgoi if not managed
Mongolian Chesney1	Poorly-known	Very rare medicinal plant	Lenders' and national regulations, Rio Tinto policies
Asiatic Wild Ass	Pasture, drinking water, extensive contiguous habitat, limited hunting pressure	Iconic species of extensive steppe and desert	Lenders' regulations, reputation, Rio Tinto policies
Argali	Pasture, drinking water, limited hunting pressure	Iconic species of rocky hills and mountains	Lenders' regulations, reputation, Rio Tinto policies
Goitered Gazelle	Pasture, drinking water, extensive contiguous habitat, limited hunting pressure	Iconic species of extensive steppe and desert	Lenders' regulations, reputation, Rio Tinto policies
Mongolian Gazelle	Pasture, drinking water, extensive contiguous habitat, limited hunting pressure	Iconic species of extensive steppe and desert	Lenders' regulations, reputation, Rio Tinto policies
Swan Goose	Safe migration route, open water habitat	Iconic international migrant	Lenders' regulations, reputation, Rio Tinto policies
Ferruginous Duck	Safe migration route, open water habitat	International migrant	Reputation, Rio Tinto policies
Short-toed Snake-eagle	Elm trees for nesting	International migrant	Lenders' regulations, Rio Tinto policies
Saker Falcon	Prey availability, nesting trees	Iconic predator of extensive steppe	Lenders' regulations, reputation, Rio Tinto policies
Egyptian Vulture	Carrion, nesting cliffs	Large bird, scavenging services	Lenders' regulations, Rio Tinto policies
Great Bustard	Safe migration route, open grassy/scrubby habitat	Iconic international migrant	Lenders' regulations, reputation, Rio Tinto policies
Houbara Bustard	Safe migration route, open stony habitat, limited hunting pressure	Iconic international migrant and inhabitant of extensive steppe and desert	Lenders' and national regulations, reputation, Rio Tinto policies
Relict Gull	Safe migration route, open water habitat	International migrant	Lenders' and national regulations, Rio Tinto policies
Pallas' Sandgrouse	Semi-desert habitat, drinking water	Conspicuous resident susceptible to collisions with overhead wires	Reputation, Rio Tinto policies
Mongolian Ground-Jay	Scrubby habitat	Declining resident	Reputation, Rio Tinto policies
Yellow-breasted Bunting	Vegetation along migration route, especially near water	International migrant	Lenders' regulations, Rio Tinto policies
Riverine Elm Trees	Surficial (primary alluvial) aquifers, limited grazing pressure to allow regeneration	Shelter for animals from heat, sun, wind and predation; nesting for birds	Reputation, Rio Tinto policies
Tall Saxaul Forest	Surficial aquifers/ soil moistures, limited grazing pressure to allow regeneration	Shelter for animals from heat, sun, wind and predation; nesting for birds	Reputation, Rio Tinto policies
Yellow-breasted Bunting	Vegetation along migration route, especially near water	International migrant	Lenders' regulations, Rio Tinto policies
Riverine Elm Trees	Surficial (primary alluvial) aquifers, limited grazing pressure to allow regeneration	Shelter for animals from heat, sun, wind and predation; nesting for birds	Reputation, Rio Tinto policies

ESIA/BIA found several priority biodiversity features at Critical and High Risk in Project Zol

Feature	Impact	Likelihood	Consequence	Risk
Asiatic Wild Ass, Goitered Gazelle	Indirect habitat loss due to avoidance of infrastructure	Likely	Serious	Critical
Asiatic Wild Ass	Indirect mortality from hunting facilitated by increased access	Possible	Major	Critical
Argali, Goitered Gazelle, Saker Falcon, Houbara Bustard, Tall Saxaul Forest	Indirect mortality from hunting and collecting facilitated by increased access	Possible	Serious	High
Argali, Houbara Bustard	Indirect habitat loss due to avoidance of infrastructure	Likely	Medium	High
Great Bustard, Houbara Bustard, Saker Falcon	Direct mortality from collision with and electrocution by power transmission lines	Almost Certain / Likely	Medium	High
Mongolian Chesney, Asiatic Wild Ass, Goitered Gazelle, Houbara Bustard, Mongolian Ground-Jay	Direct habitat loss under infrastructure	Almost Certain	Medium	High
Houbara Bustard, Mongolian Ground-Jay	Indirect mortality from increased predation rates	Likely	Medium	High

ESIA/BIA found six main project impacts on priority biodiversity features:

Direct habitat loss in mining areas and project infrastructure's footprint

- 64 km² in the mine license area
- 1.5 km² for the airport
- 1.3 km² for the borefield/pipeline corridor
- Road upgrade (19.4 km, c. 15m wide)
- Most significant impacts will be on plants, which cannot move
 - *Potaninia mongolica* known from the pipeline route
 - The other rare plants are not known to occur, but there is a possibility that they occur as they are widespread
- Impacts on other priority species are not expected to be significant because they are not likely to use the area substantially or are largely passage migrants that only fly through the area.
- Very little direct habitat loss expected on powerlines, river diversions, borefields

Indirect habitat loss due to avoidance of infrastructure by animals

Priority biodiversity feature	Hunted?	Mine site/ airport	Busy road	Powerlines	Khanbogd town
Mongolian Chesney	n/a	n/a	n/a	n/a	n/a
Snow Leopard	yes	n/a	n/a	n/a	n/a
Asiatic Wild Ass	yes	5 km	5 km	500 m	10 km
Argali	yes	500 m	1 km	0	5 km
Goitered Gazelle	yes	1 km	5 km	500 m	10 km
Mongolian Gazelle	yes	1 km	5 km	500 m	10 km
Long-eared Jerboa	no	n/a	n/a	n/a	n/a
Swan Goose	yes?	likely some avoidance but very limited habitat for this rare migrant			
Ferruginous Duck	yes?	likely some avoidance but very limited habitat for this rare migrant			
Short-toed Snake-eagle	no	0	0	0	0
Saker Falcon	(no)	0	0	0	0
Egyptian Vulture	no	0	0	0	0
Great Bustard	yes	1 km	1 km	1 km	5 km
Houbara Bustard	yes	1 km	1 km	1 km	5 km
Relict Gull	no?	likely some avoidance but very limited habitat for this rare migrant			
Pallas' Sandgrouse	no	0	0	0	0
Mongolian Accentor	no	n/a	n/a	n/a	n/a
Mongolian Ground-Jay	no	0	0	0	0
Yellow-breasted Bunting	no	0	0	0	0
Granit Outcrop Floral Communities	no	n/a	n/a	n/a	n/a
Riverine Elm Trees	no*	n/a	n/a	n/a	n/a
Ephemeral Lakes and Pools	no*	n/a	n/a	n/a	n/a
Tall Saxaul Forest	no*	n/a	n/a	n/a	n/a
Eastern Gobi desert-steppe	no	n/a	n/a	n/a	n/a
AlashanPlateau semi-desert	no	n/a	n/a	n/a	n/a

Provisional estimates of avoidance distances for priority biodiversity features (ESIA 2012)

Fragmentation of animal populations

- Potential impacts on khulan and other ungulates due to (i) avoidance of the mine site and access roads, and (ii) increases in hunting and disturbance
- The existing 'coal road' likely has already fragmented ungulate populations. The residual, cumulative risk of the Oyu Tolgoi road upgrade is assessed "medium"
- The existing Trans-Mongolia railway acts as a barrier that Asiatic Wild Ass are unable to cross, and 17,000 km² of suitable habitat on the eastern side of the railway has now been lost.
- Powerlines are not expected to act as functional barriers creating significant population fragmentation or reduced connectivity

Direct mortality

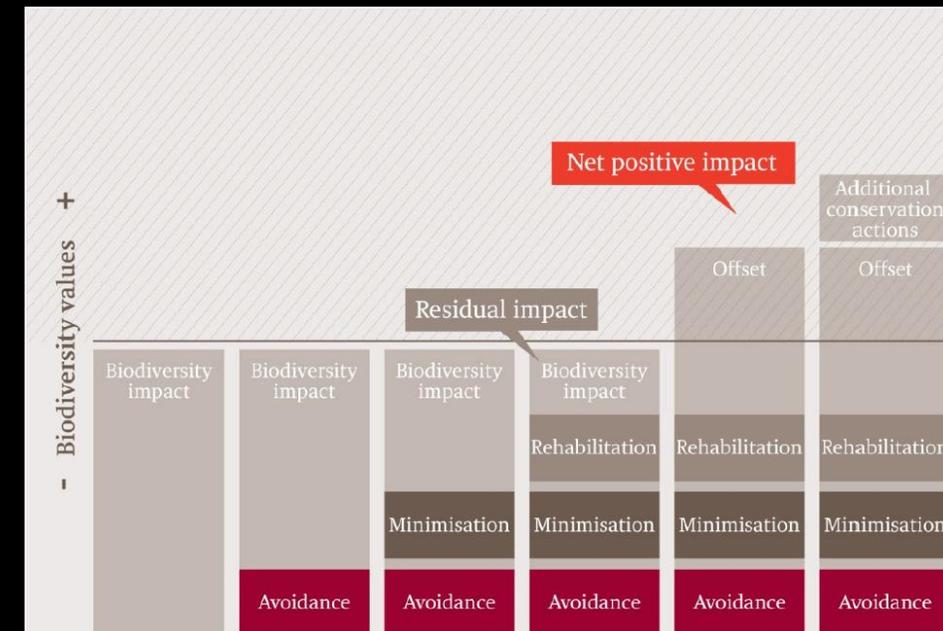
- Several priority species are susceptible to injury or death from collision with vehicles.
- Overall, mortality from collision with vehicles is likely to be limited
- Collisions with power lines: Bustards and birds of prey are particularly susceptible to the risk.
- Electrocution of any medium or large bird by power lines

Indirect mortality from hunting and collecting (in-migration, better road access) and from increased populations of natural predators (increased food and nesting opportunities)

- Regional influx of people (expected to be 32,000 people by ESIA) will likely increase illegal hunting and collecting
 - Illegal hunting: primary threat to the survival of Asiatic Wild Ass, Argali, Goitered Gazelle and Houbara Bustard
 - Collection of Tall Saxaul Forest for firewood: increasing as more people move to Khanbogd county, remote areas become more accessible by road and increased demand by roadside restaurants for fuelwood
 - Road improvement will increase accessibility to China, the world's biggest market for wild animal products
- Scavengers such as Raven, Black Kite, foxes and Long eared Hedgehog *Hemiechinus auritus* (all potential predators of nests, including of Houbara Bustard) will increase
- This impact is mainly relevant to Houbara Bustard nesting in the area. The primary predators of breeding and migrant Houbara Bustard in the region are mammals

Oyu Tolgoi LLC Biodiversity goal: seeks to ensure that the biodiversity of the southern Gobi region ultimately benefits from the project's presence in the region

- Achieve a **Net Positive Impact (NPI)** on biodiversity of the southern Gobi region:
 - By mine closure but will seek opportunities to achieve net positive impact as early as practicable in the project life, though achieving:
 - A Net Positive Impact for biodiversity with critical habitat; and
 - A No Net Loss outcome for other priority biodiversity features, including Natural Habitat
- Apply **Mitigation Hierarchy**, first avoid, minimize, and restore impacts, before offsetting residual impacts
 - TL re-routed to avoid the Small Gobi Strictly Protected Area and high dust areas near Tsagan Khad due to potential coal dust impacts
 - The original transport routes modified based on the comparison of alternatives, and the route that would not require substantial river crossings, and which help avoids potential impacts on shallow herder wells and springs, was selected



ESIA identified impact minimization and rehabilitation measures for Critical and High-risk impacts

Infrastructure	Step in the mitigation hierarchy	Action
Roads	Minimise	Deter vehicles leaving, but facilitate wildlife crossing, the OT-GS, OT-Khanbogd and OT-airport roads (probably by using immoveable boulders or posts, and optionally also ditches, but this needs further research, top revert vehicles leaving either side of the road except for agreed herder crossings)
	Minimise	Provide driver awareness and training for all OT staff and contractors with specific information on priority biodiversity features (e.g. ungulates and birds)
	Minimise	Enforce no unauthorised waste disposal/littering from OT vehicles or around work place
	Minimise	Enforce low speed limits of OT vehicles on sealed and unsealed roads on and off-lease (speed limits for OT vehicles will be reviewed in consultation with a wildlife expert).
	Minimise	Engage with key stakeholders to support the adoption and enforcement of suitable speed limits (in line with OT vehicle speed limits) on all public users of the OT-GS Road
	Minimise	Restrict OT vehicles from parking beside roads except in an emergency or to manage fatigue
	Minimise	Engage with key stakeholders to encourage all road users to minimise parking beside roads except in an emergency or to manage fatigue
	Minimise	Erect signage on roads to warn drivers of risk of collision with wild animals
	Rehabilitate	Inspect and remove litter and other anthropogenic waste from along the OT -GS Road, OT -Khanbogd Road and OT Borefield Access Road 3 times weekly during peak construction period (frequency of inspections to be reviewed on an ongoing basis, and is expected to be reduced as project moves to operational phase and traffic on roads reduces)
	Hunting and collecting	Minimise
Minimise		Engage with local and regional stakeholders to control hunting in the OT AoI and more broadly within Khanbogd soum (research the best actions to address illegal hunting and collecting, and undertake actions adequate to reduce the level and impact of illegal hunting and collecting to baseline levels)
Minimise		Provide all project operations staff and contractors fuel for fires to prevent collection of local timber (i.e. saxaul)
Minimise		Inspect an adequate proportion of all aircraft under OT control for illegal wild animal products
Minimise		Inspect all vehicles entering the OT site for illegal wild animal products
Regional	Minimise	Provide adequate funding, capacity-building and other support to enable biodiversity mitigation actions to be integrated into regional planning, including infrastructure development, within Khanbogd soum (It is noted that more detailed commitments may be developed in association with the Oyo Tolgoi project social team)
Power Lines	Minimise	Add bird flight diverters to all power lines (install alternating flapper-type flight diverters and large spirals, alternating contrasting colours, at a frequency of at least one of each every 10 -20 m i.e. one device every 5 -10 m)
	Minimise	Insulate medium-voltage powerline poles, dead-ends and sub-stations, and on pylons where necessary
	Rehabilitate	Document and remove collision carcasses and nests from medium voltage and high-voltage powerlines during regular inspections. Review periodicity of inspection safter 6 months the natanual intervals
	Rehabilitate	Remove nests of birds which predate bustards, except where known to be Saker Falconnests, where made on project-related infrastructure
Rehabilitation	Rehabilitate	Rehabilitate and restore at least equal areas or numbers of features impacted (in line with Oyu Tolgoi Rehabilitation Management Plan and standard Rio Tinto rehabilitation and restoration practice)
	Rehabilitate	Ensure replacement spring mimics the ecological functions of Bor Ovoo spring
Offsets	Offset	Undertake adequate offset actions to achieve a Net Positive Impact at low risk as discussed in the separate offsets discussion paper

OT's ESIA/Biodiversity Offsets Strategy (2012): aims to “achieve Net Positive Impact (NPI) on biodiversity through the generation of gains in priority biodiversity features to offset residual project losses” through:

- Reduce illegal hunting
- Improve rangeland management
- Reduce the impacts of non-project powerlines (elsewhere in southern Gobi region)
- Strengthen protected areas management
- Demonstrate and contribute to best-practice regional development
- Establish strong enabling mechanisms
- Monitor and evaluate
- Build Oyu Tolgoi capacity

ESIA/NPI Forecast (2013): assessed the **feasibility of NPI** based on a projection of potential biodiversity losses and gains over 25 years; expected project impacts; potential offset activities; characteristics of priority biodiversity features; and background rates of biodiversity loss and threat in the region.

Priority biodiversity features in NPI forecast: (1) all priority species and ecosystems (i.e., not ecosystem services) qualified as Critical Habitat under IFC PS6/EBRD PR6, as well as (2) species and habitats defined as appropriate for inclusion in NPI accounting by Rio Tinto internal guidance

ESIA/ NPI Forecast (2012) was updated in 2016, based on the updated BMP and OMP, with view to reaching NPI by 2040 and maintaining a net positive legacy

	CH-qualifying feature?	Significant residual risk impact ¹	Metric	Residual impact	Offset	Gain	Net position ²	Lender requirement	Requirement met?
Natural Habitats									
Riverine elm and poplar		No significant residual impacts. Elm will benefit from off-site rehabilitation						NNL	Yes
Ephemeral Lakes and Pools		No impacts						NNL	Yes
Granite outcrop floral communities	Yes	No significant residual impacts						NPI	Yes
Rangeland		Direct habitat loss (footprint)	QH	8,500	Rehabilitation	190	4,800	NNL	Yes
					Sustainable cashmere	13,125			
Tall saxaul forest		No significant residual impacts	QH	12	Rehabilitation	12	0	NNL	Yes
Mammals									
Asiatic Wild Ass	Yes	Indirect habitat loss (disturbance)	QH	17,000	Anti-poaching	44,000	2,500,000	NPI	Yes
					Fence removal	2,500,000			
		Indirect mortality	No. individuals per year	150	Anti-poaching	450	300		
Fragmentation			QH	23,000	Anti-poaching	85,000	2,600,000		
					Fence removal	2,500,000			
Goitered Gazelle	Yes	Indirect habitat loss (disturbance)	QH	17,000	Anti-poaching	44,000	27,000	NPI	Yes
		Indirect mortality	No. individuals per year	420	Anti-poaching	1,260	840		

	CH-qualifying feature?	Significant residual risk impact ¹	Metric	Residual impact	Offset	Gain	Net position ²	Lender requirement	Requirement met?
		Fragmentation	QH	23,000	Anti-poaching	85,000	62,000		
Argali	Yes	No significant residual impacts. This species will benefit from anti-poaching offsets						NPI	Yes
Mongolian Gazelle		No significant residual impacts. This species will benefit from anti-poaching offsets and sustainable cashmere						NNL	Yes
Long-eared Jerboa		No significant residual impacts						NNL	Yes
Marbled Polecat		No significant residual impacts						NNL	Yes
Birds									
Ferruginous Duck		No significant residual impacts. This species may benefit from power line offsets						NNL	Yes
Short-toed Snake-eagle		No significant residual impacts. This species may benefit from power line offsets and sustainable cashmere (rangeland improv)						NNL	Yes
Lammergeier		No significant residual impacts. This species may benefit from power line offsets and sustainable cashmere (rangeland improv)						NNL	Yes
Great Bustard		No significant residual impacts. This species may benefit from power line offsets						NNL	Yes
Houbara Bustard		Indirect habitat loss (disturbance)	No. individuals per year ³	37	Powerline standard ⁴	? ⁵	? ⁵	NNL	Unlikely
		Mortality	No. individuals per year	13	Powerline standard	? ⁵	? ⁵		
Saker Falcon		Indirect mortality	No. individuals per year	-ve ⁶	Powerline insulation	+++ve ⁶	+++ve	NNL	Yes
Relict Gull		No significant residual impacts. This species may benefit from power line offsets						NNL	Yes
Pallas' Sandgrouse		No significant residual impacts. This species may benefit from power line offsets and sustainable cashmere (rangeland improv)						NNL	Yes
Mongolian Accentor		No significant residual impacts. This species may benefit from power line offsets and sustainable cashmere (rangeland improv)						NNL	Yes
Mongolian Ground-jay		No significant residual impacts. This species may benefit from power line offsets and sustainable cashmere (rangeland improv)						NNL	Yes
Yellow-breasted Bunting		No impacts						NNL	Yes
Dalmatian Pelican		No significant residual impacts. This species may benefit from power line offsets						NNL	Yes
Plants									
<i>Amygdalus mongolica</i>	Yes	No significant residual impacts. This species will be avoided following the LDC&RMP procedures						NPI	Yes

	CH-qualifying feature?	Significant residual risk impact ¹	Metric	Residual impact	Offset	Gain	Net position ²	Lender requirement	Requirement met?
<i>Cistanche deserticola</i>		No significant residual impacts. This species will be avoided following the LDC&RMP procedures						NNL	Yes
<i>Cistanche lanzhouensis</i> (formerly <i>C. feddenana</i>)	Yes	No significant residual impacts. This species will be avoided following the LDC&RMP procedures						NPI	Yes
<i>Incarvillea potaninii</i>		No significant residual impacts. This species will be avoided following the LDC&RMP procedures						NNL	Yes
<i>Spongiocarpella</i> (<i>Oxytropis</i>) <i>grubovii</i>	Yes	Direct habitat loss (footprint)	QH	? ⁷	Rehabilitation	+? ⁸	+? ⁸	NPI	Likely
<i>Zygophyllum potaninii</i>	Yes	Direct habitat loss (footprint)	QH	? ⁷	Rehabilitation	+? ⁸	+? ⁸	NPI	Likely
<i>Cynomorium songaricum</i>		Indirect mortality	Volume collected	-ve	None available	0	-ve	NNL	No ⁹
<i>Lycium truncatum</i>		Direct habitat loss (footprint)	QH	? ⁷	Rehabilitation	+? ⁸	+? ⁸	NNL	Likely

1 - see BMP Annex 3 (Oyu Tolgoi LLC 2016a)

2 - to two significant figures

3 - impacts have been converted into population level impacts by multiplying the area of impact by population density so that impacts can be addressed through the same offset

4 - this species may benefit from sustainable cashmere offsets but population-level impacts are unquantified

5 - a Mongolian national power line standard may benefit houbara bustards in the long-term, but no plans for power line developments within houbara range are known - hence the gain is unquantified, and NPI is unlikely within OT's 25 year timeframe

6 - minus signs represent unquantified negative impacts, plus signs represent unquantified positive impacts

7 - negative impacts on this species are currently being quantified by the project - see LDC&RMP and associated procedures

8 - positive impacts on this species are being researched by the project, but have not yet been quantified - see LDC&RMP and associated procedures

9 - this species is a parasitic plant, and thus one for which rehabilitation and offsetting options are unlikely. Unless further research reveals rehabilitation options, residual impacts will remain

Summary of offset plan and metrics in NPI Forecast (2016)

Impact (loss)	Offset (gain)	Analysis	Metric
Direct habitat loss	Sustainable cashmere	Habitat quality	Vegetation condition (scored 0-1) × area (QH)
Direct habitat loss	Fence removal	Habitat quality	Vegetation condition (scored 0-1) × area (QH)
Indirect habitat loss	Anti-poaching	Human disturbance	Human disturbance (scored 0-1) × area (QH)
Indirect habitat loss	Fence removal	Human disturbance	Human disturbance (scored 0-1) × area (QH)
Direct mortality	Powerline standard	Mortality	Number of individuals
Direct mortality	Powerline insulation	Mortality	Number of individuals
Indirect mortality	Anti-poaching	Mortality	Number of individuals
Fragmentation	Anti-poaching	Landscape connectivity	Connectivity (scored 0-1) × area (QH)
Fragmentation	Fence removal	Landscape connectivity	Connectivity (scored 0-1) × area (QH)

Target outcomes from offsets to deliver gains predicted in NPI forecast (2016)

ID	KPI	Target to achieve NPI	Monitoring measure
Reduced illegal hunting and collecting		18% reduction in poaching rate	
OMP-KPI-1	Asiatic wild ass (and goitered gazelle) carcass density within the anti-poaching offset landscape	18% reduction from 2015-2016 baseline	Driven line transects - see BMEP
OMP-KPI-2	Asiatic wild ass and goitered gazelle population over approx. 100,000 km ²	Detectable increase (p<0.2) [unless decreases are linked to non-OT pressures]	Driven line transects - see BMEP
OMP-KPI-3	Avoidance by Asiatic wild ass and goitered gazelle of human infrastructure	8.5% reduction in avoidance where anti-poaching work is implemented	Satellite collaring - see BMEP
Sustainable cashmere		3.75% improvement in rangeland quality across 350,000 ha	
OMP-KPI-4	Rangeland condition	3.75% improvement in monitoring plots in offset area compared to controls	Vegetation plots – see BMEP
Fence removal		Wild ungulates cross the railway regularly and use suitable habitat on both sides	
OMP-KPI-5	Extent of Occurrence of Asiatic wild ass in the southern Gobi	Expanded range includes 5,000 km ² of suitable habitat east of the UB-Beijing railway	Ground-based and aerial surveys – see BMEP
OMP-KPI-6	Total number of detected crossings of UB-Beijing railway by Asiatic wild ass and goitered gazelle	Both species crossing >10 times per month	Camera-trapping and satellite-collaring – see BMEP*
National power line standard	Non-OT power lines built in Mongolia to a new national standard to reduce bird collisions and electrocutions	Substantive reduction in collisions and electrocutions of various bird species considered by independent experts to adequately offset OT impacts on houbara bustard	-
	Kilometers of non-OT power line built in Mongolia following a new national standard	Target not yet set (see Annex 1)	Method to be developed
Insulation of non-OT power lines	Non-OT power lines insulated to prevent bird electrocutions	Substantive reduction in electrocutions of various bird species considered by independent experts to adequately offset OT impacts on houbara bustard	
	Kilometers of non-OT power line with insulation installed	Target not yet set - this will be developed as part of the feasibility study. See OMP mgmt. control ID 17.4	Method to be developed

Offset actions 1: **Anti-poaching**

- Aim to compensate for the following predicted residual project impacts
 - Indirect mortality on Asiatic wild ass and goitered gazelle from increased hunting due to access improvement and in-migration
 - Indirect habitat loss on Asiatic wild ass and goitered gazelle (due to avoidance of OT infrastructure by animals)
 - Fragmentation to Asiatic wild ass and goitered gazelle populations (owing to OT linear infrastructure).
- About 8% of Asiatic wild ass is estimated to be poached each year and perhaps 20% of the goitered gazelle population (2014/15 baseline data poaching of argali, houbara bustard, and priority plants is negligible)
- Anti-poaching program include:
 - Support the Multi-Agency Team (MAT) in Ömnögovi province to conduct inspections at ecologically relevant times of year plus contingent patrolling to follow up the information received through the hotline
 - Support a Mobile Anti-Poaching Unit (MAPU) to do regular inspection of meat markets, grocery stores, restaurants, etc.
 - Implement and fully operationalize Spatial Monitoring and Reporting Tool (SMART) in the Small Gobi SPA
 - Launch an awareness raising campaign regarding the Law on Environmental Protection and Law on Fauna throughout the project phase

Based on the lessons of the pilot project and similar activities in Mongolia, the program will be implemented in Nomgon, Bayan Ovoo, Khatanbulag, Khuvsgul, and Khanbogd counties, as long as OT impacts exist.

Offset action 2: Sustainable Cashmere Project (SCP)

- Aim to (i) reduce grazing pressure and improve rangeland condition; (ii) create a sustainable and wildlife friendly cashmere supply chain, and (iii) improve the capacity of herder organisations to manage their livestock and rangelands for sustainable environmental and financial outcomes.
- Part of the broader Sustainable Cashmere Program implemented by WCS with funding from Kering
- Does not create a new market for cashmere but seeks to help herder cooperatives meet quality and sustainability criteria, and tap into the existing high quality cashmere market by :
 - An education program to reinforce the importance of wildlife conservation and pasture management for the financial and social sustainability of grazing rangelands
 - Price incentives to financially reward herders that reduce herd numbers to agreed levels.
 - A wildlife friendly certification process to provide assurance around the incentive mechanisms
- SCP consists of:
 - A monitoring program incl. work with herders to monitor livestock numbers
 - Wildlife friendly herding practices
 - Capacity development of herder cooperatives incl. for improved livestock breeding and husbandry
 - Improvements in animal breeding and husbandry practices to improve the quality of cashmere
 - Veterinary capacity development
 - Support for income diversification

Offset action 3: **Powerline standard and insulation**

- Aim to achieve a quantifiable averted losses of priority biodiversity by:
 - Help the GoM develop and assist the early implementation of **new powerline standards and guidance** that requires wildlife-friendly power line design and mitigation
 - **Insulate additional, non-OT powerlines in mortality hotspots** with high electrocution rates of saker falcons

Offset action 4: **Railway fence removal**

- Remove fences along the Ulaanbaatar-Beijing railway to offset residual habitat losses from (i) fragmentation and (ii) direct/ indirect habitat losses that cannot be fully managed by monitoring/ targeted interventions on hotspots
 - The fence currently represents a complete barrier to Asiatic wild ass and major barrier to goitered gazelle. The population of Asiatic wild ass has been extirpated east of the railway
 - A feasibility study incl. a socio-economic study to design and gain consensus for a compensation mechanism to help offset livestock losses associated with fence removal
 - Pilot fence removal program incl. payment of compensation for collided livestock
 - Expansion of fence removal where herder density is low and settlements are far, incl. compensation mechanism

Excerpt of detailed NPI work plan

Table 3: Work plan for offset activities to reduce illegal hunting and collecting

ID	Tasks and management controls	Means of verification input indicators)	Short-term					Mid-term	Long-term
			2016	2017	2018	2019	2020	2021-2030	2031-2040+
1	Continue supporting the Multi-Agency Team (MAT) in Umnogobi aimag established during offset piloting. This will cover the jurisdictions of Nomgon, Bayan-Ovoo, Khanbogd and Manlai soums								
1.1	Manage MAT, MAPUs and wider anti-poaching offset	Number of person-days MATs and MAPUs on patrol							
1.2	Conduct inspections at ecologically relevant times of year plus contingent patrolling to follow up the information received through the telephone hotline	Seasonality of person-days MATs and MAPUs on patrol Proportion of hotline calls responded to							
1.3	Maintain hotline number to receive environmental violation information, and expand on its informant network	Hotline maintained year round Proportion of human population in southern Gobi to whom hotline information has been distributed							
2	Support a Mobile Anti-Poaching Unit (MAPU) in Khanbogd Soum to inspect within 100 km radius of OT								
2.1	Inspection of soum center meat markets and grocery stores	Number of soum centre meat markets and grocery stores patrolled by MATs and MAPUs Number of visits to each soum centre meat market and grocery store by MATs and MAPUs							
2.2	Surveillance of the soum radio stations, web-sales, loudspeaker announcements, and events (wildlife trade related announcements are sometimes made) to gather information on illegal activities	Frequency of surveillance							

Enabling mechanisms to be supposed

- **Improve the management of the Small Gobi Strictly Protected Area** to address illegal hunting of wildlife, one major threat to biodiversity within the Small Gobi SPA
 - Training in the use, and supporting implementation, of a Spatial Monitoring and Reporting Tool (SMART) in the Small Gobi SPA
 - Staff recruitment
- **Support regional development planning:**
 - Capacity development to minimise cumulative impacts on biodiversity in the southern Gobi, and ensure gains delivered via OT offsets are sustained into the future (study tour, regional baseline, legislative development, etc.)



Biodiversity Management and Evaluation Plan (2015)

- Assess impacts (positive and negative) of operational activities and the effectiveness of mitigation (including rehabilitation and offset) actions in order to allow for adaptive management
- Demonstrate that the project is on track for and, in the longer-term, results in a NPI on priority biodiversity features
- Evaluate experimental management options within a scientific framework.

BMEP implementation mechanism:

- Water team (water monitoring results)
- Environment team (air and dust monitoring results)
- Social performance team (community-related monitoring results)
- Security team (illegal plant and wildlife inspection results)
- Transportation team (off-site transport/vehicle monitoring results)
- Training team (conducting biodiversity and environment training with employees and contractors)
- Ecosystem services working group.

External interface: Ministry of Environment, Green Development and Tourism; Ministry of Transportation; Wildlife Science and Conservation Center; Wildlife Conservation Society; and Tri Partite Council (TPC)

Excerpt of BMEP (2015)

Biodiversity	Pressure State or Response? OMP KPI?	Indicator (refer to appendices for details)	NPI target (over 25-year NPI timeframe)	Orange threshold	Red threshold
1. Critical Habitat qualifying features					
1a. Predicted critical risk from OT impacts					
Asiatic wild ass (khulan) and Goitered gazelle	Pressure (= OMP-KPI-1)	Carcass density within the anti-poaching offset landscape (from line transects)	18% reduction in new carcasses (from 2015 baseline)	Any inter-annual increase, or <30% reduction over ten years	No decrease in carcasses over any 5 years
	Pressure / Response (= OMP-KPI-3)	Avoidance of infrastructure	8.5% reduction where anti-poaching work is implemented	To be set when baseline data are available	To be set when baseline data are available
	Pressure	Number of crossings of OT-GS road (by GPS collared individuals)	Any animal crossing/year (from 20 collared Asiatic wild ass) Any animal crossing/year (from 10 collared goitered gazelle)	<5 animal crossings/year (from 20 collared Asiatic wild ass) <5 animal crossings/year (from 10 collared goitered gazelle)	<1 animal crossing/year (from 20 collared Asiatic wild ass) <1 animal crossing/year (from 10 collared goitered gazelle)
	Pressure	Number of confirmed incidents of illegal hunting, collecting or possession (from enforcement teams)	Detectable reduction per unit effort (from 2015-2016 baseline)	To be set when baseline data are available	To be set when baseline data are available
	Pressure	Number of OT inspections finding illegal wildlife products	n/a	Any inspection finding any listed priority	>1 inspection finding any listed priority

2. Other stakeholder priority features					
2a. Predicted high risk from OT impacts					
Houbara bustard	Pressure	Number of collision carcasses (before applying correction factors) found under power lines	≤4 collision carcasses / year	>4 collision carcasses / year	>6 collision carcasses / year
	Pressure	Number of construction and maintenance activities in the Galba Gobi IBA during the bustard lekking season	n/a	Any activity	>1 activity in same area in same year
	Pressure	Number of wildlife collisions with OT and contractor vehicles	n/a	Any bustard collisions	>1 bustard collisions/year
	Pressure	Number of ravens at the Waste Management Center	n/a	To be set when baseline data are available	To be set when baseline data are available
	Pressure	Number of active raven nests in Khanbogd survey area	n/a	To be set when baseline data are available	To be set when baseline data are available
	State	<i>Based on results of monitoring pressure, annually review the periodicity and methods for monitoring population density</i>			
	Response	% bird flight diverters along all OT related powerline infrastructure malfunctioning / missing	n/a	n/a	n/a
	Response (= OMP-KPI-7)	Kilometers of non-OT powerline built in Mongolia following a new national standard	To be set when the powerline standard is agreed	To be set when the powerline standard is agreed	To be set when the powerline standard is agreed
Other priority plants		Potential impacts from loss and degradation of rangeland habitat: same methods as Critical Habitat-qualifying priority plants			

Project NPI strategy towards net gain is supported by parallel programs

Gobi Oyu Development Support Fund (DSF)

- Established in 2015 as a standalone legal entity:
 - **Vision:** Together based on trust, we will contribute to a prosperous future for the South Gobi
 - **Mission:** Our fund sponsors cooperation-based development initiatives that promote and support the well-being of South Gobi people
- OT contributes US\$5 million/year based on the Cooperation Agreement between OT, Umnugovi province and the partner communities of Khanbogd, Manlai, Bayan-Ovoo and Dalanzadgad counties
- Fund projects and programs on health, education, training, employment, local business expansion support, environment and preservation of cultural heritage
- Administered jointly between Oyu Tolgoi and the Community (Relationship Committee) for review and prioritization of proposals against established criteria and make recommendations to the DSF Board
- DSF Board: review the recommendations and prioritized DSF proposals from the Relationship Committee against the funding guideline, to take a decision on approval of proposals in line with a 3 year plan.
- Relationship Committee and DSF Board meet quarterly.

Project NPI strategy towards net gain is supported by parallel programs

Pastureland and Livelihood Improvement Management Plan

- Establish Animal health center in Khanbogd county and build operational capacity with Agriculture department of Omnogovi province
 - Conduct a comprehensive study on pasture quality and quantity
 - Support additional income generation initiatives by the herders group and cooperatives (ecotourism, vegetation planting) through the DSF
 - Conduct a comprehensive study on pasture water resource under the DSF
 - Develop the capacity of country veterinary and breeding service unit under the DSF

(<http://www.goviinoyu.mn/eng/page/54>)



Project NPI strategy towards net gain is supported by parallel programs

Participatory environmental monitoring

- Local herders and community members monitor hand well water levels and observe wildlife and elm trees along the Undai riverbed (since 2011)
- This information helps validate the results of OT's environmental protection and monitoring initiatives.
- Munkh Nagoon Galba NGO established by local residents and herders to carry out environmental monitoring projects (since 2018):
 - Comprehensive monitoring of sites potentially impacted by mining operations
 - Water resources and precipitation
 - Soil degradation and soil moisture
 - Pasture and beneficial plants
 - Wildlife and natural open water bodies
 - Air quality and ambient dust
 - Ecological education for young people and students.

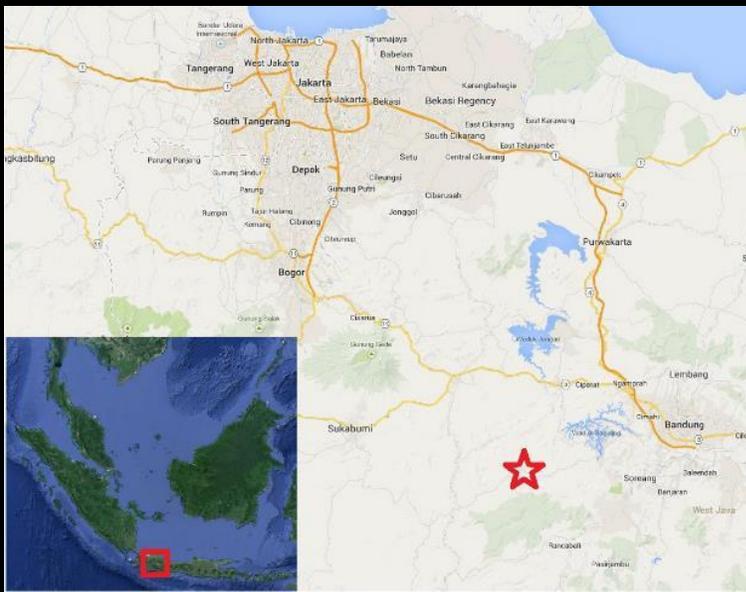
As of first quarter 2021, 118 herders were reportedly participating in five types of monitoring at 168 points

(<https://www.ot.mn/participatory-environmental-monitoring/>)



Upper Cisokan Pump Storage (UCPS) project

- Installed capacity: 1,040 MW
- Upper dam (75.5m height, 10 million m³, 800 m asl), Lower dam (98m height, 10 million m³, 460 m asl)
- Waterways (2,375 m), Powerhouse, Transmission Lines (15 km), Access roads (27km)
- Project footprint covers 775.64 ha
- Project area: about 3 hours from city of Bandung, West Java, Indonesia.
- The Cisokan River originates from a forest upland area (2,000m asl), flow into the existing Waduk Jangari and Waduk Jatiluhur reservoirs after the project areas, and eventually into the Java Sea.
- Project catchment area: steep hills with a maximum altitude of about



Biodiversity Assessment conducted as part of ESIA, and Biodiversity Management Plan (BMP) prepared as part of ESMP

- ESIA established **overall E&S baseline** and assessed the **project impacts** including on but not limited to biodiversity, building on earlier E&S assessments conducted and consistent with WB ESF
- ESIA includes **Integrated Catchment Management (ICM) studies, biodiversity field work, Land Acquisition and Resettlement Plan (LARAP)** and the **2020 cumulative impact assessment** on the nature and rate of existing forest degradation
- Management plans developed based on ESIA incl. BMP.
- BMP complements other management plans and constitute part of ESMP
- ESMP includes management plans for all project risks, incl. biodiversity management, access road construction, quarry management, environmental monitoring, social and community impact, etc. during pre-construction, construction and operation

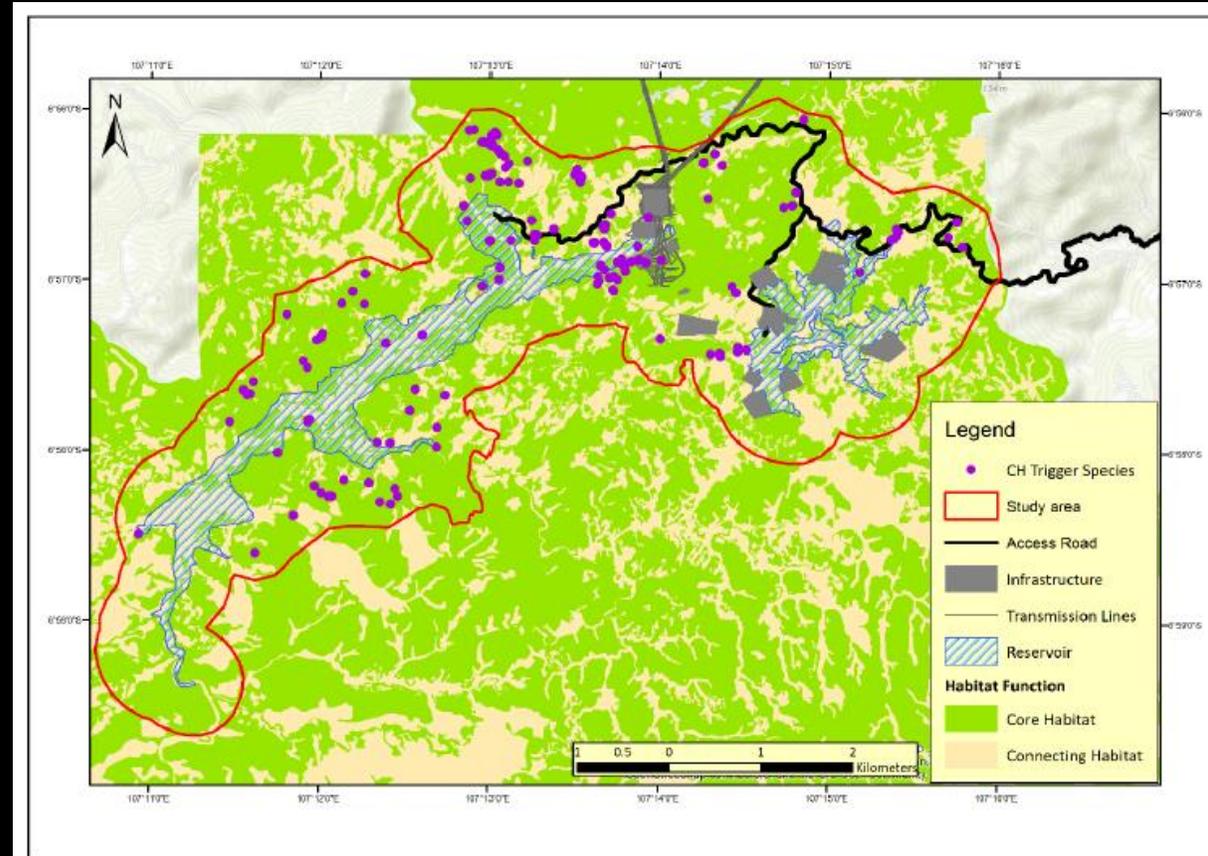


Figure 8. UCPS landscape showing land cover, presence of species triggering Critical Habitat, and the approximate extent of the study area in which these species have been assessed.

Project E&S baseline:

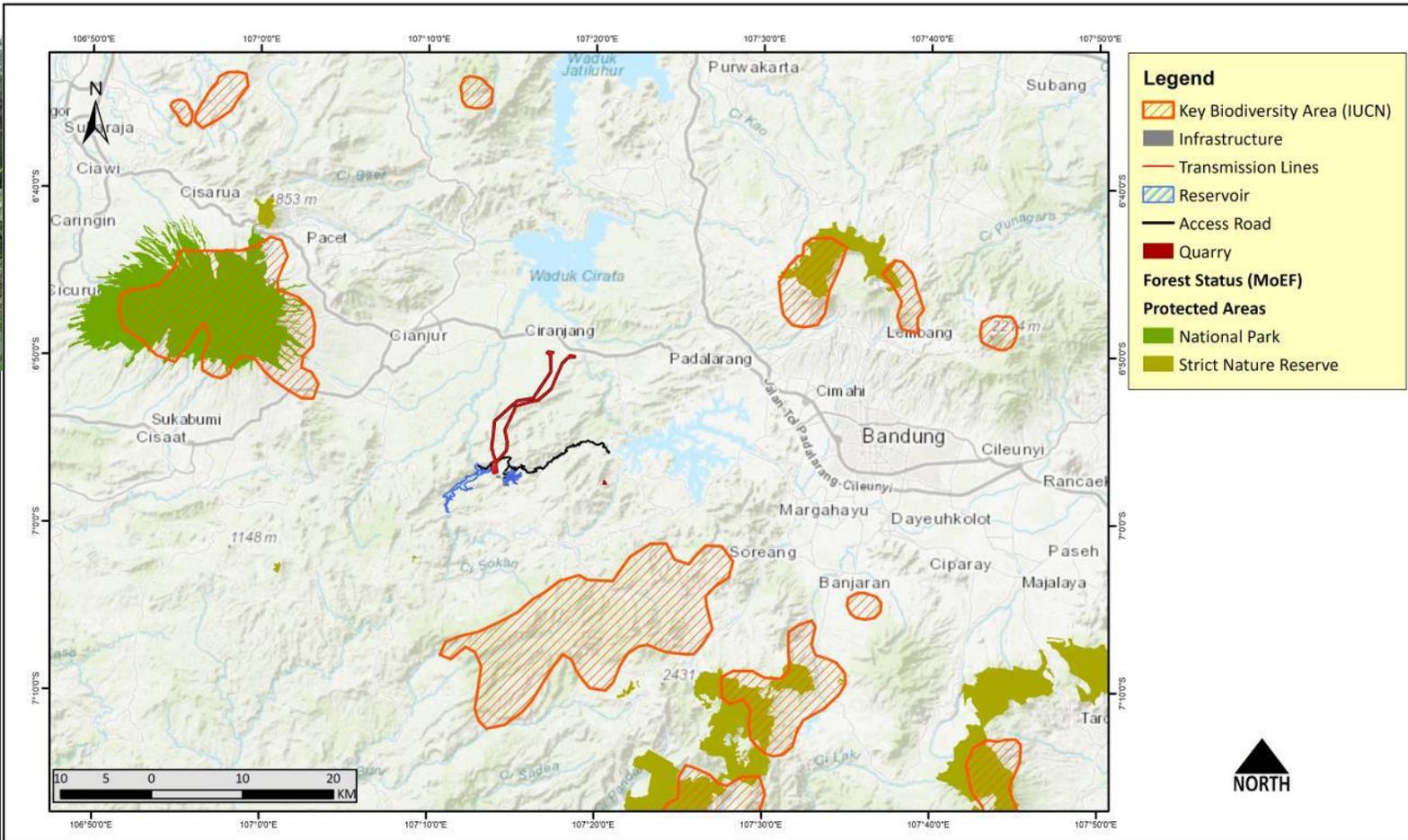
- **Existing land cover:** village settlements, rice fields, mixed gardens, production forest mainly pine trees owned/ managed by Perhutani (state owned forestry company), and pockets of modified tropical forest. A matrix of more or less degraded forest and scrub areas, as well as grasslands.
- **Community activities** have had a major impact on production forests. Very hard to find a good pine tree now.
- **Patchy land cover** around the future reservoirs, small forest patches separated by grassy or bare areas
- **Hunting and poaching** by local people: a threat to biodiversity esp. pangolin and bird species popular in the pet trade.
- **Wildlife conflict:** a threat to species, especially pigs and deer feeding on agricultural crops
- **Natural tropical forest** (east of Cisokan River the Project) will not be directly impacted by inundation.
- **No protected areas** and **Key Biodiversity Areas (KBA)** within 10km radius of Cisokan, but 23 protected areas, 8 KBAs and 1 Alliance for Zero Extinction area exist within a 50 km radius.





Rice fields inside BIA

Strongly human-modified landscape due to a long history of conversion of forests to agricultural fields, with pockets of forest areas with Critical Habitat/KBAs



Production forest, mixed gardens and paddy fields co-exist inside or near the BIA



BMP identified 15 BIAs over 425 ha of forest areas

- The lower dam area has **rich mammal species** with 34 species detected, compared to 25 in the upper dam area; 6 in the quarry area; 11 in the access road area; and 1 species in areas earmarked for TL
- Natural forests have over many decades been degraded, deforested and converted into **rice fields and production forest**
- Critically Endangered Pangolin and Javan Slow Loris, Endangered Javan Gibbon and Grizzled Leaf Monkey, and the Javan Leopard (until recently Critically Endangered in IUCN Red List) are confined in **mutually disconnected, 15 pockets of 'Biodiversity Important Areas' (BIA)** without sufficient ecological resources to sustain the population independently
- No plant species have been identified in project areas that are international listed as threatened.
- **Agroforestry** inside critical habitat areas under threat of agricultural and forestry expansion. Without intervention, agroforestry patches will continue to shrink, expanding gaps between BIAs
- Assuming a constant rate of decline, **the agroforest area will be reduced** by 762 ha to less than 1,500 ha by 2050.



Taxa	Local name/English name	Status	
		Protection status in Indonesia	IUCN Red List Category ³
Accipitriformes			
<i>Nisaetus bartelsi</i>	Elang Jawa/Javan Hawk-eagle	P	EN
Artiodactyla			
<i>Tragulus javanicus</i> (Osbeck, 1765)	Pelanduk kancil/Javan Mouse-Deer	P	DD
Carnivora			
<i>Aonyx cinerea</i> (Illiger, 1815)	Sero ambrang/Small-clawed Otter	NP	VU
<i>Arctictis binturong</i> (Raffles, 1821)	Binturung muntu/Binturong	NP	VU
<i>Prionailurus bengalensis</i> (Kerr, 1792)	Meong congkok/Leopard Cat	P	LC
<i>Panthera pardus melas</i> (Cuvier, 1809)	Macan tutul jawa/Javan Leopard	P	Currently not evaluated
Pholidota			
<i>Manis javanica</i> (Desmarest, 1822)	Trenggiling/Pangolin	P	CR
Primata			
<i>Presbytis comata</i> (Desmarest, 1822)	Lutung surili/Grizzled Leaf Monkey	P	EN
<i>Trachypithecus auratus</i> (Geoffroy, 1812)	Lutung budeng/Javan Langur	P	VU
<i>Hylobates moloch</i> (Audebert, 1798)	Owa Jawa/ Javan Gibbon	P	EN
<i>Nycticebus javanicus</i> (Geoffroy, 1812)	Kukang/Javan Slow Loris	P	CR



Two species in the project areas qualify as Critical Habitat, and possibly three more species



Figure 4. The Javan Slow Loris (left) is a small, nocturnal primate found only on the Indonesian island of Java. Slow lorises, including the Javan slow loris, are unique among primates in having a venomous bite. The Javan slow loris is seriously threatened by the illegal pet trade. The Javan Leopard is the largest remaining carnivore on Java (now that the Javan Tiger is extinct). It is widely persecuted and its prey base – deer, pigs and monkeys – is disappearing with ongoing deforestation.

The Project will impact 400ha and 2,288ha of Critical Habitat, directly and indirectly. In addition, TL will directly impact 100 ha and indirectly impact 341 ha of critical habitat

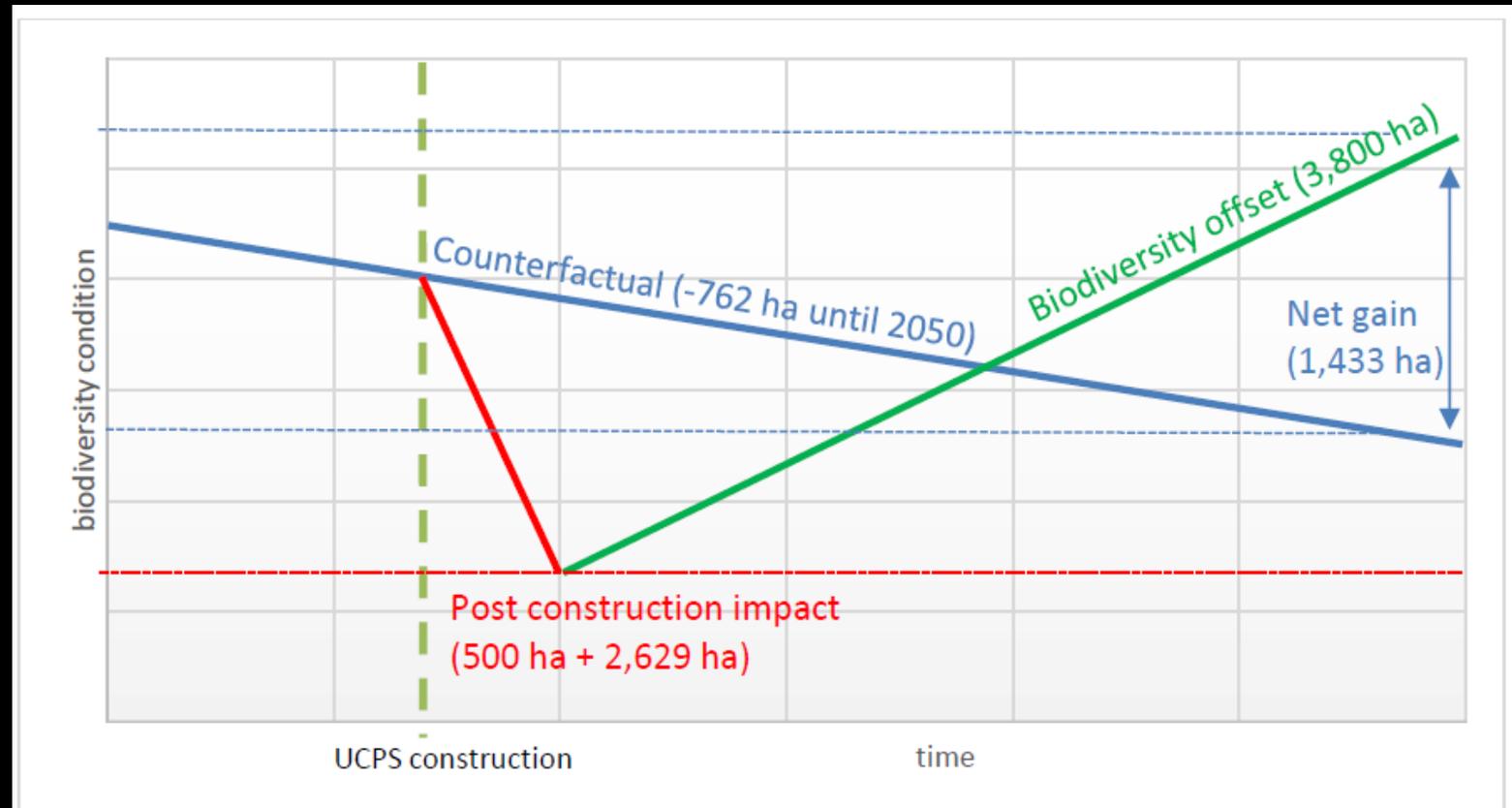
- **Direct habitat loss** due to land clearing and inundation from infrastructure development (access road, reservoir area, dams, switchyard, transmission lines, temporary access roads, spoil banks etc.), causing loss of forest area (cultivated plants with economic value to the communities and Perhutani, and natural forests), and impeding wildlife movement
- **Habitat fragmentation** from construction of reservoirs, TLs and access roads
- **Induced development** from improved access causing further transformation of remaining forests for agricultural activities
- **Indirect habitat loss** due to hunting and collecting by project workers and in-migrants
- **Forest fire risks**
- **Electrocution/Collision risks**

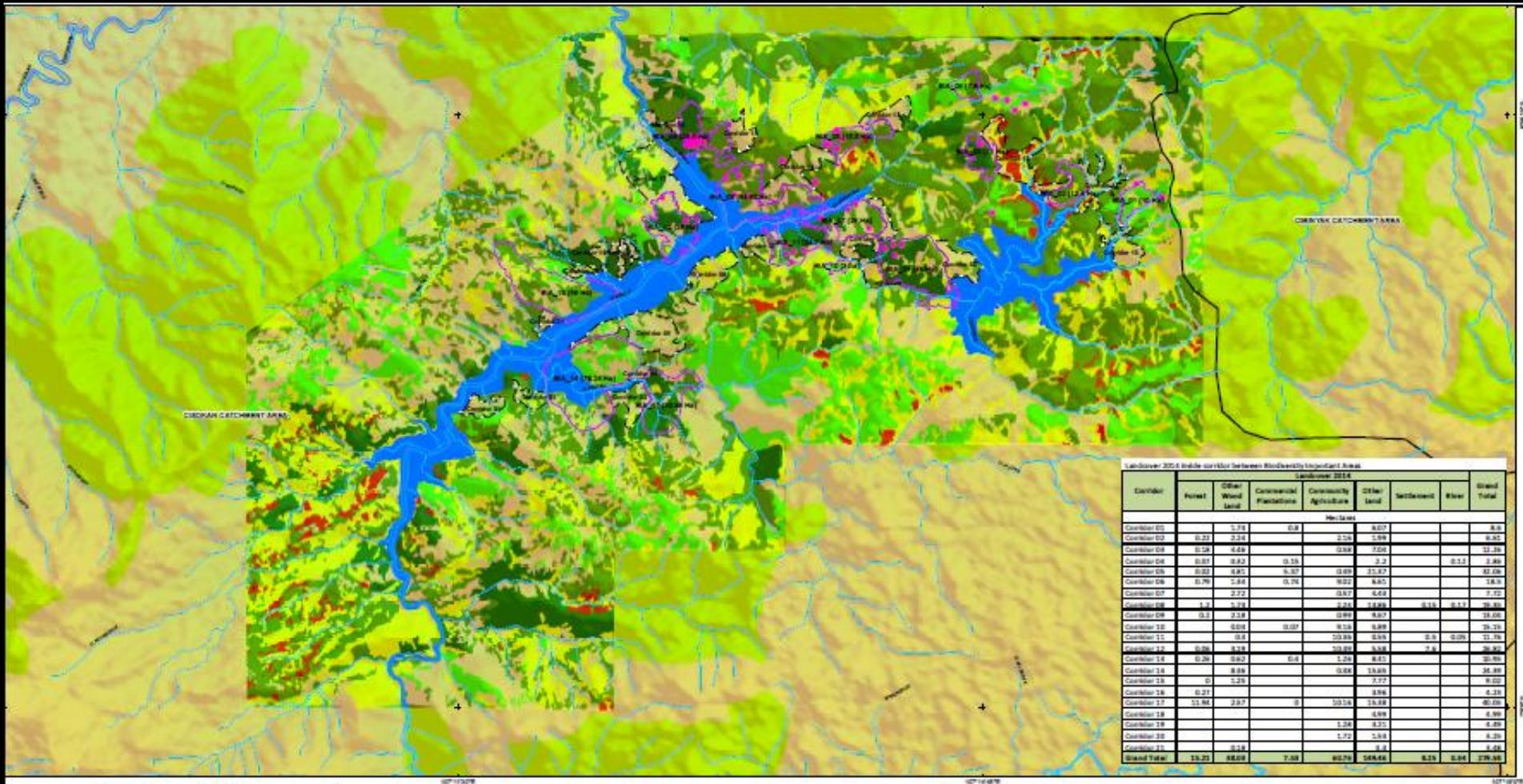


The Project aims to achieve Net Positive Impact (NPI):

Restore a connected (agro)forest landscape across 3,800 ha of land around the reservoirs and project facilities, and **achieve a net positive gain, offsetting the 500 ha of direct impacts and the 2,629 ha of indirect impacts.** The NPI targeted from the biodiversity offset against the counterfactual scenario estimated at **3,800 ha – 500 ha (direct) – 2,629 ha (indirect) + 762 ha (counterfactual loss) = 1,433 ha** over a 30-year time frame

The biodiversity offset is **additional** to the losses that would have occurred under the counterfactual scenario

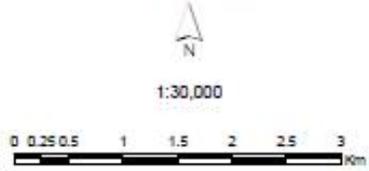




Landcover 2014 inside corridor between Biodiversity Important Area

Corridor	Landcover 2014							Grand Total
	Forest	Other Wood Land	Commercial Plantations	Community Agriculture	Other Land	Settlement	River	
Corridor 01		1,75	0,8			0,07		2,62
Corridor 02	0,21	2,24			0,99	0,04		3,48
Corridor 03	0,19	0,44				0,04		0,67
Corridor 04	0,07	0,42	0,15			0,11		0,75
Corridor 05	0,02	0,95	0,37	0,03	11,37			12,74
Corridor 06	0,79	2,38	0,19					3,36
Corridor 07		2,72		0,17	0,02			2,91
Corridor 08	1,3	5,78		2,24	7,88	0,14	0,14	17,46
Corridor 09	0,1	2,18		0,99	0,07			3,32
Corridor 10		0,04	0,07	0,14	0,09			0,34
Corridor 11		0,0		11,83	0,16	0,0	0,0	12,0
Corridor 12	0,09	0,14		10,03	0,08	0,0		10,34
Corridor 13	0,20	0,02	0,0	1,23	0,01			1,46
Corridor 14		0,04		0,03	11,04			11,11
Corridor 15	0	0,29			1,72			2,01
Corridor 16	0,21				0,04			0,25
Corridor 17	11,91	2,97	0	10,13	11,88			36,89
Corridor 18					0,04			0,04
Corridor 19					1,24	0,21		1,45
Corridor 20					1,72	0,04		1,76
Corridor 21		0,14						0,14
Grand Total	19,21	24,68	7,68	10,74	144,44	0,14	0,04	276,99

Landcover 2014 inside corridors Biodiversity Important Areas
 Integrated Catchment Management (ICM)
 Upper Cisokan catchment area
 West Bandung and Cianjur Districts
 West Java, Indonesia



Legend

- Important Species sight
 - River/ Water Body
 - Biodiversity Important Areas
 - Corridor between BIA
 - CISOKAN CATCHMENT AREA
 - Reservoirs
- Cisokan Landcover 2014**
- 1, Forest
 - 2, Other Wood Land
 - 3, Commercial Plantations
 - 4, Community Agriculture
 - 5, Other Land
 - 6, Settlement
 - 7, River



Sources:

1. Basmagri/ West Java, 1:25,000, Indonesia Topographic Agency, 2008
2. JSTTR (Advanced Spatiotemporal Emission and Reflection), JICA, 2010
3. WorldView 2 Image 30 cm Resolution, August 10, 2014
4. Cisokan Catchment Area Landcover, 2014
5. Biodiversity Assessment, IWRM, 2014

Grid and Projection System / Sistem Grid dan Proyeksi

Projection: Geographic Latitude - Longitude
 Proj4: Geographic Latitude - Longitude
 Old System: World Geodetic Coordinate System 1984
 Datum: WGS 1984
 Datum: WGS 1984

BMP seeks to achieve the NPI through core principles

- **Minimise** the direct impacts from Construction on the Biodiversity Important Areas (BIAs)
- Focus on the **immediate and medium-term needs** of the Critically Endangered Pangolin and Javan Slow Loris, Endangered Javan Gibbon and Grizzled Leaf Monkey, and Javan Leopard to sustain and enhance local populations
- **Protect and expand forest habitats** to connect the BIAs together and into the wider landscape while addressing the indirect impacts on biodiversity.
- Ensure community development programs, resettlement and other activities in the catchments are **complimentary** to the reforestation and wildlife protection efforts (and do not compromise /undermine them)
- Develop **an organizational structure and network** that addresses the immediate and longer-term needs of effective ICM



The Project applies the **Integrated Catchment Management (ICM) approach**

- Simultaneously address biodiversity, environmental and social aspects of landscape management to influence the wider issues in the catchment impacting on habitat, soil erosion and water quality
- Challenging environment: (i) *a highly fragmented ecological setting*; (ii) *densely populated landscape*; (iii) *many competing demands on land use*; (iv) *predominantly land/ natural resource-based livelihoods*; and (v) *limited opportunities for economic development*
- Comprehensive approach is considered necessary based on past experience, to protect small populations of Endangered and Critically Endangered species, increase the availability of inter-connected forests habitats, and increase gene flow between populations and increasing their effective (and eventually self-sustaining) population sizes.
- **Multiple, inter-related focus:**
 - Construction-related impact mitigation and management
 - Reforestation and forest management
 - Wildlife management
 - Stakeholder participation
 - Community engagement (and support for agroforestry).



BMP Action Plan prepared per the ICM approach, to be refined during implementation

- A. Construction-Related Impact Management
 - A.1 Minimize Further Habitat Fragmentation and Losses
 - A.2. Control Access
 - A.3. Fire Management
 - A.4. Manage Impacts of Traffic on Native Fauna
- B. Restoration and Forest Management
 - B.1 Collection of Plant Material, Management of Nurseries and Planting Services
 - B.2. Forest Management
- C. Wildlife Management
 - C.1. Wildlife and Habitat Management
 - C.2. Wildlife Encounters
- D. Stakeholder Participation
 - D.1. Strengthening Capacities for Institutionalizing ICM
 - D.2. Gaining Political Support
- E. Community Engagement
 - E.1. Biodiversity Awareness, Communication and Education
 - E.2. Aligning Resettlement Programmes with the BMP
 - E.3. Alternative Sustainable Livelihoods for Communities



Action Plans for Construction-Related Impact Management

No	BMP Action Plan 2015	Updated BMP Action Plan 2020	Project Stages			Contact person	Document	Remark
			Pre-construction	Construction	Operational			
A. Construction-Related Impact Management								
A1. Minimizing Further Habitat Fragmentation and Losses								
1	Survey and mark out BIA on the ground prior to construction at least 1 month before	(1) Mark out BIA boundary both on the map and on the ground				Perum Perhutani	MoU PT. PLN (Persero) and Perum Perhutani, Contract of PT. PLN (Persero) and Contractor	<p>The installation of boundary markers is necessary to facilitate monitoring, and also to make it easy for the public to recognize.</p> <p>The delineation of BIA territorial boundaries and corridors in the BMP AP 2020 should be included in the revised MoU and PKS between PT. PLN (Persero) and Perum Perhutani.</p>
2	Agreement for BIA (and blocks in Working Zone 2 and 3) management in accordance with the BMP is required from Perum Perhutani under the MoU and PKS	(2) Extend MoU and PKS with Perum Perhutani				PT. PLN (Persero) and Perum Perhutani	MoU PT. PLN (Persero) and Perum Perhutani, Perum Perhutani Revegetation Report	The contents of the revised MoU and PKS are adjusted to several findings of the BMP 2020, such as community engagement from seedling nursery to planting maintenance as well as tree species selection based on the BMP AP 2020 recommendations.

Action Plans for Construction-Related Impact Management

No	BMP Action Plan 2015	Updated BMP Action Plan 2020	Project Stages			Contact person	Document	Remark
			Pre-construction	Construction	Operational			
3	Confirm the planting plans for Working Zone 2 and 3 as required during the period of construction	(3) The planting plan in Working Zones 2 and 3 is adjusted to the goal of improving the quality of wildlife habitat and accommodate community to meet their daily needs				PT. PLN (Persero) and Perum Perhutani	MoU PT. PLN (Persero) and Perum Perhutani	It should be included in the revised MoU and PKS between PT. PLN (Persero) and Perum Perhutani
4	Implement the land clearing SOP12 during any necessary works in the BIA	(4) Continue to implement the land clearing SOP12 during any necessary works in the BIA as long as land clearing takes place				Main contractor	Contract of PT. PLN (Persero) and contractor	
5	Provide features such as tunnels or rope bridges along permanent and temporary roads (refer to guidance in Annex also action 51)	(5) Repair and maintain features that will be used by wildlife such as tunnels and rope bridges that have been built				Main contractor	Contract of PT. PLN (Persero) and contractor	Repairs should consider the suitability of materials and designs for the target species. Work steps: 1. Maintain tunnels as corridors 2. Repair rope bridges by considering the existing conditions (in 2020) between NR24,550 to NR25,150 (BIA 6) because the impact of AR development on the rope bridges of BIA 3, 4, and 5 is permanent with

Action Plans for Construction-Related Impact Management

No	BMP Action Plan 2015	Updated BMP Action Plan 2020	Project Stages			Contact person	Document	Remark
			Pre-construction	Construction	Operational			
								3. Data management related to the condition of the features that have been built and placed in a location in accordance with the BMP AP 2015 recommendations
6	Perennial planting along the access road between km 13 to km 22 for stabilization, especially in degraded road side areas (see appendix 2)	(6) Continue perennial planting in some landslide-prone areas along the access road, including the replanting between km 13 to km 22 if required					Contract of PT. PLN (Persero) and contractor	The plant chosen should refer to the recommended plant species in the BMP AP 2020 document. The database of species planted along the access road between km 13 – km 22 should be developed.
7	Planting of trees for community use near resettlements. These could include plants from the "support zone" or "agroforestry type", see appendix 2.	(7) Continue planting of trees for community use near resettlements					MoU PT. PLN (Persero) and Perum Perhutani	Plant species and agroforestry models are adjusted to the recommendations in the BMP AP 2020. Plant species and agroforestry types in the BMP AP 2020 are the results of the study of the PRA by Perum Perhutani, FGD with the community, and a list of

Action Plan for Forest Restoration and Ecological Connectivity

- **Working Zone 1. BIA** (319 ha): Develop and implement planting plans in partnership with Perhutani, LGs and local community to 1) **restore or enhance** ecological function for the key species known to be present, 2) **protect slopes** from erosion; and 3) provide **tree-based incomes to communities**. Native species with maximum ecological value for target species preferred. No agriculture, monocultures or agro-forestry or sharecropper activity (other than non-timber forest products) allowed.
- **Working Zone 2. Adjacent Forest Corridors** (280 ha): Develop and implement planting plans in partnership with Perhutani to: 1) **restore or enhance** ecological function for the key species known to be present, adjacent to Working Zone 1; 2) provide **corridors of habitat** to allow animal movement between remnants; and 3) **protect slopes** from erosion. Native species for maximum habitat value for target species prioritized. Other, 'traditional' agroforestry and NTFP harvesting trees allowed, but no agriculture or tree monocultures.
- **Working Zone 3. 500m Re-greening Zone** (2195 ha): Reforestation incl. by agroforestry by local communities to: 1) **restore or enhance** ecological function for the key species known to be present, adjacent to Working Zone 1&2; 2) provide **corridors of habitat** to allow animal movement between remnants, 3) provide **income to communities and Perhutani**; and 4) protect land from soil erosion. Native tree species preferred, but traditional agroforestry or species with non-timber forest values allowed. No logging or agriculture.
- **Working Zone 4 (location to be confirmed)**: Reforestation incl. through agroforestry by local communities in areas outside Working Zone 1,2&3 essential to achieving the 3,800 ha of contiguous forest cover and the minimum habitat requirements for in-situ conservation of the key species of interest.



Land cover in many parts of corridors will be restored through Agroforestry

Action Plan for Forest Management

- Digital mapping of reforested areas
- Awareness raising, patrolling and signage
- Develop and implement models of long term, participatory forest management

Action Plan for Wildlife Management and Encounters

- Dry culverts and canopy bridges
- Awareness raising, training and incentives to prevent hunting and poaching by project staff
- Ongoing monitoring and management of the 10 species of interest and implement wildlife management projects (e.g. supplementary feeding, camera traps, veterinary care, etc.)
- Develop wildlife encounter protocols and train project workers

Action Plan for Stakeholder Participation and Community Engagement

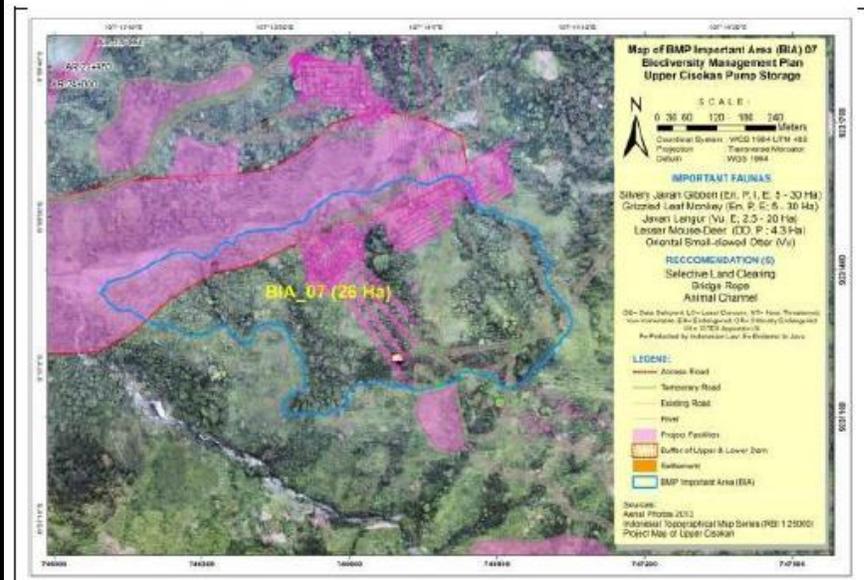
- Strengthening Capacities for Institutionalizing Integrated Catchment Management
- Establish ICM Facilitation Team to coordinate between stakeholders for strategic alignment and political support
- Improve community awareness and understanding on ICM objectives and sustainable forest management
- Alternative Sustainable Livelihoods for Communities (agroforestry, ecotourism, employment of community members in reforestation and patrolling work)



Management guidance for 15 BIAs

BIA	Area and land cover prior to development	Important wildlife and ranging needs	Planned activities and area remaining after development	Management guidance
BIA-1 Datarmala	10 ha. Production forest, scrub, shifting cultivation, banana plantings	Pangolin. Range: 5-7 ha.	Access road. 8 ha	Avoid impact where possible. Selective land clearing, habitat rehabilitation, wildlife connectivity structures
BIA-2 Cipateung-teung	12.4 ha. Production forest, shifting cultivation, agroforestry with sugar palm	Javan Slow Loris. Range: 0.4-25 ha.	Access road. 10.4 ha	Avoid impact where possible. Selective land clearing, habitat rehabilitation, wildlife connectivity structures
BIA-3 Above Cipateung-teung	13.1 ha. Agroforestry with bamboo and sugar palm	Javan Slow Loris. Range: 0.4-25 ha.	Access road. 11.8 ha	Avoid impact where possible. Selective land clearing, habitat rehabilitation, wildlife connectivity structures
BIA-4 Boundary Bandung-Cianjur	7.8 ha. Production forest with pine and other species, scrub land, shifting cultivation, agroforestry with bamboo and sugar palm	Javan Langur. Range: 2.5-20 ha.	Access road. 6.6ha.	Avoid impact where possible. Selective land clearing, habitat rehabilitation, wildlife connectivity structures
BIA-5 Puncak Haur	15.5 ha. Forest with Calliandra calothyrsus scrub land, agroforestry dominated by sugar palm	Javan Porcupine. Range: 5-30 ha; Javan Mouse Deer. Range: 4.3 ha; Javan Slow Loris. Range: 0.4-25 ha.	Access road and switch yard. 11.6 ha.	Avoid impact where possible. Selective land clearing, habitat rehabilitation, especially towards the east, wildlife connectivity structures
BIA-6 Pasir Nangka	44.7 ha. Agroforestry and natural forest. <u>Also</u> Production forest, scrub and shifting cultivation.	Grizzled Leaf Monkey. Range: 5-30 ha; Javan Langur. Range: 2.5-20 ha. Javan Slow Loris. Range: 0.4-25 ha; Javan Porcupine. Range: 5-30 ha; Javan Mouse Deer. Range: 4.3 ha; Javan Leopard. Range: 500-1,500ha.	Lower reservoir inundation, access road, Lot 1B spoil bank and concrete plant. 20.2ha.	Avoid impact where possible. BIA-6 needs to be connected to BIA-8. Reforestation, selective land clearing, habitat enrichment, wildlife connectivity structures.
BIA-7 Power House	26.0 ha. Agroforestry with bananas, production forest with pine, scrub land and shifting cultivation.	Javan Gibbon. Range: 5-30 ha; Grizzled Leaf Monkey. Range: 5-30 ha; Javan Mouse Deer. Range: 4.3 ha; Oriental Small-Clawed Otter: Ranging needs unclear	Lower reservoir inundation, tail race tunnel portal, 500Kv cable portal. 20.0ha.	Avoid impact where possible. Connect BIA-7 with BIA-9, BIA-10, and BIA-11 through reforestation to the north and south; selective land clearing, habitat rehabilitation, especially towards the east, wildlife connectivity structures.
BIA-8 Gowek	26.6 ha. Natural forest.	Grizzled Leaf Monkey. Range: 5-30 ha; Javan Langur. Range: 2.5-20 ha; Javan Porcupine. Range: 5-30 ha; Javan Mouse Deer. Range: 4.3 ha; Javan Leopard. Range 500-1,500 ha; Pangolin. Range: 5-7 ha; Javan Leopard. Range: 500-1,500 ha.	No change in area.	Expand forest area to Casik Taman and Pasir Nangka (BIA6 and 12); habitat enrichment.
BIA-9 Upper Dam, Japarana	48.1 ha. Pine forest, scrub land, shifting cultivation, agroforestry.	Javan Gibbon. Range: 5-30 ha; Javan Langur. Range: 2.5-20 ha; Pangolin. Range: 5-7 ha; Javan Porcupine. Range: 5-30 ha; Leopard Cat. Range: 200-400 ha.	Upper Dam, Temporary Access Road, diversion channel. 45 ha.	Connect BIA-9 with BIA-7, BIA-10, and BIA-11 through reforestation, habitat enrichment, wildlife connectivity structures.
BIA-10 Between Japarana and Curug Walet	2.8 ha. Natural forest along Cirumamis River , with pine forest and scrub land.	Javan Langur . Range: 2.5-20 ha.	No change in area.	Connect BIA-10 with BIA-7, BIA-9, and BIA-11 through reforestation.
BIA-11 Curug Walet	24.8 ha. Natural forest, with quite dense tree cover.	Javan Gibbon. Range: 5-30 ha; Javan Langur. Range: 2.5-20 ha; Pangolin. Range: 5-7 ha; Leopard Cat. Range: 200-400 ha.	Lower reservoir inundation. 21.3ha.	Habitat enrichments, and habitat expansion by connecting BIA-11 with BIA-7, BIA-9, and BIA-10.
BIA-12 Lemburhoream-Pasir Taman	29.4 ha. Teak forest, scrub land, and agroforestry.	Javan Leopard. Range: 500-1,500 ha; Grizzled Leaf Monkey. Range: 5-30 ha; Javan Langur. Range: 2.5-20 ha.	Lower reservoir inundation, spoil bank (within reservoir). 20.7 ha	Habitat enrichment and expansion by connecting BIA-12 with BIA-8.
BIA-13 Across from Cangkuang	56.0 ha. Agroforestry	Leopard Cat. Range: 200-400 ha; Grizzled Leaf Monkey. Range: 5-30 ha; Javan Langur. Range: 2.5-20 ha; Javan Slow Loris. Range: 0.4-25 ha; Wild Boar (ranging needs unclear)	Lower reservoir inundation. 45.2ha.	Habitat expansion to the north and habitat enrichment.
BIA-14 Ciawitali	78.3 ha. Pine forest, scrub land, shifting cultivation, and agroforestry with bamboo.	Leopard Cat. Range: 200-400 ha; Javan Gibbon. Range: 5-30 ha; Wild Boar (ranging needs unclear); Javan Slow Loris. Range: 0.4-25 ha; Javan Langur . Range: 2.5-20 ha.	Lower reservoir inundation. 54.5ha.	Habitat expansion by connecting with BIA-15.
BIA-15 Bunbulang	0.7 ha. Remnant natural forest above waterfall, pine forest, scrub land, shifting cultivation and agroforestry.	Javan Langur. Range: 2.5-20 ha; Javan Leopard. Range: 500-1,500 ha; Pangolin. Range: 5-7 ha.	No change in area	Habitat expansion by connecting with BIA-14.

BIA 7 - Power House area



Description:

Located near the power house; extent about 26 ha. Four important species reported: Javan Gibbon, Grizzled Leaf Monkey, Javan Mouse Deer, and Small-clawed Otter. Vegetation consists of sparse pine forest and agroforestry land with banana plants, palms, and scrub land.

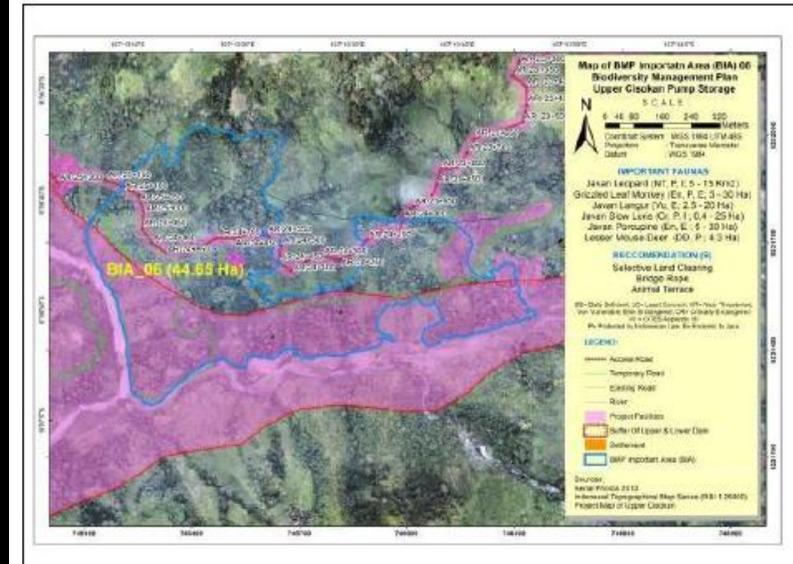
Threats:

Wildlife could be affected by the construction of the temporary access road, trailrace tunnel, outlet, generator house and 500kv cable, underground powerhouse, and the lower dam inundation area. This will reduce to remaining area to 16 ha. Disturbance and loss and fragmentation of forest habitat are key concerns.

Recommended Management:

1. Avoid and minimize impacts where possible.
2. Land clearing follows SOP (see Appendix 7).
3. Expand the available amount of habitat by replanting areas connecting BIA-7 with BIA-9, BIA-10 and BIA-11.
4. Plant greenbelt around reservoir.
5. Install traffic signs to avoid car collisions with wildlife, and signs banning hunting and trapping by project workers.

BIA 6 - Pasir Nangka



Description:

Located near Pasir Nangka; extent of about 44.7 ha. Seven important species recorded: Grizzled Leaf Monkey, Javan Langur, Javan Slow Loris, Javan Porcupine, Javan Mouse Deer and Javan Leopard. Vegetation consists of fairly dense agroforestry in Pasir Nangka and natural forest areas adjacent to Gowek forest (see below); in between the two locations, there is also production forest, scrub land, and shifting cultivation.

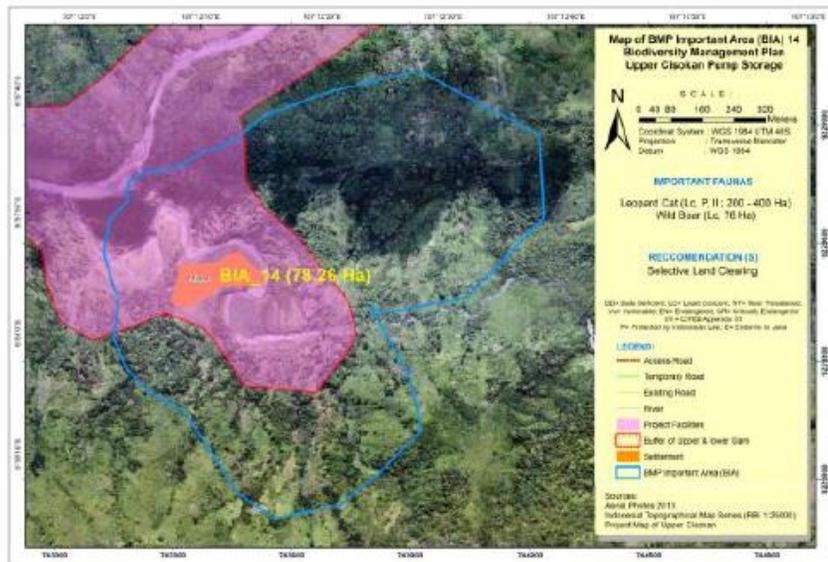
Threats:

Construction of access road, LOT 1B spoil bank, PH C Plant, Camp LOT 1B B & C, temporary office buildings, Temporary access road and the Lower Dam inundation area will reduce the area by 24 ha. Various developments are likely to cause significant disturbance to local wildlife populations.

Recommended Management:

1. Avoid and minimize impacts where possible.
2. Rearrange construction layout
3. Land clearing follows SOP (see Appendix 7).
4. Expanding the available amount of habitat by replanting areas to the north and also in area connecting BIA6 with BIA8 (Gowek) is important.
5. Replant areas adjacent to road and other degraded areas and plant greenbelt.
6. Install traffic signs to avoid car collisions with wildlife and install signs banning hunting and trapping by project workers.

BIA 14 - Ciawitali



Description:

Located near Ciawitali village, with an area of 78.3 ha. Land cover consists of fairly extensive and lush agroforestry with palms and bamboo and on higher slopes pine forests with shrubs. Five important species occur: Leopard Cat, Wild Boar, Javan Slow Loris, Javan Gibbon, and Javan Langur.

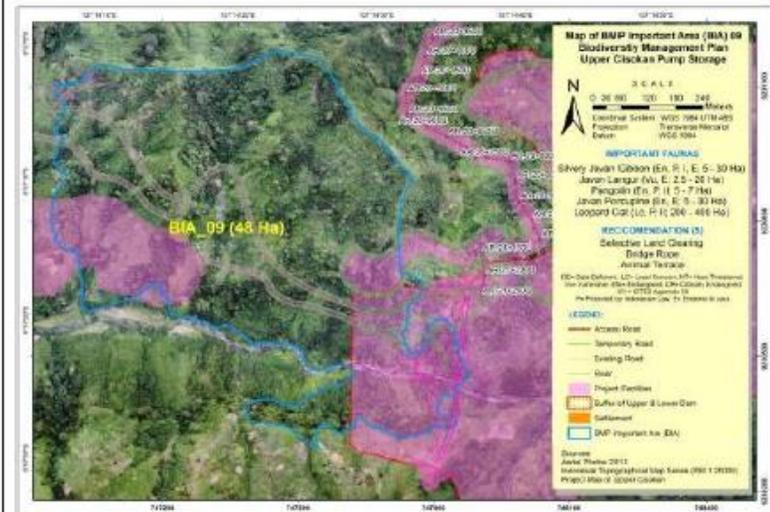
Threats:

Inundation of lower dam reservoir will reduce the area by 23.8 ha, thus leaving about 54.4 ha. Ongoing shifting cultivation could further degrade the area. Ongoing shifting cultivation could further degrade the area.

Recommended Management:

1. Avoid and minimize impacts where possible.
2. Plant greenbelt around reservoir.
3. Expand the area through reforestation and link it with BIA-15.
4. Enrichment planting in degraded parts of this BIA.
5. Implement ICM program to deal with resettlement impacts, shifting land use and expansion of forest habitats.

BIA 9 - Upper Dam area and Japarana



Description:

Located in the Upper Dam area near Japarana waterfall; extent about 48.1 ha, consisting of pine forest, agroforestry, and scrub and shifting cultivation areas. Five important species recorded: Javan Gibbon, Javan Langur, Pangolin, Javan Porcupine, and Leopard Cat.

Threats:

A variety of on-site project activities including spoil bank for Upper Dam, Upper Dam Camp B, Headrace Tunnel, Temporary Access Roads, and diversion channel could reduce the area by 15.2 ha. Noise and dust from construction activities would disturb wildlife.

Recommended Management:

1. Avoid and minimize impacts where possible.
2. Land clearing follows SOP (see Appendix 7).
3. Expand the available amount of habitat by replanting areas connecting BIA-9 with BIA-7, BIA-10, and BIA-11, and expanding forest area to the north and south.
4. Plant greenbelt around reservoir.
5. Install rope bridges and culverts across roads and similar exposed areas to assist wildlife movement.
6. Install traffic signs to avoid car collisions with wildlife.
7. Install signs banning hunting and trapping by project workers.

Reforestation targets. CA = corridor area

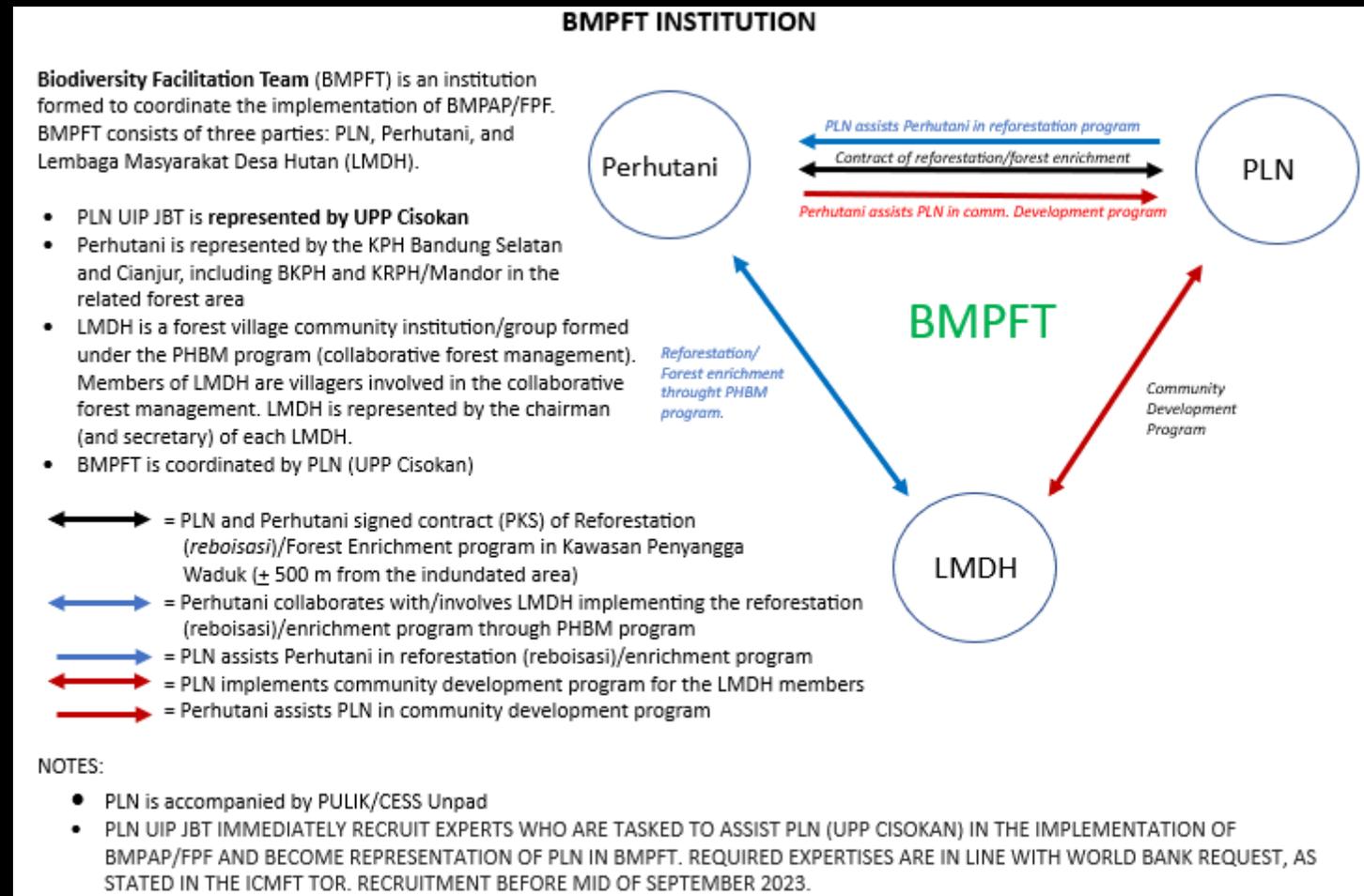
	End of 2014 (prior to project implementation and reservoir inundation)				End of 2022	End of 2023	End of 2024	End of 2025	End of 2026	End of 2027	2028
	Forest	Other Wood Land	Plantations	Total wooded cover							
BIA_01		0.4	7.2	7.5	8.0	8.0	8.0	8.0	8.0	8.0	8.0
BIA_02		10.0		10.0	10.4	10.4	10.4	10.4	10.4	10.4	10.4
BIA_03	9.1	2.3		11.4	11.8	11.8	11.8	11.8	11.8	11.8	11.8
BIA_04		3.7	3.5	7.1	6.6	6.6	6.6	6.6	6.6	6.6	6.6
BIA_05		12.2		12.2	11.6	11.6	11.6	11.6	11.6	11.6	11.6
BIA_06		30.1		30.1	15.0	18.0	20.2	20.2	20.2	20.2	20.2
BIA_07	6.7	8.5		15.2	15.2	16.0	16.0	16.0	16.0	16.0	16.0
BIA_08	18.2	8.0		26.2	26.2	26.2	26.2	26.2	26.2	26.2	26.2
BIA_09	28.0	4.6		32.7	32.7	32.9	32.9	32.9	32.9	32.9	32.9
BIA_10			2.0	2.0	2.0	2.8	2.8	2.8	2.8	2.8	2.8
BIA_11	15.3	3.6	0.3	19.1	19.1	20.0	21.3	21.3	21.3	21.3	21.3
BIA_12	13.2	1.4	0.1	14.7	17.0	19.0	20.7	20.7	20.7	20.7	20.7
BIA_13		30.2	4.8	35.0	38.0	42.0	45.2	45.2	45.2	45.2	45.2
BIA_14	0.6	19.4	21.2	41.2	47.0	53.0	54.5	54.5	54.5	54.5	54.5
BIA_15	17.3	5.4	0.0	22.7	25.5	28.5	30.7	30.7	30.7	30.7	30.7
TOTAL BIA				287.2	286.0	306.8	318.9	318.9	318.9	318.9	318.9
CA 1		1.7	0.8	2.5	2.8	3.3	4.7	6.5	8.5	8.6	8.6
CA 2	0.2	2.2		2.5	2.7	3.2	4.5	6.4	6.6	6.6	6.6
CA 3	0.2	4.5		4.6	5.1	6.1	8.6	12.0	12.0	12.3	12.3
CA 4	0.1	0.3	0.2	0.5	0.6	0.7	1.1	1.6	2.4	2.9	2.9
CA 5	0.0	4.8	5.4	10.2	11.2	13.5	18.8	26.4	32.1	32.1	32.1
CA 6	0.8	1.3	0.7	2.9	3.4	4.5	6.7	10.1	15.1	18.5	18.5
CA 7		2.7		2.7	3.0	3.6	5.0	7.0	7.7	7.7	7.7
CA 8	1.2	1.7		2.9	3.2	4.2	6.3	9.4	15.1	19.4	19.4
CA 9	0.2	2.2		2.4	2.6	3.4	5.1	7.7	12.3	13.0	13.0
CA 10		0.0	0.1	0.1	2.5	5.0	7.5	10.0	12.5	15.2	15.2
CA 11		0.3		0.3	2.0	4.0	6.0	8.0	10.0	11.8	11.8
CA 12	0.1	3.2		3.3	3.6	4.6	7.0	10.5	16.7	26.8	26.8
CA 13	0.3	0.6	0.4	1.3	1.9	2.9	4.3	6.5	9.7	11.0	11.0
CA 14		8.4		8.4	9.2	11.0	15.4	21.6	24.4	24.4	24.4
CA 15		1.3		1.3	1.9	2.8	4.2	6.3	9.0	9.0	9.0
CA 16	0.3			0.3	0.7	1.1	1.6	2.4	3.5	4.2	4.2
CA 17	11.9	2.6		14.5	16.0	19.2	26.8	37.5	40.1	40.1	40.1
CA 18				0.0	1.0	2.0	3.0	4.0	5.0	5.0	5.0
CA 19				0.0	1.0	2.0	3.0	4.0	4.5	4.5	4.5
CA 20				0.0	1.0	2.0	3.0	3.3	3.3	3.3	3.3
CA 21		0.2		0.2	1.0	2.0	3.0	3.5	3.5	3.5	3.5
TOTAL CA				60.8	76.4	101.1	145.7	204.7	254.1	279.9	279.6
500m zone	279.5	685.3	148.9	1113.6	1247.3	1396.9	1564.6	1752.3	1962.6	2195.0	2195.0
3800 ha	466.6	1488.2	375.6	2330.4	2464.0	2613.7	2781.3	2969.1	3179.4	3411.8	3800.0

Key mitigation actions to reduce impact of transmission lines

Actions	BMP action item	Relevant Document
Conduct survey to determine which species on Java are vulnerable to electrocution and collision	Not yet in BMP	Contract of PLN and contractor
Bring line design in line with avian-safe structures, using appropriate horizontal and vertical cable spacing	Not yet in BMP	Contract of PLN and contractor
Insulate energized parts	Not yet in BMP	Contract of PLN and contractor
Apply anti-perch structures	Not yet in BMP	Contract of PLN and contractor
Create canopy bridges where mammal mortalities occur	Develop, repair and maintain features that will be used by wildlife such as tunnels and rope bridges	Contract of PLN and contractor
Wire-marking to avoid collisions	Not yet in BMP	Contract of PLN and contractor
Monitoring of animal fatalities by checking along entire length of transmission lines	Report wildlife incidences, such as animals getting hit by cars or a tree falling in the project area based on the Human-Wildlife Conflict Reporting form that has been compiled	SOP Fauna Encounter/Accident Report
Community consultation regarding conservation, and risks of encroachment and over exploitation of forest resources	BMP Action 16	The outreach should be carried out jointly by the "BMP Facilitation Team" consisting of representatives of PLN,
Community consultation regarding conservation, and risks of encroachment and over exploitation of forest resources	BMP Action 16	The outreach should be carried out jointly by the "BMP Facilitation Team" consisting of representatives of PLN,

ICM Facilitation Team will oversee ICM implementation process

- Secretariat support to the Biodiversity Management Plan Facilitation Team (BMPFT)
- Prepare ICM Action Plan
- Prepare and implement Species Management Plans
- Prepare and implement Livelihood Development Plan
- Establish Forest Monitoring System
- Lead stakeholder engagement, networking and public communications
- Report to ICM Governance Committee that consist of PLN, Perhutani and local communities



Monitoring



- BMP Manager sets up and maintains a **database** in which all actions in the BMP and their associated implementation times lines are monitored.
- **Monitor** the presence of populations of the most endangered species and their habitat and take action when their immediate survival seems threatened
- hire **independent wildlife experts** as part of ICM Facilitation Team
- Install camera traps in all BIAs to monitor the presence of terrestrial species.
- Hire **independent wildlife experts** to monitor arboreal species (especially primates) at least 3 times/ year
- Monitor changes in vegetation cover through annual analysis of **high resolution, remotely sensed imagery** in and around all BIAs.
- Conduct **annual interview surveys with communities** to determine changes in attitudes towards threatened wildlife and activities that could be detrimental or beneficial
- Monitor all permanent and temporary **access roads** to determine areas where wildlife cross, record road kills, and monitor whether wildlife tunnels and rope bridges are being used
- Conduct **monthly inspections** of the retained vegetation areas
- Monitor **tree mortality** and conduct repeat planting if needed.
- Conduct a **three-yearly evaluation** of monitoring data and review / revision of BMP

Key challenges



- How to incentivize Perhutani, State Owned Forestry Company, to plant native species, and manage wildlife
 - Perhutani's main income source is logging of pine trees
 - Perhutani does not have legal mandates/ expertise in wildlife management
- How to incentivize local communities to shift to sustainable agroforestry
 - Community based agroforestry declined as the government support shifted
 - Not all villagers are members of Community Forestry Groups (LMDH)
 - Access to market, initial investments, skills, etc.
- How to ensure coordination between agencies, and within agencies
 - There is no entity that directly control PLN, Perhutani and local communities
 - PLN, the project owner, has limited leverage over Perhutani and local communities

Second Djibouti-Ethiopia Power System Interconnection Project

- Construction of a new 280 km transmission line (230 kV)
- Potential impact on critical habitat (Digri Area, Galafi Wetlands, and Haramous-Loyada Ramsar Wetlands)
 - Realignment to avoid the wetlands in Gran Barra area, and migratory birds' corridors in Galafi areas
- The TL is in close range of one protected area, four IBAs (important zones for the conservation of birds)
- 193 species of birds, 23 species of terrestrial mammals, and 17 species of bats, incl. 20 species classified as threatened, reported along development corridor
- Key biodiversity risks: electrocution, collision, habitat alteration, habitat fragmentation, disruption of wildlife corridor, increased propagation of invasive species (the prosopis), increasing threats to endangered species.
- The Biodiversity Management Plan to describe relevant additional measures needed to achieve net gain (adding markers to an existing transmission line, restoration of Aloe habitat, anti-perching system)
- The ESIA to be updated to reflect alignment modifications to minimize impacts on diversity as well as an assessment of residual risks and impacts

<https://documents1.worldbank.org/curated/en/099410002122218859/pdf/Appraisal0Envi0on0Project000P173763.pdf>

<https://documents1.worldbank.org/curated/en/099062923042513840/pdf/P17376309d1e2f08a0a9cc03c038d823ce4.pdf>

Upper Arun Hydropower Electric Project (UAHEP)

- Located about 10 kilometers (km) south of Nepal's border with China, on the Arun River in eastern Nepal
- Peaking run-of-river plant with optimum capacity of 1,060 MW.
- A 23 km long access road, a 5.8 km 400 kV transmission line will be constructed
- A biodiversity management plan (BMP) will be developed as part of the ESIA, and a biodiversity action plan (BAP) will be prepared for critical habitat features to achieve net gain
- The Upper Arun River: forms the boundary of the Makalu Barun National Park (MBNP) buffer zone (IUCN management category IV reserve/ Important Bird Area (IBA)
- Expected impact on biodiversity:
 - Impacts on the MBNP (buffer zone and core areas), primarily due to construction activities, increased poaching and increased demand for resources by project workers
 - Loss of terrestrial and riparian habitats due to project construction activities outside of the MBNP
 - Impact on fauna due to vehicle collisions and other project activities
 - Effects on critical habitat species including the red panda, Himalayan black bear, Chinese pangolin, black musk deer and mouse-eared myotis (bat)
 - Impact on aquatic habitat on the Upper Arun River due to diverted flow, hydropeaking effects, barriers to fish movement, and reduced access to spawning grounds, particularly in tributary streams
 - Cumulative impacts on aquatic biodiversity from multiple hydropower investments in the Arun River and associated tributaries
- Critical habitat assessment under way, E-flow assessment to be conducted
- The project is under preparation

Thank you
for your participation

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