



Biodiversity and Critical Habitat

Summary and Status

March 2025



Separate surveys and analysis conducted for two project components:

- **Hydroelectric Plant:**
 - Surveys 2015-2018
 - Initial Critical Habitat analysis in 2018 (using IFC Guidance Note methodology 2012)
 - Decision to update CH analysis in 2024, using GN6 2019
 - Field surveys of 3 flora species, and CH screening in 2024
 - Later in 2025 (according to seasons): surveys and full CH analysis including BAP and BMEP
- **Transmission line (106 km)**
 - Surveys in December 2023 (dry season) and April 2024 (wet season)
 - Biodiversity Assessment, Critical Habitat Analysis, Biodiversity Action Plan delivered February 2025

IFC PS-6: Natural and Critical Habitats



Natural Habitats

13. Areas composed of viable assemblages of plant and/or animal species of largely native origin, and/or where human activity has not essentially modified an area's primary ecological functions and species composition.

Critical Habitats

16. Areas with high biodiversity value, including
- i. habitat of significant importance to Critically Endangered and/or Endangered species;
 - ii. habitat of significant importance to endemic and/or restricted-range species;
 - iii. habitat supporting globally significant concentrations of migratory species and/or congregatory species;
 - iv. highly threatened and/or unique ecosystems; and/or
 - v. areas associated with key evolutionary processes

IFC PS-6: Natural and Critical Habitats



Natural Habitats (para's 13-15)

13. Areas composed of viable assemblages of plant and/or animal species of largely native origin, and/or where human activity has not essentially modified an area's primary ecological functions and species composition.

14. The client will not significantly convert or degrade natural habitats, unless all of the following are demonstrated:

- No other viable alternatives within the region exist for development of the project on modified habitat;
- Consultation has established the views of stakeholders, including Affected Communities, with respect to the extent of conversion and degradation;⁸ and
- Any conversion or degradation is mitigated according to the mitigation hierarchy.

15. In areas of natural habitat, mitigation measures will be designed to achieve **no net loss** of biodiversity where feasible

Critical Habitats (para's 16-19)

16. Areas with high biodiversity value, including

- i. habitat of significant importance to Critically Endangered and/or Endangered species;
- ii. habitat of significant importance to endemic and/or restricted-range species;
- iii. habitat supporting globally significant concentrations of migratory species and/or congregatory species;
- iv. highly threatened and/or unique ecosystems; and/or
- v. areas associated with key evolutionary processes

17. In areas of critical habitat, the client will not implement any project activities unless all of the following are demonstrated:

- No other viable alternatives within the region exist for development of the project on modified or natural habitats that are not critical;
- The project does not lead to measurable adverse impacts on those biodiversity values for which the critical habitat was designated, and on the ecological processes supporting those biodiversity values;
- The project does not lead to a net reduction in the global and/or national/regional population¹³ of any Critically Endangered or Endangered species over a reasonable period of time; and
- A robust, appropriately designed, and long-term biodiversity monitoring and evaluation program is integrated into the client's management program.

18. In such cases where a client is able to meet the requirements defined in paragraph 17, the project's mitigation strategy will be described in a Biodiversity Action Plan and will be designed to achieve **net gains** of those biodiversity values for which the critical habitat was designated.

19. In instances where biodiversity offsets are proposed as part of the mitigation strategy, the client must demonstrate through an assessment that the project's significant residual impacts on biodiversity will be adequately mitigated to meet the requirements of paragraph 17.

Determination of Critical Habitats

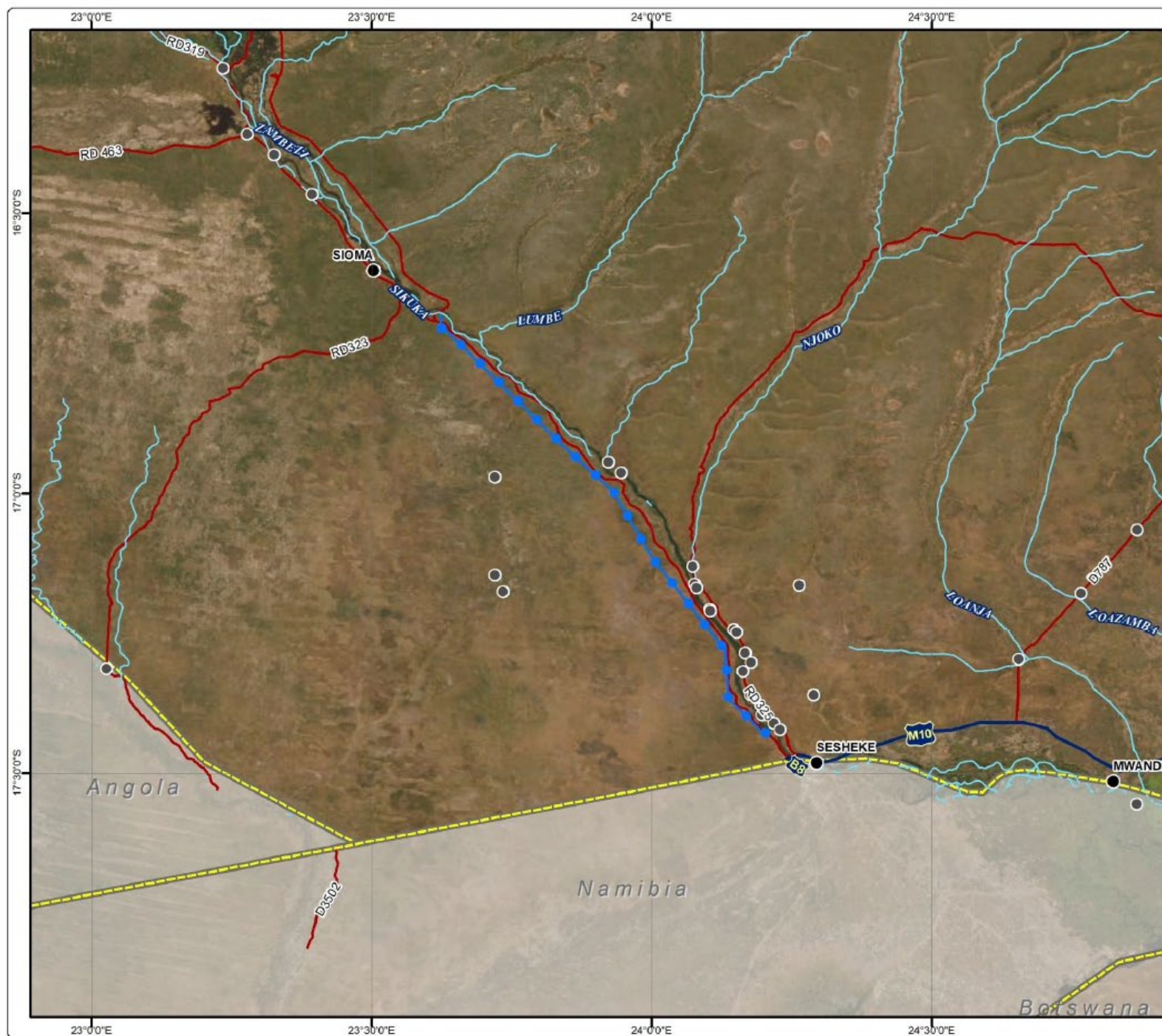
EAAA: “an ecologically appropriate area of analysis should be identified to determine the presence of critical habitat.”

Criterion	Thresholds
Criterion 1: Habitat of Significant Importance to Critically Endangered and/or Endangered Species	<ul style="list-style-type: none">a) Areas that support globally important concentrations of an IUCN Red-listed CR or EN species ($\geq 0.5\%$ of the global population AND ≥ 5 reproductive units GN16 of a CR or EN species).b) Areas that support globally important concentrations of an IUCN Red-listed Vulnerable (VU) species, the loss of which would result in the change of the IUCN Red List status to CR or EN and meet the thresholds in (i).c) As appropriate, areas containing important concentrations of a nationally or regionally listed CR or EN species.
Criterion 2: Endemic and Restricted-range Species	Areas that regularly hold $\geq 10\%$ of the global population size AND ≥ 10 reproductive units of a species
Criterion 3: Migratory and Congregatory Species	<ul style="list-style-type: none">a) Areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population of a migratory or congregatory species at any point of the species' lifecycle.b) Areas that predictably support ≥ 10 percent of the global population of a species during periods of environmental stress.
Criterion 4: Highly Threatened and/or Unique Ecosystems	<ul style="list-style-type: none">a) Areas representing $\geq 5\%$ of the global extent of an ecosystem type meeting the criteria for IUCN status of CR or EN.b) Other areas not yet assessed by IUCN but determined to be of high priority for conservation by regional or national systematic conservation planning
Criterion 5: Key Evolutionary Processes	[No numerical thresholds]

20. In circumstances where a proposed project is located within a legally protected area or an internationally recognized area, the client will meet the requirements of paragraphs 13 through 19 of this Performance Standard, as applicable. In addition, the client will:

- Demonstrate that the proposed development in such areas is legally permitted;
- Act in a manner consistent with any government recognized management plans for such areas;
- Consult protected area sponsors and managers, Affected Communities, Indigenous Peoples and other stakeholders on the proposed project, as appropriate; and
- Implement additional programs, as appropriate, to promote and enhance the conservation aims and effective management of the area.

Transmission Line



WPC Biodiversity & Biomass Assessment Local Setting

Legend

Populated Places

- Town
- Village

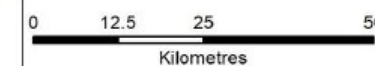
Road Network

- National Road
- Main Road
- River / Stream
- Sesheke-Ngonye 330kV
- International Boundary



DIGBY WELLS
ENVIRONMENTAL

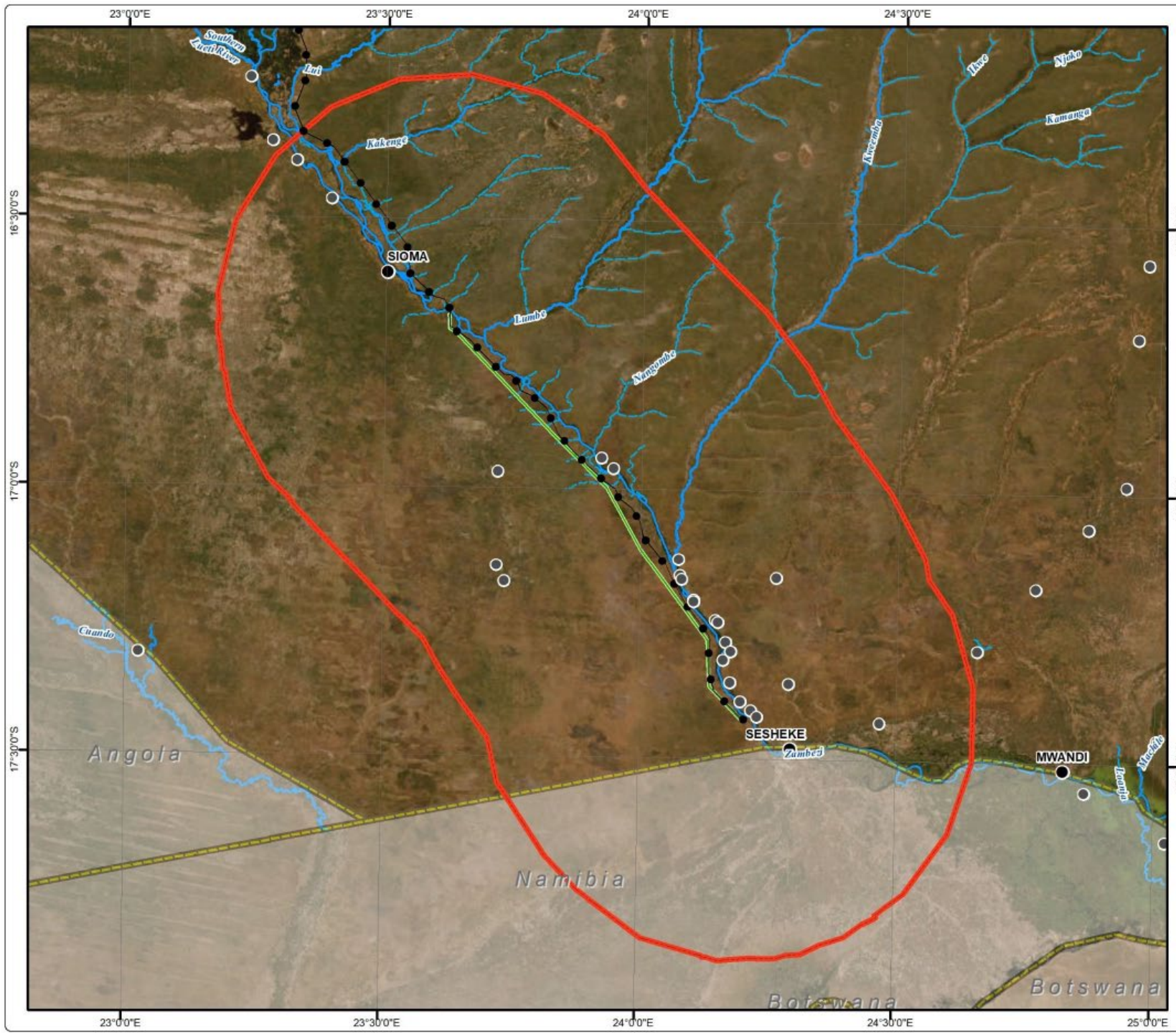
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Datum: WGS 1984
Central Meridian: 27°E
Date: 07/05/2024
Ref #: AES8588_A_02_GC_v02



Transmission Line: EAAAs



EAAA	For	Area (km ²)
EAAA 1: 50 km Buffer	Airsheds of bird species	17,537.70
EAAA 2: 100 m Buffer	Habitats of other terrestrial species	20.70
EAAA 3: Hydrobasin Level 10 Sub-catchments	Aquatic habitats	2,332.64




WPC Biodiversity & Biomass Assessment

EAA - 50km Buffer

Legend

Populated Places

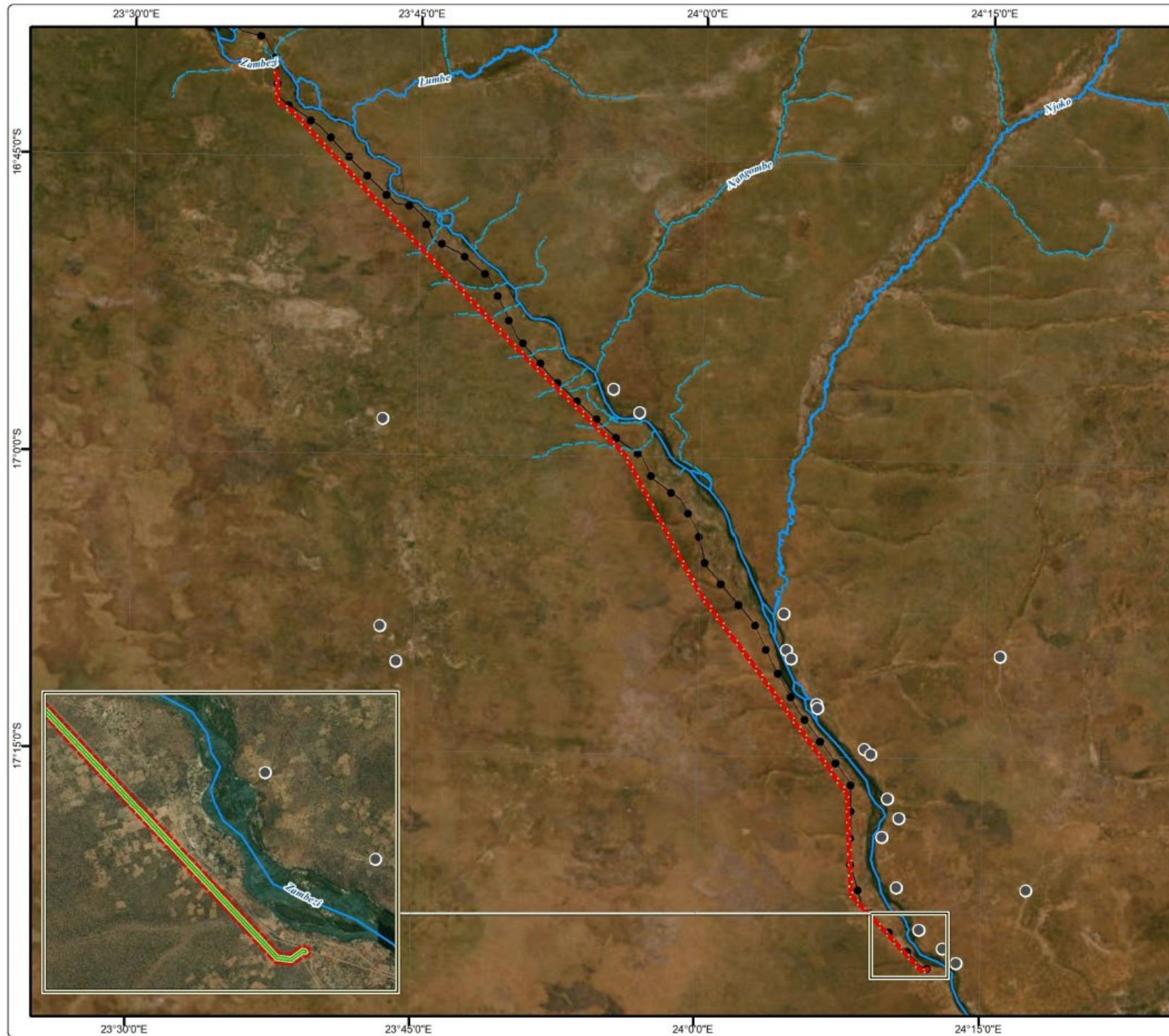
- Town
- Village
- River
- - - Stream
- Existing 66kV Powerline
- Area of Influence
- EAA - 50km Buffer
- International Boundary


DIGBY WELLS
ENVIRONMENTAL

Projection: UTM Zone 34S
Datum: WGS 1984
Central Meridian: 27°E
Date: 30/05/2024
Ref #: AES8588_BD_07_VS_v03

0 12.5 25 50
Kilometres

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WPC Biodiversity & Biomass Assessment

EAA

Legend

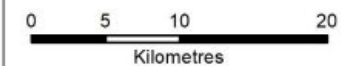
Populated Places

- Village
- River
- - - Stream
- Existing 66kV Powerline
- Area of Influence
- EAA - 100m Buffer



DIGBY WELLS
ENVIRONMENTAL

Projection: UTM Zone 34S
Datum: WGS 1984
Central Meridian: 27°E
Date: 10/05/2024
Ref #: AES8588_BD_14_VS_v02

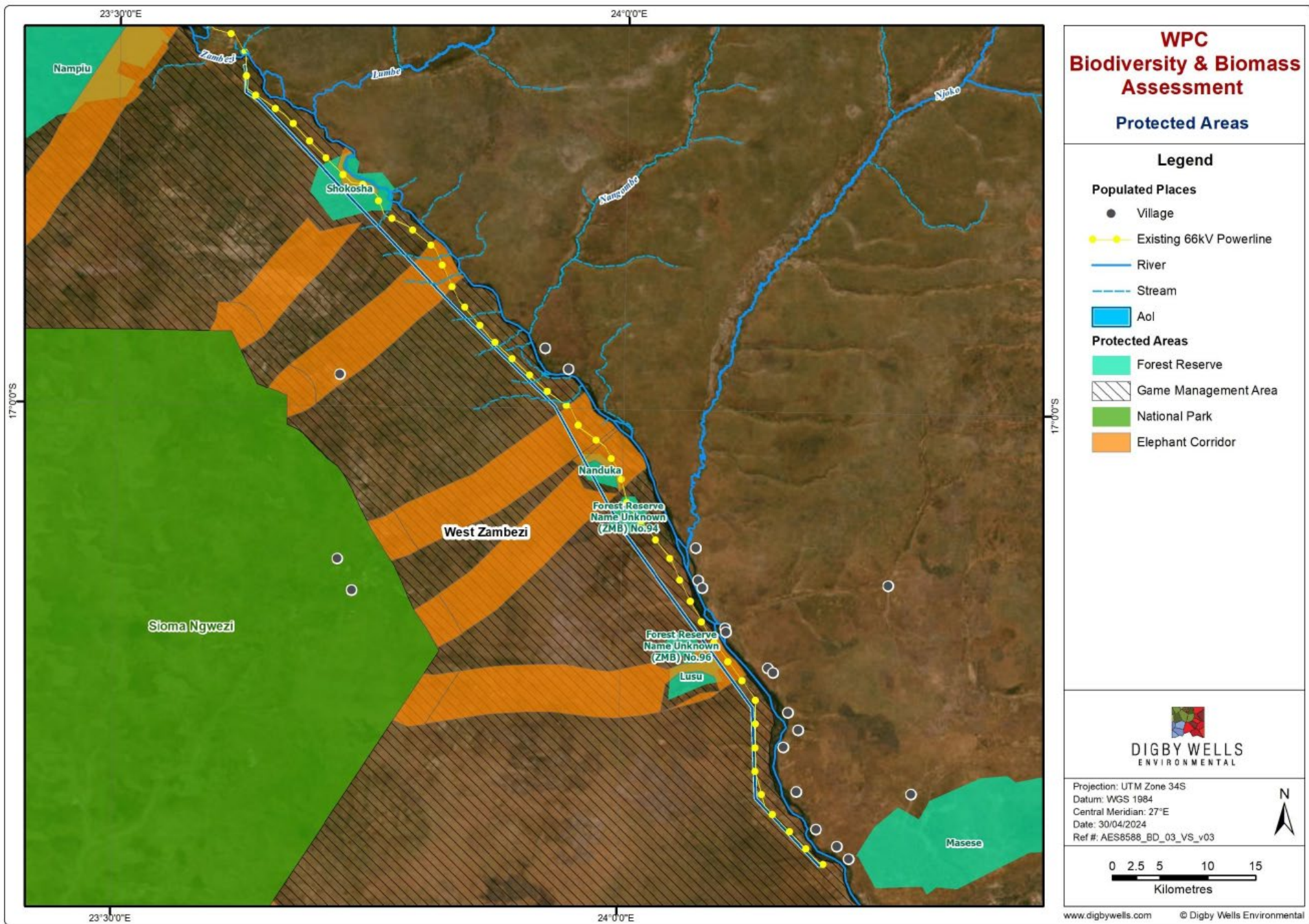


Conclusions

- Within the 5.18 km² Aol (layout, with 100 m buffer):
 - Modified habitat 2.09 km²
 - Natural habitat 3.09 km², including Gibourta Woodland and Kalahari Scrubland units
- EAAAs do not pass thresholds for any species; no EAAA is Critical Habitat
- Recommend maintaining natural habitat and supporting avifaunal monitoring

Protected Areas

Name	Designation	Designation Type	IUCN Category
Overlapped			
West Zambezi	Game Management Area	National	VI
Forest Reserve Name Unknown (ZMB) No.94	Forest Reserve	National	Not Reported
Lusu	Forest Reserve	National	Not Reported
Nanduka	Forest Reserve	National	Not Reported
Shokosha	Forest Reserve	National	Not Reported
Within 1 km			
Forest Reserve Name Unknown (ZMB) No.96	Forest Reserve	National	Not Reported
Lilengo West	Forest Reserve	National	Not Reported
Naluywa	Forest Reserve	National	Not Reported
Nampiu	Forest Reserve	National	Not Reported
Within 10 km			
Luanga Namakusi	Forest Reserve	National	Not Reported
Masese	Forest Reserve	National	Not Reported
Within 50 km			
Nanyota	Forest Reserve	National	Not Reported
Sikabenga	Forest Reserve	National	Not Reported
Sioma Ngwezi	National Park	National	II
Zungubo	Forest Reserve	National	Not Reported



Hydroelectric Plant

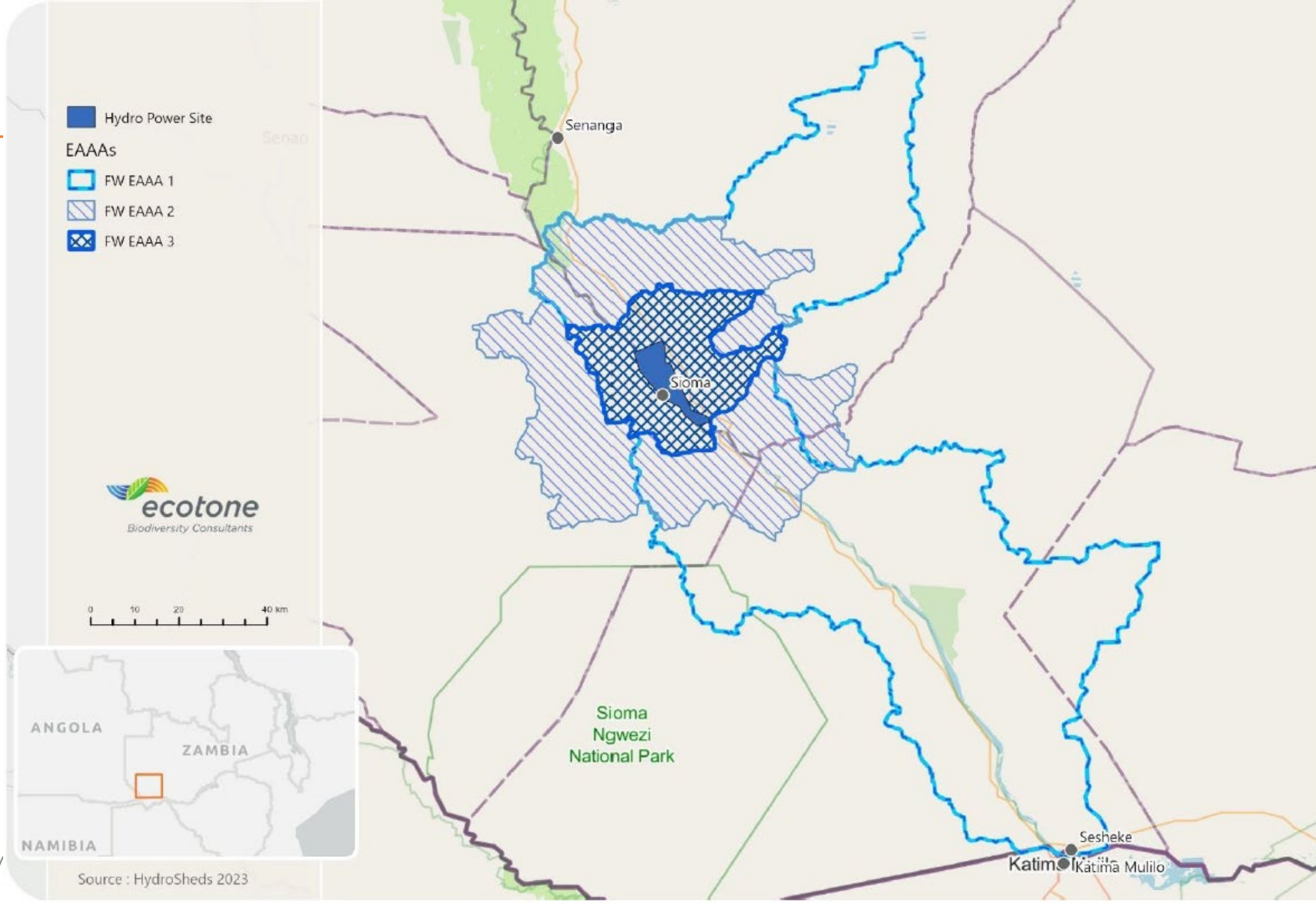
Previous Studies



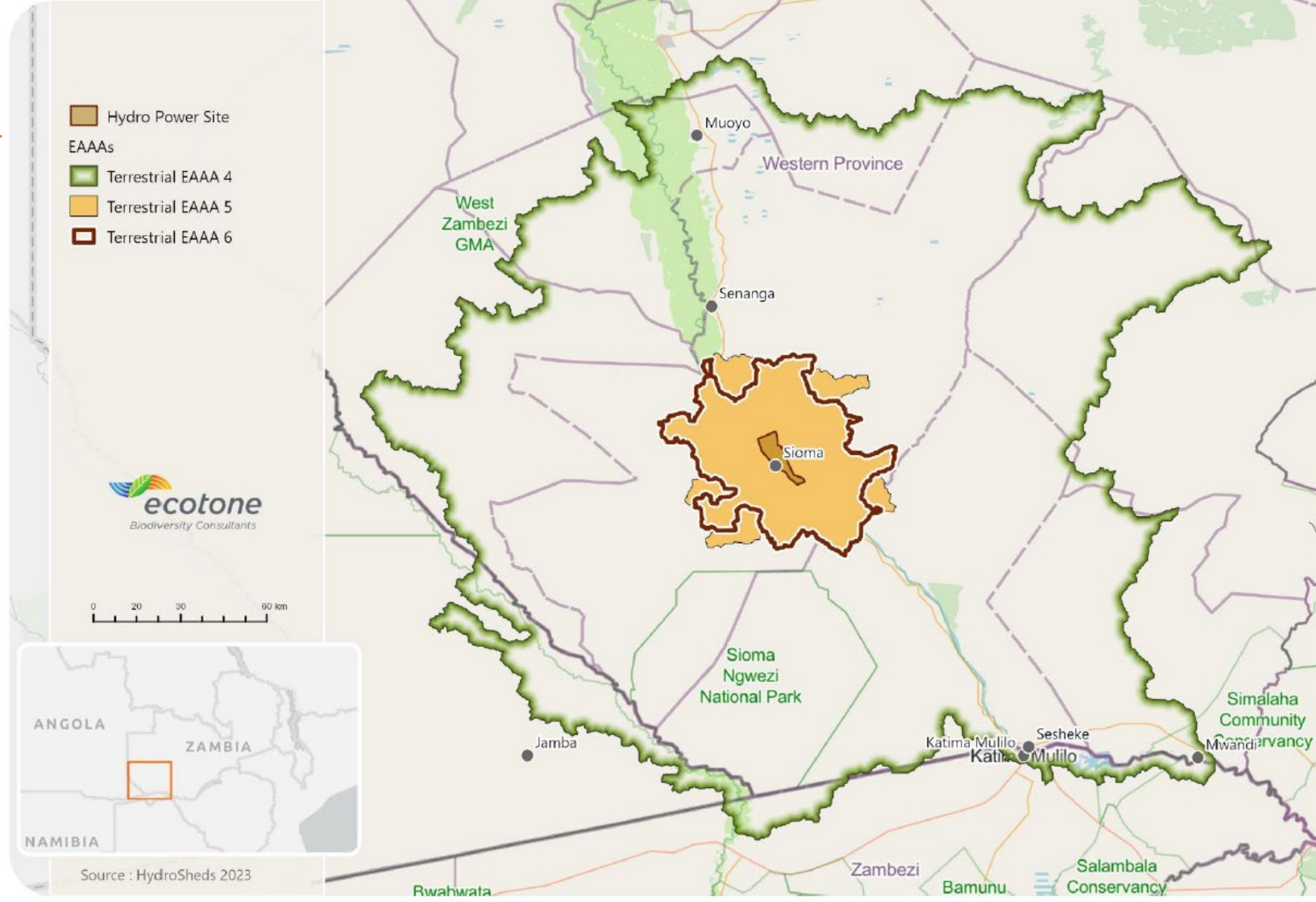
Experts	Assessment	Dates / Details
Ecotone	Baseline Biodiversity Assessment, September 2018	October 2015, November 2017, and January 2018 for habitat integrity, water quality, diatoms, aquatic macroinvertebrates and fish; October 2015 and January 2018 for mammals, birds, herpetofauna and Odonata; and additional flora surveys. Includes original CH analysis (Table 7-2).
Ecotone	Ecological Flow Assessment	Assessment February 2017, surveys October 2015 and October 2017
Drs M and T Ross	Fish Migration Requirements and Fishway Design, March 2019	Site visit in November 2017
Warren McLeland (SLR)	Surveys of three flora species	2024

EAAA	Habitat	Taxonomic Group/Species	Potential Critical Habitat Trigger species
EAAA 1	Freshwater	Large-bodied fish with long range migration requirements	Mud fish (Labeo spp.), Yellow fish (Labeobarbus spp.), Eels (Anguilla spp.), Catfish (Clarias spp.), Tigerfish (Hydrocynus vittatus), Butter catfish (Schilbe intermedius), Barred minnow (Opsaridium zambezense) etc. Certain Morymridae listed as migratory (e.g. Marcusenius altisambesi).
EAAA 2	Freshwater	Fish with local migration/movement requirements	Barbs (Enteromius spp.), Cichlids (e.g. Oreochromis spp.), Alestids (e.g. Micralestes acutidens, Brycinus spp. Hemigrammocharax sp. excluding Hydrocynus vittatus), African Pike, (Hepsetus cuvieri), Citharines (Nannocharax spp.), Squeakers (Syndontis sp). etc., certain Morymridae not listed as migratory (e.g. Hippopotamyrus spp., Pollimyrus marianne, Mormyrus lacerda)
EAAA 3	Freshwater	Resident and range restricted freshwater species	Broadhead catfish (Clariallabes platyprosopos, Catlets (Amphilius spp), Suckermouth Catfish (Chiloglanis spp.), Neolebias spp. and aquatic plants including the Water lily Nymphoides tenuissima., all bivalves, insects and molluscs
EAAA 4	Terrestrial	Large terrestrial mammals with large home ranges and migration requirements	Blue Wildebeest (Connochaetes taurinus), Plains Zebra (Equus quagga), African Savanna Elephant (Loxodonta africana), African Wild Dog (Lycaon pictus) etc.
EAAA 5	Terrestrial	Birds and Bats that are migratory/congregatory, soaring birds, savanna generalists	Grey Crowned Crane (Balearica regulorum), Secretary Bird, (Sagittarius serpentarius), Lappet-faced Vulture (Torgos tracheliotos, White-headed Vulture (Trigonoceps occipitalis), Striped Leaf-nosed Bat (Macronycteris vittatus) etc.
EAAA 6	Terrestrial	Savanna species with home range max 15 km ²	Temminck's Pangolin (Smutsia temminckii), insects such as Acontias schmitzi, Siloana agile, frogs and reptiles (e.g. Hemisus barotseensis), Hippopotamus (Hippopotamus amphibius), all plants.

EAAAs 1, 2 and 3



EAAAs 4, 5 and 6



4 fish species (2 likely, 2 possible CH triggers)

EAAA	Scientific Name	Common Name	Range Area (km ²)	IUCN Red List status	% of global range in EAAA	CH trigger	Criterion	Justification	Sampled in baselines
EAAA1	<i>Labeo lunatus</i>	Upper Zambezi Labeo	272266	LC	2.76	Likely	3	Migratory species with a global range overlap of c. 2.8% with EAAA1.	Yes, in surveys in 2018.
EAAA1	<i>Labeobarbus codringtonii</i>	Upper Zambezi Yellowfish	174169	LC	4.33	Likely	3	Migratory with a global range overlap of c. 4% with EAAA1.	Yes, in surveys 2018.
EAAA2	<i>Pharyngochromis</i> sp. 'black'		<500 km river width	NE	100% - all documented localities in the EAAA2	Possibly	Cr2	Newly discovered species found within the project footprint and EAAA2.	No, however reported from the rapids in the EAAA 2.
EAAA3	<i>Clariallabes platyprosopos</i>		100993	LC	c. 7-9%	Possibly	Cr2	Restricted to rapid habitat in the Zambezi and the Okavango system.	Yes, sampled in the project surveys.

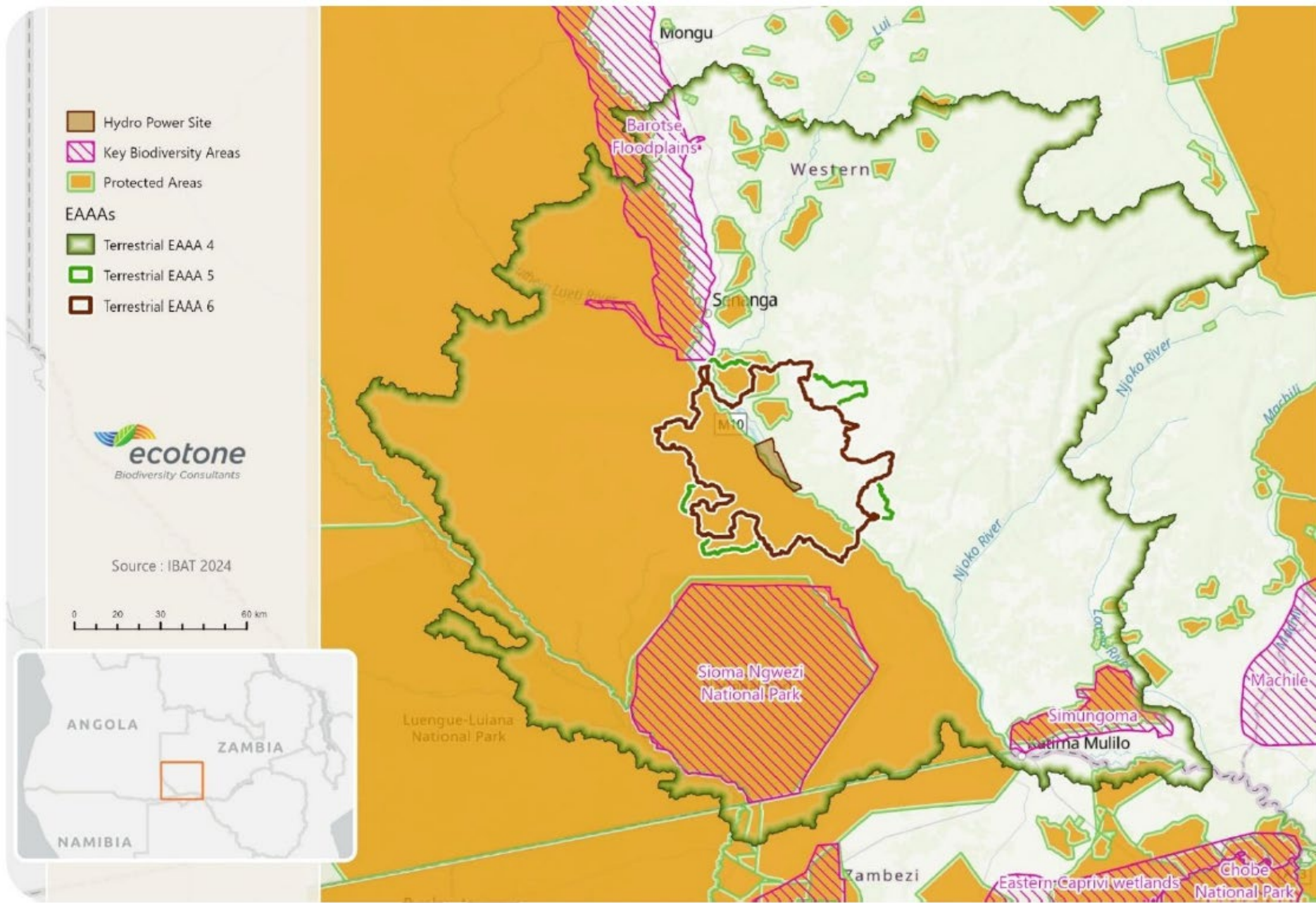
5 mammal species (1 unlikely, 2 possible, 2 likely)

EAAA	Scientific Name	Common Name	Range Area (km ²)	IUCN Red List status	% of global range in EAAA	CH trigger	Criterion	Justification	Sampled in baselines
EAAA4	<i>Diceros bicornis ssp. minor</i>	South-eastern Black Rhino	3 634 449	CR	1.31	Unlikely	1a	CR species with a global range overlap of 1.31% with EAAA4. Extinct in Zambia but reintroduced to North Luangwa National Park.	No
EAAA4	<i>Connochaetes taurinus</i>	Common Wildebeest	3 119 324	LC	1.61	Possibly	3	Migratory and congregatory, range overlap of 1.6% with EAAA4.	No
EAAA4	<i>Equus quagga</i>	Plains Zebra	2 327 433	NT	2.08	Possibly	3	Migratory, range overlap of 2.1% with EAAA4; populations declining in Zambia.	No
EAAA4	<i>Loxodonta africana</i>	African Savanna Elephant	3 234 022	EN	0.83	Likely	1a, 3	Endangered and migratory	Yes
EAAA4	<i>Lycaon pictus</i>	African Wild Dog	1 279 909	EN	1.7	Likely	1a, 3	Listed as present in Sioma Ngwezi National Park and the Lower West Zambezi GMA.	No

2 other species (1 likely, 1 confirmed)

EAAA	Scientific Name	Common Name	Range Area (km ²)	IUCN Red List status	% of global range in EAAA	CH trigger	Criterion	Justification	Sampled in baselines
EAAA6	<i>Brachyphymus siloana</i>	Siloana Agile Grasshopper	9 361	LC	15.9	Likely	Cr2	A range restricted grasshopper, only known from the Siloana Plain just north of Sioma to the Shesheke flats.	No
EAAA6	<i>Acontias schmitzi</i>		12 729	LC	10	Confirmed	Cr2	A burrowing skink found in deep Kalahari sands. This species is only known from two specimens (one from the 2018 project survey). 2km from forebay and canal on the east bank	Yes

Protected Areas



Potential species of stakeholder concern



Group	Scientific name	Common name	IUCN Category	Present in Baselines
Birds	<i>Bucorvus leadbeateri</i>	Southern Ground Hornbill	VU	Y
Birds	<i>Terathopius ecaudatus</i>	Bateleur	EN	Y
Birds	<i>Falco vespertinus</i>	Red-footed Falcon	VU	Y
Birds	<i>Buggeranus carunculatus</i>	Wattled Crane	VU	N
Birds	<i>Gyps africanus</i>	White-backed Vulture	CR	N
Birds	<i>Necrosyrtes monachus</i>	Hooded Vulture	CR	Y
Birds	<i>Polemaetus bellicosus</i>	Martial Eagle	EN	N
Birds	<i>Sagittarius serpentarius</i>	Secretary bird	EN	N
Birds	<i>Torgos tracheliotos</i>	Lappet-faced Vulture	EN	N
Birds	<i>Trigonoceps occipitalis</i>	White-headed Vulture	CR	Y
Mammals	<i>Acinonyx jubatus</i>	Cheetah	VU	N
Mammals	<i>Hippopotamus amphibius</i>	Common Hippopotamus	VU	Y
Mammals	<i>Panthera pardus</i>	Leopard	VU	Y
Mammals	<i>Smutsia temminckii</i>	Ground Pangolin	VU	N
Fish	<i>Oreochromis macrochir</i>	Greenhead Tilapia	VU	Y
Plant	<i>Aloe esculenta</i>		Previously thought to be extinct	Y
Plant	<i>Crinum binghamii</i>		NE	Y
Reptiles	<i>Crocodylus niloticus</i>	Nile Crocodile	LC	Y