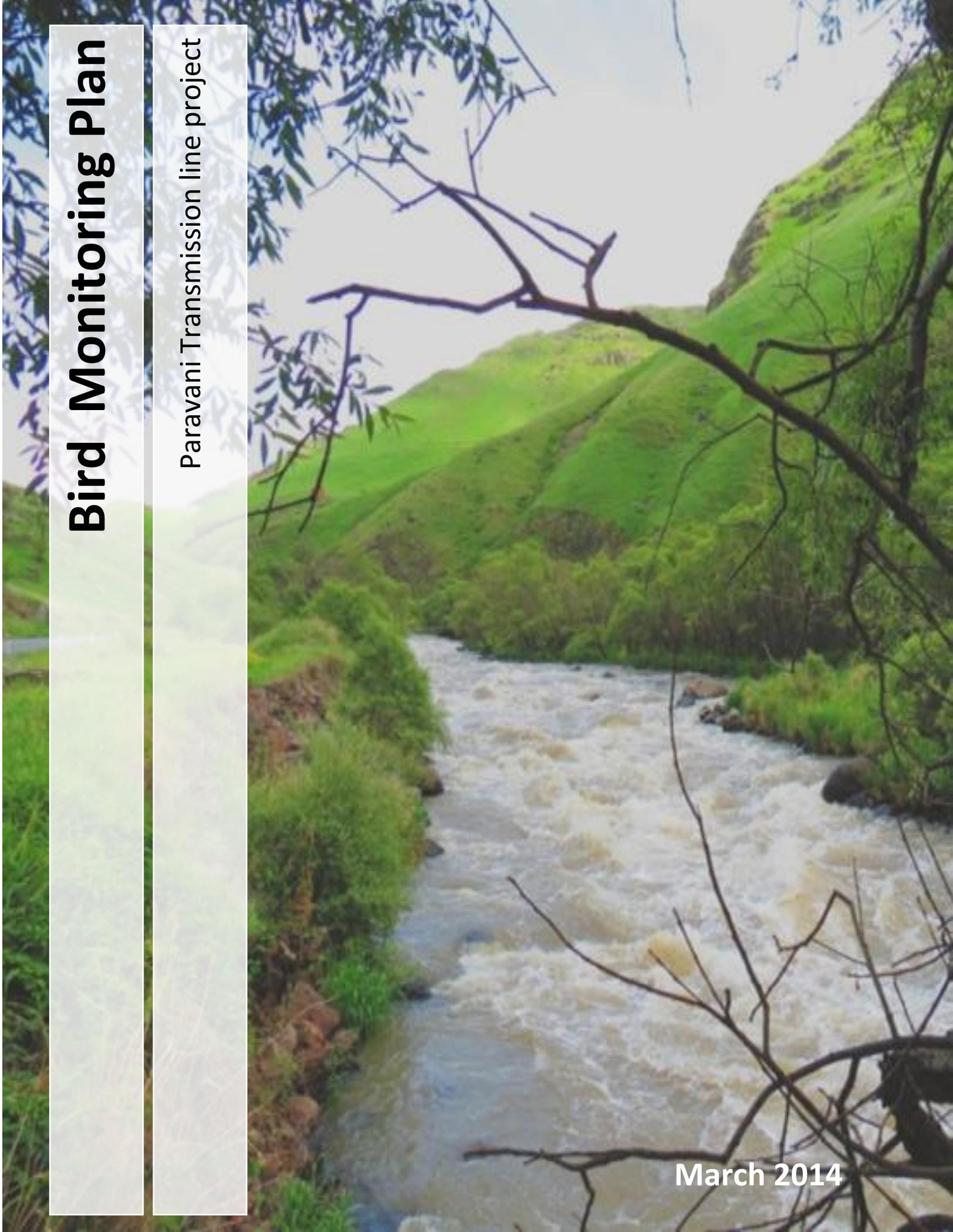


Bird Monitoring Plan

Paravani Transmission line project

March 2014



Contents

- 1. Transmission line corridor.....1
- 2. Bird species in the project region.....3
- 3. Monitoring.....6
 - 3.1. Spatial and temporal coverage6
 - 3.2. Registration7
 - 3.3. Searcher detection & scavenger removal experiments (optional)7
- Annex 1. Registration forms8

1. Transmission line corridor

According to the project 33 km long high voltage (220 kV) transmission line will connect Paravani HPP to the national grid. The line will start from the power house/switchyard, will go up the ridge dividing the Paravani and Mtkvari gorges, run along the left slope of the Paravani, cross the Paravani River, go up the right slope of Paravani gorge, run between Saro, Khizabavra villages, parallel to the existing transmission line Vardzia-110 up to Aspindza. From there, up to village Agara it will run parallel to an existing 500 kV transmission line. Near Agara, the line will turn and connect to the existing Akhaltiskhe substation. A total of 105 towers will be installed.

Two types of towers ПС220-6 and Y220-1(Y220-1+5; Y220-1+14) will be used. Main parameters and design of the towers is shown in Figure 3.

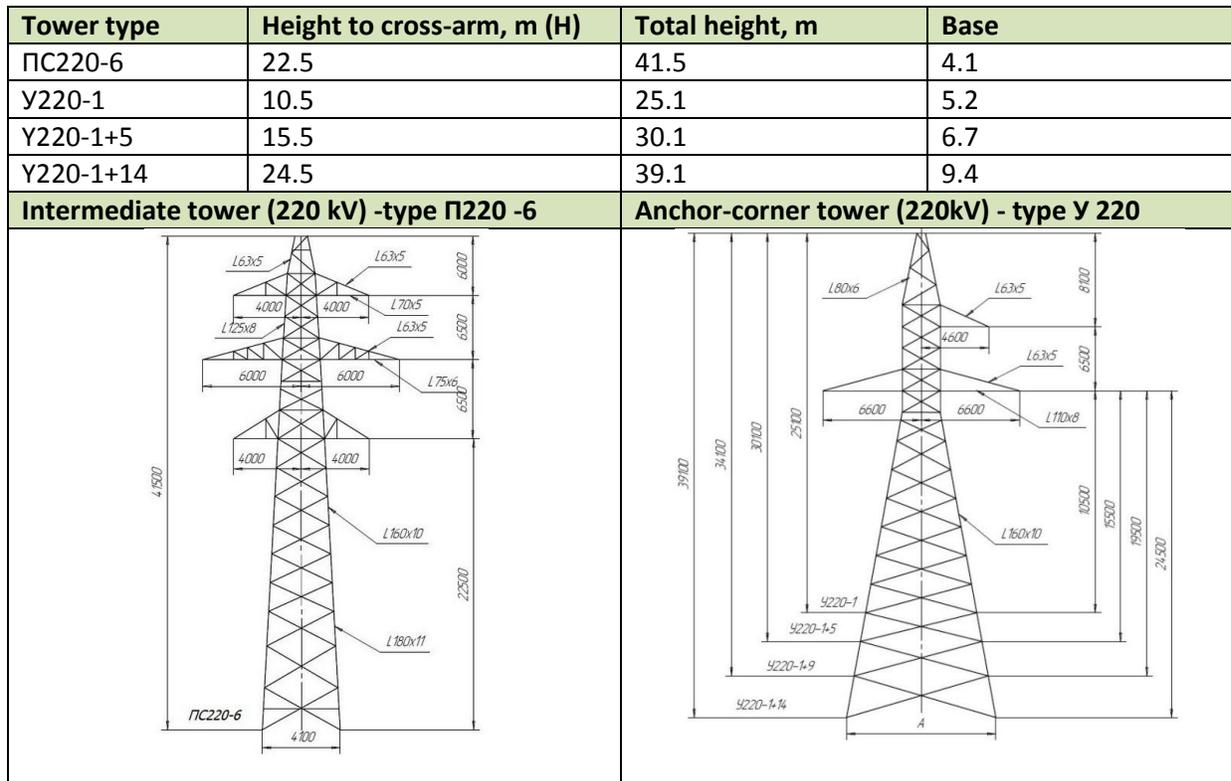


Figure 3. Transmission line towers

In some sections the Paravani line runs almost parallel to 500kV OHL, connecting to the same substation. Location of transmission lines are shown in Figure 1.

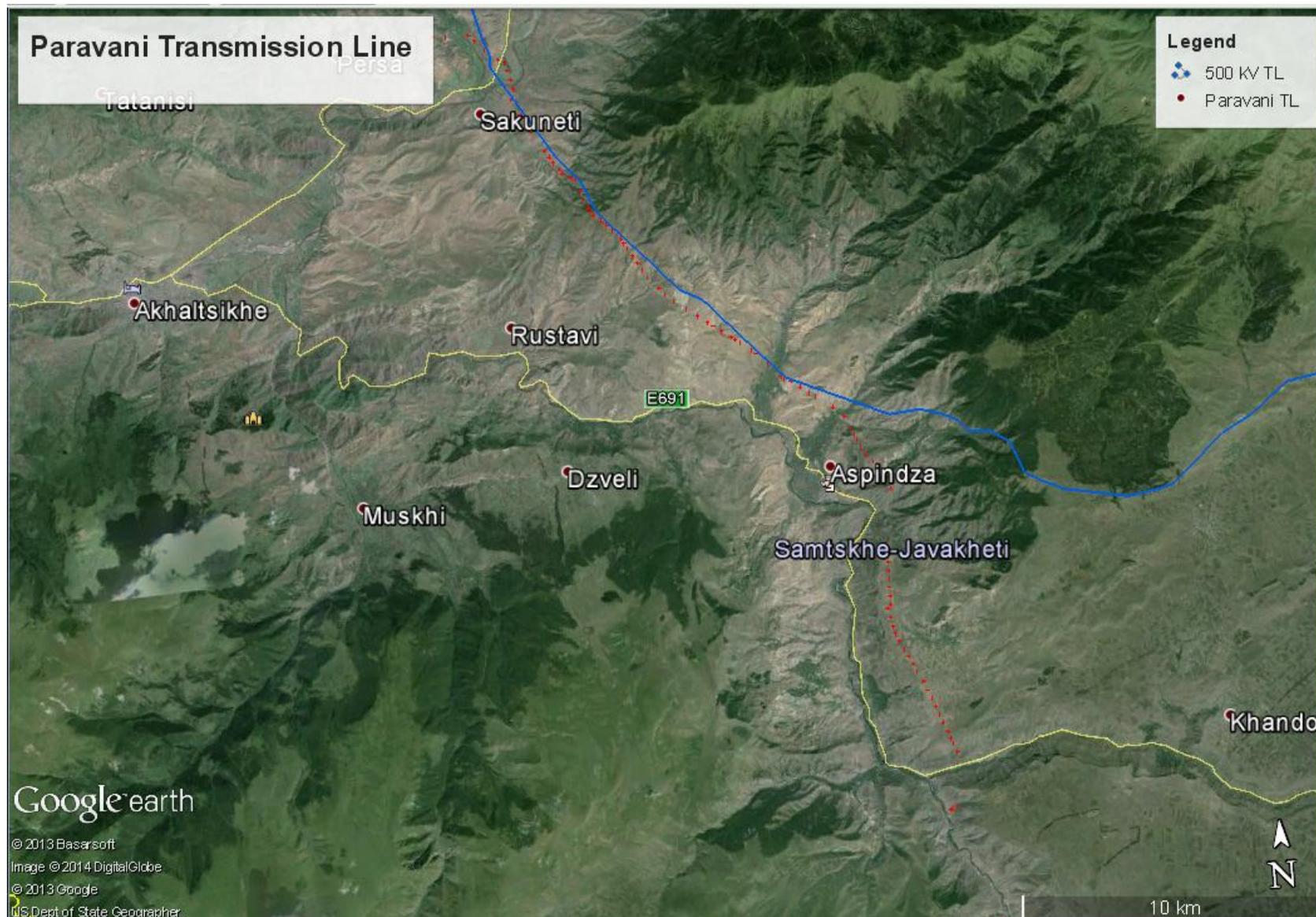


Figure 1. Location of Paravani and 500kV transmission line

2. Bird species in the project region

Avian fauna of Javakheti includes the species of Georgian Red List, International Union for Conservation of Nature (IUCN) Red List, species included in Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA) and Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES), some – species included in convention on protection of migratory species. Globally threatened species such as Corncrake and Imperial Eagle can be found in the area. Khanchali, Madatapa and Bugdashevi lakes are on the pathway of migratory waterfowl species. Lakes in the corridor have significant congregation of waterfowl. In autumn migration from the north of Georgia is observed.

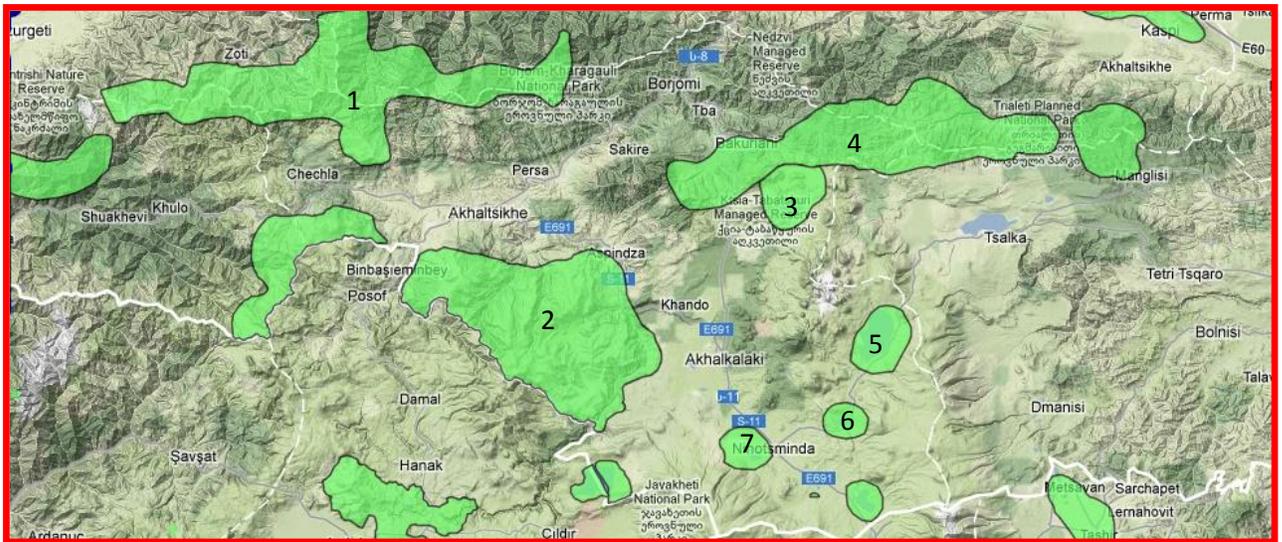
The list of species registered/potentially available in the RoW includes:

N	Common name (English)	Latin name	IUCN Status	Description
1	Chukar pertridge	<i>Alectoris chukar</i>	LC	Length: 36cm. Wingspan: 56cm Ground-dwelling birds that are more likely to run from a perceived threat, but when they do take flight they often stay low to the ground and fly with a series of rapid wing beats followed by a glide.
2	Common Quail	<i>Coturnix coturnix</i>	LC	Length: 17 cm. Wingspan: 32-35cm Is reluctant to fly, preferring to creep away instead. Even when flushed, it keeps low and soon drops back into cover.
3	Little Egret	<i>Egretta garzetta</i>	LC	Length: 55–65cm. Wingspan: 88–106 cm
4	Great (White) Egret	<i>Casmerodius albus</i>	LC	Length: 80-104cm. Wingspan: 131- 170 cm
5	Grey Heron	<i>Ardea cinerea</i>	LC	Length: 84–102cm. Wingspan: 155–195 cm
6	White Stork	<i>Ciconia ciconia</i>	LC	Length: 100–11 cm. Wingspan: 155–215 cm
7	Black Stork	<i>Ciconia nigra</i>		Length: 95- 10 cm. Wingspan: 145–155 cm
8	Eurasian Griffon	<i>Gyps fulvus</i>	LC	Length: 93–122cm. Wingspan: 2.3–2.8 m. Flies high above ground
9	Booted Eagle	<i>Aquila pennatus</i>	LC	Length: 46cm. Wingspan: 120 cm
10	Lesser Spotted Eagle	<i>Aquila pomarina</i>	LC	Length: 60cm. Wingspan: 150 cm
11	Greater Spotted Eagle	<i>Aquila clanga</i>	VC	Length: 59–71 cm. Wingspan of 157–179 cm
12	Steppe Eagle	<i>Aquila nipalensis</i>	LC	Length: 62–81cm. Wingspan: 1.65–2.15 m Often perches and walks on ground
13	Imperial Eagle	<i>Aquila heliaca</i>	VU	Length: 72–90 cm. Wingspan: 1.8–2.16 m
14	Common Buzzard	<i>Buteo buteo</i>	LC	Length: 54 cm. Wingspan: 120 cm Often perches on posts and power constructions
15	Long-legged Buzzard	<i>Buteo rufinus</i>	LC	Length: 50-66cm. Wingspan:115-160cm
16	Black Kite	<i>Milvus migrans</i>	LC	Length: 45-55cm. Wingspan: 120 - 140 cm
17	Eurasian Sparrowhawk	<i>Accipiter nisus</i>	LC	Length: 29–34 cm. Wingspan: 59–64 cm
18	Northern Goshawk	<i>Accipiter gentilis</i>	LC	Length: 46–57 cm (male); 58–69 cm (female) Wingspan: 89–105 cm (male); 108–127 cm (female)
19	Short-toed Snake-eagle	<i>Circaetus gallicus</i>	LC	Length: 62–67 cm. Wingspan: 170–185 cm
20	Western Marsh-harrier	<i>Circus aeruginosus</i>	LC	Length: 43-54cm. Wingspan: 115-130cm Flight is very low over ground
21	Montagu's Harrier	<i>Circus pygargus</i>	LC	Length: 43–4 cm. Wingspan: 97–115cm. Flight is very low over ground
22	Pallid Harrier	<i>Circus macrourus</i>	NT	Length: 40–48cm. Wingspan: 95–120cm Flight is very low over ground
23	Common Kestrel	<i>Falco tinnunculus</i>	LC	Length: 32–39cm. Wingspan: 65–82cm
24	Lesser Kestrel	<i>Falco naumanni</i>	LC	Length: 27–33cm. Wingspan: 63–72cm

25	Eurasian Hobby	<i>Falco subbuteo</i>		Length: 29-36cm. Wingspan: 74-8 cm
26	Peregrine Falcon	<i>Falco peregrinus</i>	LC	Length: 34-58cm. Wingspan: 74-120cm
27	Saker Falcon	<i>Falco cherrug</i>	EN	Length: 47–55cm. Wingspan: 105–129cm. Flies low
28	Common Sandpiper	<i>Actitis hypoleucos</i>	LC	Length: 18–20cm. Wingspan: 32–35cm
29	Little Ringed Plover	<i>Charadrius dubius</i>	LC	Length: 15–18cm. Wingspan: 32–35cm
30	Green Sandpiper	<i>Tringa ochropus</i>	LC	Length: 20–24cm. Wingspan: 39–44cm
31	Northern Lapwing	<i>Vanellus vanellus</i>	LC	Length: 28–33cm. Wingspan: 67–87cm
32	Armenian Gull	<i>Larus armenicus</i>	LC	Length: 60–67 cm. Wingspan: 125- 155 cm
33	Common Crane	<i>Grus grus</i>	LC	Length: 100–130cm. Wingspan:180–240cm
34	Common Cuckoo	<i>Cuculus canorus</i>	LC	Length: 32–34 cm. Wingspan: 55–60 cm ¹
35	Eurasian Skylark	<i>Alauda arvensis</i>	LC	Length: 18cm. Wingspan: 33cm
36	Wood Lark	<i>Lullula arborea</i>	LC	Wingspan: 27 - 30 cm
37	Horned (Shore) Lark	<i>Eremophila alpestris</i>		Length: 18-20cm. Wingspan: 31.12- 35.56cm
38	Barn Swallow	<i>Hirundo rustica</i>	LC	Length: 17–19 cm including 2–7 cm of elongated outer tail feathers. Wingspan of 32–34.5 cm
39	Northern House-martin	<i>Delichon urbica</i>	LC	Length:12-13 cm. Wingspan: 25-30 cm
40	Sand Martin	<i>Riparia riparia</i>	LC	Length: 12 cm. Wingspan: 28 cm
41	Water Pipit	<i>Anthus spinoletta</i>	LC	Length: 18 cm. Wingspan: 26 cm
42	Tree Pipit	<i>Anthus trivialis</i>	LC	Length: 15 cm. Wingspan: 26 cm
43	White Wagtail	<i>Motacilla alba</i>	LC	Length: 16.5-19 cm. Wingspan: 25-30 cm
44	Grey Wagtail	<i>Motacilla cinerea</i>	LC	Length: 18-19cm. Wingspan: 26cm
45	Black Redstart	<i>Phoenicurus ochruros</i>	LC	Length: 14-15cm Wingspan: 23-2 cm
46	Northern Wheatear	<i>Oenanthe oenanthe</i>	LC	Length: 14.5cm. Wingspan:26–27cm
47	Whinchat	<i>Saxicola rubetra</i>	LC	Length: 12 cm Wingspan: 22 cm
48	Common Stonechat	<i>Saxicola torquata</i>		Length: 12.5cm Wingspan: 12cm
49	Common Whitethroat	<i>Sylvia communis</i>	LC	Length: 14 cm Wingspan: 20cm
50	Marsh Warbler	<i>Acrocephalus palustris</i>	LC	Length: 13 cm Wingspan: 20cm
51	Common Chiffchaff	<i>Phylloscopus collybita</i>	LC	Length: 10 cm. Wingspan: 18cm
52	Greenish Warbler	<i>Phylloscopus nitidus</i>	LC	Length: 10 cm Wingspan: 18cm
53	Red-backed Shrike	<i>Lanius collurio</i>	LC	Length: 17 cm.Wingspan: 26 cm
54	Common Raven	<i>Corvus corax</i>	LC	Length: 56-78cm. Wingspan: 100-150cm
55	Eurasian Linnet	<i>Carduelis cannabina</i>	LC	Length: 14 cm. Wingspan: 24 cm
56	Twite	<i>Carduelis flavirostris</i>	LC	Length: 14 cm. Wingspan:23 cm
57	European Goldfinch	<i>Carduelis carduelis</i>	LC	Length: 11.5–12.5 cm. Wingspan: 20–22.5cm
58	Greenfinch	<i>Chloris chloris</i>		Length: 15cm. Wingspan: 24.5-27.5cm.
59	Red Crossbill	<i>Serinus pusillus</i>	LC	Length: 53-69cm. Wingspan: 106-116 cm
60	Common Rosefinch	<i>Carpodacus erythrinus</i>	LC	Length: 14 cm. Wingspan: 26 cm
61	Rock Bunting	<i>Emberiza cia</i>	LC	Length: 16 cm. Wingspan: 24 cm
62	Corn Bunting	<i>Miliaria calandra</i>	LC	Wingspan: 29 cm

Note: LC – Least concern; VU – Vulnerable; NT – Near threatened; EN – endangered

Important bird site is the region crossed by transmission line is shown in Figure 2. Location of the line with relative to the important bird area (IBA) is given in Figure 3.



N	Name	Area (ha)
1	Adjara-Imereti ridge	173,279
2	Meskheti (including Erusheti) 2	82,828
3	Tabatskuri lake (including its environs)	9,991
4	Trialeti ridge	66,848
5	Paravani lake	5,830
6	Sagamo lake	857
7	Khanchali lake	2580

Figure 2. Important bird areas in the project region



Figure 3. Location of the lines with regards to the IBA

3. Monitoring

In order to monitor impact of transmission lines of birds (mainly bird collision) the following monitoring of the section of line concerned is suggested.

This will involve driving or walking along the power line and searching for collision victims (bird carcasses). It will be considered that the data are subject to several biases such as

- detection bias (the percentage of dead birds that are actually found, which varies with habitat and topography),
- the scavenger removal bias (the percentage of birds that collide, that remain after a certain time period, not removed by scavengers), and
- the crippling bias (those birds that are injured but manage to move away from the power line sufficiently to avoid detection).

The monitoring of impact on migratory species will be carried out in spring and autumn. Suggesting monitoring dates are set with consideration of migration periods: March 20 - May 10; August 20 - November 10. Monitoring will be carried out in the beginning, middle and end of migration season, 3-5 days per each.

The monitoring team will include ornithologist, assistant and driver. The terrain will be covered on foot, but for large open bare areas, searches can be carried out by car.

3.1. Spatial and temporal coverage

According to statistics the most collision victims are found within 50 m distance from a power line. The search area should, therefore, include the area up to at least 40-50 m, on both sides, measured from the centre of the line.

The search intensity will be adjusted depending on the size of the victims (small passerines to large swans), the type of terrain (irregular surface, hollows, rocks, etc.), and vegetation cover (size and structure).

Medium sized birds in flat terrain with low vegetation will be checked within a radius of 10 m.

Because most electrocution victims fall close to the base of the pole, a search radius for electrocuted birds will be set as 10 m around poles/pylons. Victim searches will be carried out often enough to prevent too many victims being lost to scavengers.

While selection of temporal coverage and planning the following facts will be considered:

- the smaller the bird victims are, the more frequent searches have to be carried out.
- for small to medium sized birds and birds of prey an intensity of twice weekly or once a week is sufficient.
- large conspicuous birds (such as storks, eagles, cranes, bustards) must be searched for fortnightly.

The frequency of the monitoring will be set/specified on initial stage of monitoring thorough observation.

3.2. Registration

Every 'victim' will be registered. Information to be recorded will include:

- Position of the carcass indicated on a map or form to later identify the most problematic line sections or poles.
- Information with which line - conductors or ground wires - the bird has collided.
- Information on age and sex of the bird (to analyse the effect of age and gender on susceptibility for electrocution and collision).
- Cause of death/injury – whether the dead bird has truly suffered from an impact with the power line or if there is another reason of death. Cause of death will be identified by visual examination to exclude other unnatural death causes than electrocution or collision such as shooting or kills by birds of prey.

Note: Evidence of electrocution can include burn marks on feathers, feet, or bill, visible as *e.g.*, small well-defined burn holes in the plumage, scorched areas at current entry and exit points, or large necrotic areas on the limbs. Evidence of collision can include fractured bones of the extremities (wings, legs and shoulder bones), broken vertebrae and skull fractures, torn off wings and limbs, flesh wounds, impact wounds on head or body where the bird hit the wire. Birds that have been shot often show shattered bones, spattered blood, contusions and bullet wounds (references in APLIC, 2006; Haas *et al.*, 2005).

3.3. Searcher detection & scavenger removal experiments (optional)

Line searches and evaluation of mitigation measures should include experiments to correct for searcher detection bias and scavenger removal bias. Rates to correct for both biases should be established with experiments in which carcasses are laid out below and near the studied power line sections.

In searcher detection experiments searchers are not aware that colleague researchers have put out 'test' carcasses. Trial administrators should therefore be careful not to put out too many carcasses at once or leave traces, such as footprints or tags on trial carcasses, otherwise they may influence search intensity.

Preferably 'test' carcasses are similar in size and colour of the species normally encountered in the impact study. In cases where a broad range of electrocution or collision victims are involved, the test carcasses should be of various sizes (small, medium and large birds) and colours.

Use of chicken or feral pigeon carcasses as surrogates is discouraged as these are often more rapidly removed by scavengers than species that are typically found as electrocution or collision victim. They will also notify the searchers of the ongoing experiment.

The duration and season of the tests is of importance as well as intervals between carcass searches. It is also important not to put out too many carcasses at once, because this may give scavengers more than they can remove and process and carcasses may become unattractive as food because of rotting or mummification processes.

The monitoring of live bird movement is even less commonly conducted than the dead bird searches. as the likelihood of actually observing a bird strike is not high.

Annex 1. Registration forms

ID			
Date:			
Start time:		End time:	
Observer:			
Location		X	
		Y	
Description of terrain			
Species	Latin name		
	Common name		
Migratory/local	<input type="checkbox"/> M	<input type="checkbox"/> L	
Age			
Sex	<input type="checkbox"/> M	<input type="checkbox"/> F	
Relation of the carcass to the line/tower (approximate distance)			
Carcass condition (see Note)			
Presumable cause of death, description of injury			
Additional comments			
Photo			

Note: Categories of carcass condition.

Code	Description
I	Injured or dying.
F	Freshly dead with little or no decay or scavenging by insects; likely died within 48 hours.
R	Recently dead but with noticeable decay or scavenging; likely died within 2-7 days.
D	Decomposed carcass, may not be identifiable to species; likely died more than 1 week ago.
U	Unknown; impossible to determine because only feathers remain.