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Birds and Power Lines within the Rift Valley/Red Sea Flyway

Many bird species and bird populations potentially face significant risks associated with power lines. These risks include collision, electrocution and disturbance/displacement effects as well as habitat impacts.

Developers and consultants can ensure that these impacts are minimised by integrating bird and biodiversity concerns.

Developers should:

- Recognise that appropriate routing of power lines is the main mechanism to minimise the risk to birds and biodiversity, and select the appropriate routes
- Consult a **Strategic Environmental Assessment** (**SEA**) to identify areas suitable for routing and high risk areas
- Where no SEA has taken place, consult experts and request guidance from BirdLife Partners on high risk areas
- Design routes to avoid protected areas, Important Bird Areas and migratory bottlenecks
- Carry out a site-specific **Environmental Impact Assessment** (**EIA**) which will provide site-specific recommendations
- Consult ornithological and conservation experts regarding proper assessment methodologies
- Utilise bird-sensitive pole designs which minimise electrocution risk, and line configurations which minimise collision risk
- Ensure the early adoption of bird risk mitigation procedures, which can reduces costs in the long term
- Undertake continuous monitoring post-construction. This can help identify high-impact areas and inform retrofitting actions
- Commit to making ecological and bird data freely and publicly available from a centralised source
- Engage with governments, utility companies and consultants, and conservation organisations and other civil society groups, to ensure the best available solutions are utilised
- Carry out environmentally-friendly construction practices.

Once energy is generated, it must be transported to the end user. This infrastructure will occupy space within the landscape, and can pose a significant risk to birds and biodiversity. The Middle East/North Africa region which includes the Rift Valley/ Red Sea flyway has significant plans for the development of energy, both renewable and conventional. These new and additional energy developments are driven by economic development and technological innovation, and will require the construction of additional power lines, the cumulative length of which could reach thousands of kilometres. The total length of transmission and distribution lines worldwide is expected to rise from 70.5 million kilometres at the end of 2010 to 76.2 million kilometres in 2015.

New power infrastructure may pose a high risk to birds and bird populations, potentially leading to the deaths of thousands of birds annually across the region. The impact of these power lines on bird populations will vary between species and

locations, but for some, mortality rates are high enough to have a considerable impact at the population level, and may be a significant factor driving population decline.

Special attention needs to be given to the development of power lines along migration flyways, and investigating the impacts of existing power lines. The Rift Valley/Red Sea flyway is the second most important flyway in the world for migratory soaring birds. Over 1.5 million migratory soaring birds of 37 species use the flyway, including raptors, storks, pelicans, ibises and cranes, of which five species are globally threatened. Any negative impact on migratory birds in one area along the flyway has the potential to have knock-on consequences in another area along the flyway. A severe impact could break the links in the chain of sites along the flyway that migrating birds use to rest and feed.

Transmission infrastructure operators have a responsibility to ensure that adverse impacts are minimised. Where there are negative impacts on globally or nationally important species, there is a risk of significant reputational damage, and where nationally protected species are involved, there may also be a statutory responsibility to mitigate these impacts.

Energy developers may bear the responsibility of connecting their projects to the grid, and must ensure that they are appropriately designed to reduce potential impacts on birds and biodiversity. The developers responsible for the construction of the grid, the utility company itself, the Transmission System Operator or a contracted party must ensure that the electrical power line infrastructure poses little risk to birds and biodiversity.

This guidance document is aimed at informing developers and consultants involved in the routing and construction of power lines about the potential impacts on birds, and measures to minimise these impacts. Utility companies will also benefit from using these materials to inform appropriate design of bird-sensitive pole and lines.

Adverse impacts on birds and biodiversity can lead to public scrutiny of an industry, but appropriate measures can reduce such impacts, and reflect positively on the sector or individual operators. BirdLife International and BirdLife Partners are committed to working with all stakeholders involved in the construction of power lines, to ensure that adverse impacts are minimised, and bird and biodiversity concerns are integrated into the decision-making processes, and that this is done as early as possible, to reduce costs.

Potential Impacts

The power lines needed to deliver power from where it is generated to the end user can occupy a substantial amount of horizontal and vertical space across a landscape, and are likely to be one of the main sources of impacts on bird populations along the flyway. A 2010 Sudanese study found 17 electrocuted corpses of the globally threatened Egyptian Vulture *Neophron percnopterus* over a two month period[1]. Like other large soaring bird species, these long-lived birds have low reproductive rates and are likely to be significantly impacted by such mortality rates.

Significant effects of power lines on birds are likely to include:

- **Collision**: With power lines or associated masts leading to death or injury;
- **Electrocution**: owing to contact with live energised components;
- **Displacement/Barriers**: along migration routes or to suitable habitats/feeding grounds;
- **Habitat impacts**: including fragmentation of habitats at landscape level.

Exact numbers of birds killed through electrocution or collisions are difficult to estimate, although up to 10,000 electrocutions and many hundreds of thousands of collisions are estimated to occur per country in the African-Eurasian region each year[2].

The potential impacts are likely to vary depending on the site location, and also the species migrating through an area. For instance, raptors are more likely to suffer electrocution from power lines than collisions. The birds most commonly associated with electrocution are large wading birds (such as storks, herons and ibises), raptors, owls, and song birds and other perching birds (Passeriformes).

Birds which are vulnerable to collision are relatively fast-flying, heavy-bodied birds with limited manoeuvrability during flight. Particularly high mortality is likely to occur where placement of power lines coincides with migratory bottlenecks. Many collisions happen at night, or at dawn and dusk, or when visibility is low. The birds most commonly associated with collision are waterfowl, large wading birds (such as storks, herons and ibises), and cranes and other water birds such as sandpipers, plovers and gulls.

Birds can also have significant and costly effects on power lines. Collisions and electrocution incidents, and roosting and nesting, can damage power line infrastructure, requiring repairs to a section or length of power line, and causing disruption of service. It may even be necessary to replace or move a section if it has been built across a route used regularly by birds, where impacts would potentially be high[3].

The impacts on birds differ, depending on which of the three types of power line, carrying differing phases of electrical transmission, is involved

- High (>60kV usually 110 kV and above, Extra High > 250kV)
- Medium (1-59 kV) and
- Low (<1000 V).

This fact sheet focusses on high and medium power lines, which are believed to have the largest direct impact on birds and bird populations, mainly from collision and electrocution risks.

High voltage power or transmission lines form the backbone of many national grids. The design of power lines along a vertical (upward) plane with cables of low visibility is associated with collision risks, especially during adverse weather conditions. Greater collision risk is associated with the thin earth (shield) wire which is found above the thicker high voltage wire. As they are usually connected to pylons with long suspended insulators, electrocution risk is typically low.

Medium and low voltage power lines or distribution lines are more likely to result in electrocution, due to birds making a connection between two live components. This electrocution risk is most commonly associated with poles and perching areas.

Interactions and the impacts on birds and bird populations result from a complex mixture of biological, environmental and also engineering factors.

There are a number of factors related to the routing of power lines which increase the risks

- Areas in the surroundings with high bird populations and high percentages of migratory birds;
- Presence of wetlands, marshes, coastal areas and steppes, which may be important to bird species;
- Power lines crossing a flight path at right-angles;
- Poor visibility of the conductor cables, usually grey coloured.

[1] Angelov, I., Hashim, I., & Oppel, S. (2011) Persistent electrocution mortality of Egyptian Vultures Neophron percnopterus over 28 years in East Africa. Bird Conservation International, Available on CJO 2012 doi:10.1017/S0959270912000123
[2] CMS (2011) Review of the Conflict between Migratory Birds and the Electricity Power Grids in the African-Eurasian Region
[3] Bahat O., (2008) Wintering Black Storks (Ciconia nigra) cause severe damage to transmission lines in Israel- A Study of the risk and mitigation possibilities www.birdsvision- solutions.com/image/users/142826/ftp/my_files/downloads/WinteringBlackStorks.pdf

Power pole design factors which increase electrocution risk include:

- Spacing between conductors being too narrow, enabling connection and causing a circuit to form;
- The use of upright insulators which are not insulated, which can cause a circuit to form;
- The spacing between lines being too narrow.

Physiological, behavioural and ecological features which increase the vulnerability risk of certain species to collision and electrocution include:

- Large body, poor frontal vision, and a preference for nocturnal activity;
- Lack of flying experience in young birds which may increase vulnerability to collision;
- Preference for elevated places for roosting, perching or nesting;
- Preference for treeless open habitats and attraction to elevated poles;
- Flocking and gregarious behaviour which may impair visibility in large concentrations;
- Susceptibility to disturbance;
- Preference for low-altitude habitats, where there is likely to be a higher density of power lines;
- Low species density (with lower replacement potential);
- Low reproductive potential, meaning that an increase in adult mortality leads to an increased amount of time for a population to recover;
- Low fecundity, low natural mortality rates and long life expectancy;
- Long-distance intercontinental migrants, which may pass through an area and can be affected by new and additional lines.

All power lines that are inappropriately placed across a landscape can lead to displacement and have habitat impacts, including isolation of populations and loss of genetic resources. Poles can also provide perching areas for raptor species which can lead to increased use of an area, which may have an impact on the local ecosystem.

Given the high probability that the increase in energy generation within a region will mean the routing of additional power lines, the cumulative impact on birds and bird populations could be significant. The fragmentation of habitat and displacement of birds, and resulting exclusion from particular areas, could have effects similar to actual habitat loss. Transmission System Operators and developers should work to reduce this impact, by applying a suite of mitigation actions. Many operators already engage in mitigation actions and have bird-friendly standards in place, and sharing best-practice examples and lessons across the region will make an important contribution to reducing impacts.

Strategic planning and assessment

The potential negative impacts and risks will be significantly reduced by appropriate routing of power lines, and the use of bird-sensitive pole designs.

At the pre-planning stage, a **Strategic Environmental Assessment** (**SEA**) should be consulted to identify areas where significant impacts may occur. Where there is a high probability of a significant impact, this area should be excluded from the route. Protected areas and other sites important for biodiversity, such as Important Bird Areas, wetlands and areas with high concentrations of birds, should be avoided if possible. Areas of high bird-flight frequency with associated low height use, such as coasts, topographical straits (corridors or passage ways) or areas with concentrations of breeding colonies, should also be avoided in this advanced planning stage.

If no SEA has been produced, regional and national experts should be consulted to provide guidance on high-risk areas and appropriate routes. Developers should also refer to any other available tools which can provide information on high-risk areas. One important tool is sensitivity mapping, which records the locations and movements of species that are vulnerable to the impacts of infrastructural development. Another decision support tool is IBAT, which can help guide routing and inform an EIA by showing important species and habitats which could be present along a route. These tools allow for the risks associated with a range of different actions to be identified at an early stage of planning, and avoided or substantially reduced.

BirdLife International has developed and is continuing to refine a sensitivity-mapping tool for the Rift Valley/Red Sea Flyway. This tool will provide valuable information on the potential impact on bird populations, specifically for wind energy development at different locations along the flyway, but also shows the areas which are important to birds, which will be useful in identifying areas for routing.

The routing of power lines needs to consider 1) proximity to areas rich in birds, 2) vegetation type present at the site, 3) topography and 4) disturbance, all of which can influence the abundance and species of birds present.

When appropriate routes have been identified, it is essential to undertake an **Environmental Impact Assessment** (**EIA**). This must appropriately assess the ornithological value and biodiversity of the entire route. Several routes should be investigated in parallel, with the risks associated with each route considered and appropriately addressed. A reconnaissance survey is the initial step in deciding on routes, and whether certain species are more vulnerable along different routes. The route with the lowest risk should be the preferred route.

Stakeholder consultation with local communities, indigenous groups, planners, researchers, and specific interest groups such as conservation groups, should take place at the earliest stages of development, so that expert and local knowledge can feed in to the routing process, and any issues can be addressed early in the project life cycle. This participation should take place throughout the assessment processes. Data may be limited in the region, and expert knowledge can provide a valuable insight into areas where there is a likelihood of high risk.

Ideally ecological data generated by the EIA should be stored in a centralised and accessible information system, which enables strategic analysis and also the generation of greater knowledge, and can increase the accuracy of any sensitivity map or other decision-support tool. This publication of this data will ensure that the industry is using the most up-to-date readily available data, and will provide valuable input into their knowledge of birds and bird populations in the region, and any impacts, positive or negative, that are occurring through industry activities.

As part of an EIA, it is essential that the Environmental Management Plan is open to stakeholder consultation, and a non-technical summary report is published. Stakeholders should be encouraged to take part in any consultation, and this should be done in an open and transparent manner. Mechanisms should be put in place to aid this consultation, and incorporate any of the comments received.

The EIA will aid in identifying the extent of risks to birds and other biodiversity at the site/project level. It enables specific risks to be addressed, and outlines specific avoidance and mitigation actions, which will reduce the impact on birds and biodiversity. A robust pre-construction **baseline survey** is an essential component of the EIA. It is recommended that a minimum of one year's baseline surveys should be undertaken at each of the hotspots identified, as part of the baseline survey of the preferred routes.

If the risk levels posed by a project are deemed acceptable, then the mitigation hierarchy of **avoidance, minimisation/ mitigation, and rehabilitation/restoration, offset** should be adhered to.

The mitigation hierarchy is defined as[4]:

a. Avoidance: measures taken from the outset, such as careful spatial or temporal placement of elements of infrastructure, in order to completely avoid impacts on certain components of biodiversity.
b. Minimisation: measures taken to reduce the duration, intensity and/or extent of impacts (including direct, indirect and cumulative impacts, as appropriate) that cannot be completely avoided, as far as is practically feasible.
c. Rehabilitation/restoration: measures taken to rehabilitate degraded ecosystems, or restore cleared ecosystems, following exposure to impacts that cannot be completely avoided and/or minimised.
d. Offset: measures taken to compensate for any residual significant adverse impacts that cannot be avoided, minimised and/or rehabilitated or restored, in order to achieve no net loss, or a net gain, of biodiversity. Offsets can take the form of positive management interventions, such as restoration of degraded habitat, arrested degradation or averted risk, and/or protecting areas where there is imminent or projected loss of biodiversity.

The primary objective must be to avoid any adverse impact, which can be done through appropriate routing. Offsets as part of the mitigation hierarchy should be the option of last resort, and if required, should be directed towards conservation efforts and habitat restoration, targeting those species and habitats affected by the development.

The steps in carrying out a robust EIA are:

- **Screening stage** to determine whether a full or partial assessment is required. As there is little ornithological and ecological data available for the flyway, it is recommended that a full assessment is carried out. However, as more information is generated, it may become appropriate for full assessments to be restricted to identified high-impact areas;
- **Scoping** determines the content and extent of what needs to be investigated to generate the ecological information required to be submitted by the developer to a designated national authority. The scoping stage is an important feature of an adequate EIA regime, and improves the quality and output of the EIA. It should determine the range of ornithological issues likely to be encountered, and decide upon an expert-reviewed suite of surveys, to ensure that all ornithological aspects are appropriately assessed. It should take into account international, national, regional and local considerations and priorities. The scoping stage provides a good opportunity for developers to identify and engage with a wide range of stakeholders. It sets out the terms of reference for the impact assessment stage;
- **Preparation and assessment** which states the description of the project, describes the likely impacts, and a prediction related to the likelihood of these impacts occurring, the data required to identify and assess the main effects on the environment, the main alternatives studied, and the reasons for the preferred choice of operations. It should also consider the magnitude, extent, duration and reversibility of impacts, alongside their probability of occurrence. The ecological significance of any impact should be quantified, and should also include the cumulative impacts of similar existing and proposed developments in the area. The information and data gathered should be publicly available;
- **Reporting**. The Environmental Impact Assessment should be published, including an Environmental Management Plan. A non-technical summary in the local language should also be published and distributed;
- **Consultation and review**. The public, local communities and other interested groups, as well as national environment authorities, must be informed and consulted before a developer proceeds to make a request for consent for the development. The results of this consultation and the information accumulated must be taken into consideration and integrated into the decision making processes and the impact assessment. The ornithological and biological data should be freely available in a centralised information facility, to allow for interested groups to formulate their positions;
- **Decision**. The national decision authority that refuses or grants consent for development must make the information available to the public, including the reasons and considerations on which the decision is based;
- **Monitoring** should then take place to make sure that the predicted impacts and the mitigation actions are occurring as set out in the Environmental Management Plan. Monitoring will also ensure unpredicted impacts are addressed. The data which is generated should be freely available in the same information facility, and be accessible.

The EIA and ornithological assessment should be designed and carried out by trained and qualified individuals to a high standard.

Pre-Construction surveys

The EIA, the pre-construction baseline surveys and also the post-construction monitoring must include an accurate assessment of the species present, and the significance of the area impacted by a project. The method used should be reviewed by a trained ornithological expert, and BirdLife Partners can help ensure these methods are appropriate. Baseline surveys should take place for a minimum of a year.

These methods should include:

1. Assessment of birds breeding along the route, and within an appropriate buffer zone;
2. Vantage point surveys throughout the year, with intense monitoring during peak migration periods;
3. Species-specific assessments of rare or threatened and breeding bird species for collision risks;
4. Winter ornithological surveys may also be required;
5. Cumulative Impact Assessments may also be required.

Assessing the impact of disturbance and displacement is a vital component of impact assessment. Given the eventual length of power lines across the landscape, developers must refer to expert knowledge to identify potential hotspots, and a stratified random sample approach should be used along the power line route where the habitat is variable.

If there is a high likelihood of significant impact on vulnerable species or sensitive ecosystems through the routing of a power line, this area should be avoided. Enhancement of an area by habitat alteration which can benefit birds and biodiversity is an additional consideration, and will be informed by an appropriate EIA assessment. BirdLife Partners and other conservation organisations can offer advice and guidance on ways to maximise biodiversity benefits and minimise risks.

[4] Business and Biodiversity Offsets Programme (BBOP) (2012) Standard on Biodiversity Offsets. www.forest-trends.org/documents/files/doc_3078.pdf

Construction activities

The construction of the power line has the potential to have a significant impact on biodiversity, in particular resident bird species with territories close to the construction site. These impacts can be reduced by utilising environmentally-sensitive construction practices and techniques, including habitat restoration at the site level. Industry-specific best practice guidelines for mitigating impacts on birds in relation to power line cables and mast structure should be adhered to.

Good construction techniques include (1) minimising any clearing of natural vegetation; (2) implementing adequate measures to control soil erosion and runoff; (3) ensuring proper disposal of all wastes; (4) ensuring construction materials come from local and environmentally sustainable sources; (5) restoring cleared areas where feasible; and (6) ensuring invasive alien species are not introduced.

Construction should be timed to avoid times of peak sensitivity, such as during the breeding season or periods of peak migration.

Mitigation actions and bird-sensitive design

Utility engineers should work with biologists, ornithologists and national experts early in the design and routing processes, to identify collision and electrocution issues and develop feasible impact reduction strategies. The later in the process a solution is initiated, the more difficult, time-consuming and costly it can become.

The main mitigation actions to reduce the risk of collision, electrocution and disturbance, which should be carried out at an early stage, are:

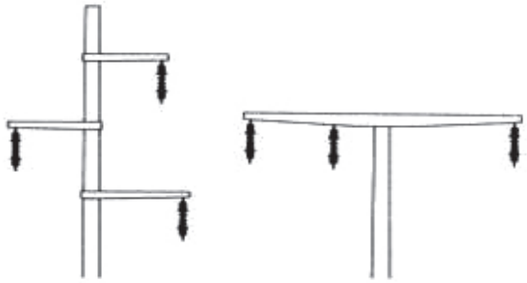
- Routing of lines to avoid key areas for birds, including migratory flyways and bottlenecks;
- Avoiding areas which are attractive to birds such as waste water treatments plants and waste dumps, especially in arid regions;
- Avoiding where possible establishing power lines close to shorelines and over wetlands, maintaining a minimum distance of 5 km from shorelines.

To reduce collision risk actions include:

- Placing power lines parallel to land features which could be potential bird routes, such as ridges and valleys, and not cutting across them;
- Using bird deflectors in high impact areas, specifically along migration flyways. These should increase line visibility by thickening the appearance of the line by a minimum of 20 cm over a length of 10-20cm;
- Markers should be moveable, of contrasting colours (e.g. black and white), contrast with the background, protrude above and below the line, and be placed 5-10 m apart;
- Removing the thin neutral or earth (shield) wire above the high voltage transmission lines where feasible, and where this is not possible, marking the line to make it more visible;
- Bundling high voltage wires, and using spacers to increase visibility;
- Burying cabling of low and medium voltage lines may be possible. While expensive, this eliminates the majority of risks associated with bird collision and electrocution. But this depends on the local site condition, as in specific habitats it may be ecologically disruptive;
- Minimising the vertical spread of power lines. Having lines in a horizontal plane reduces collision risk;
- Depending on the location and topography, it may be suitable to have low-lying power lines which are beneath the altitude at which birds may travel;
- Habitat manipulation to influence flight activity and bird behaviour, e.g. tree lines under the high voltage lines to increase visibility;
- Clustering of lines along the same route may also be beneficial, as the network will then cover a smaller area;
- Avoid establishing areas which are attractive to birds, such as waste water treatment plants and solid waste dumps, near high concentrations of power lines.

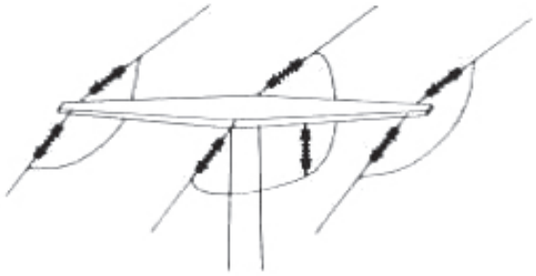
To reduce electrocution risk, design of the poles is vital:

- Designing power lines and associated masts to reduce electrocution risk;
- Hanging insulators under cross arms and poles, provided the distance between a likely perch (mainly the crossarm) and the energised parts (conductors) is at least 70 cm;



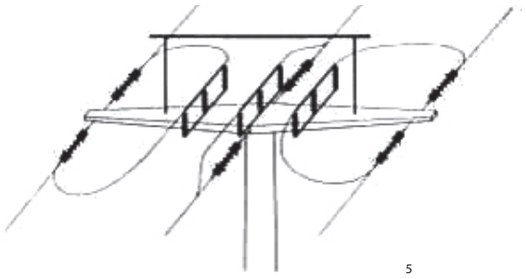
Hanging insulators beneath cross arms (taken from Haas et al. 2003)

- Capping upright insulators with a nonconductive material, and using a nonconductive material to attach insulators to poles;
- Insulating cables close to poles, at least 70 cm on both sides and around perching areas, and up to at least 140 cm (even 180cm if vultures are present) in areas with large soaring birds[5];



Insulated conductors minimum of 70 cm on each side of cross arm (taken from Haas et al. 2003)

- Where the pole is made of steel, insulating all conductor lines;
- On strain structures where jumpers are used, at least two jumper wires should be suspended below the cross arm and the third insulated, or all jumpers insulated;
- Providing safe nesting and perching platforms above the pole at a minimum of 70 cm above energised components, or higher depending on the species present;
- Spacing between conductors should be not less than 140 cm, and 70cm between perching sites and live components;



Safe perching area, and insulated strain poles (taken from Haas et al. 2003)

[5] Haas D, Nipkow M, Fielder G, Schneider R, Haas W, Schürenberg B (2003) Protecting Birds from Powerlines: a guide on the risks to birds from electricity transmission facilities and how to minimise any such adverse effects Recommendation no 110 (2004) of the standing Committee on minimising adverse effects of above ground electricity transmission facilities (power lines) on birds Bern Convention

- In areas where large soaring birds occur, spacing between live components or insulation should be over 2.7 m horizontally and over 1.8 m vertically;
- Providing safe perching areas and using perch management techniques;
- Retrofitting of lines identified as high risk through the SEA and continuous monitoring.

The mitigation actions should be decided at the planning stage. This should include the selection of appropriate design of power poles and line configuration. Any mitigation actions should take place early in the construction phase, rather than retrofitting; given the long operational life of a power line this can save money in the long term. The costs associated with integrating these concerns at an early stage are less than those involved in returning to an area and carrying out retrofitting activities.

Post-Construction monitoring

Once power lines have been constructed, the ongoing effects on bird populations and biodiversity should be monitored so that potential long term impacts can be identified and addressed. Continuous monitoring generates information on the impacts of the power lines, and will inform the need to adapt mitigation actions and operational procedures within the development. This monitoring should be carried out in a standardised way by recognised professionals.

In addition to the continuation of pre-construction baseline surveys which have been carried out, post-construction surveys are required:

- Carcass searches and mortality surveys;
- Disturbance and displacement assessment.

These post-construction mortality surveys are used to:

- Assess the level of mortality along the entire electrical power line infrastructure, in order to trigger potential intervention if it is too high;
- Identify particular sections of the route where hotspots of mortality occur, as priorities for mitigation;
- Quantify avoidance rates, collision and electrocution risk for particular species;
- Improve understanding of the factors associated with mortality.

Since power lines can be expected to extend over long distances, monitoring can be focussed on expected and known hotspots e.g. wetland areas and bottlenecks, and a stratified random sampling can be done along the route. At a minimum, carcass searches should be done at short intervals, to minimise scavenger removal, and should continue for three years. The interval should ideally be every other day, at a sufficient random sample along the route. The scavenger removal rate should be accurately assessed, and be species- and site-specific. Searcher efficiency should also be estimated. Dogs have recently been used to improve efficiency. It may be appropriate to use the results from the carcass search to apply a model to identify priority areas along the route for retrofitting.

Surveys to estimate disturbance and/or displacement are vital, and are derived through repeat surveys of bird distribution along the electrical power line route. The results must be comparable to the pre-construction surveys, allowing changes to be quantified. The surveys should be conducted under the same protocols as used for the pre-construction surveys, and take place for a minimum of three years. The Before After Control Impact (BACI) approach should ideally be used, which combines the data collected in pre-construction surveys and at a control site with data obtained from the post-construction monitoring, in order to assess environmental impacts caused by routing of power lines.

Developer commitments

Organisations responsible for the construction of power lines should refer to guidance on the appropriate design for power lines to reduce the impacts on birds and bird populations. Developers have an obligation to work within the laws and regulations of the country in which they operate. They should refer to the appropriate designated national authority and seek guidance on vulnerable species and ecosystems to guide routing.

An SEA may have been carried out by the designated national authority which is responsible for the operations of a national grid. Developers should refer to this strategic assessment to guide the routing of power lines, and increase the efficiency of their own projects. Where a strategic assessment has not been carried out, developers should seek guidance from environment and energy departments, as well as expert opinion on appropriate routing.

Developers should refer to specific legislation on power line design. Where national legislation does not exist, routing and design which represents the lowest possible risk to birds and biodiversity should be selected. Expert opinion and the information provided by an appropriate EIA will guide the routing and use of appropriate pole design. Where there is little data, the highest possible standard should be used.

Budgets should also be set aside for the retrofitting of existing lines. This may form part of the offset mechanism as part of the mitigation hierarchy.

The ecological and bird data which is collected should be freely available and accessible. This data can input into a national development plan, to enhance the decisions made as part of a strategic framework. Publication of the ecological data will generate better results, and feed back into appropriate strategic assessments, and in the long run reduce the risk for developers.

National governments have adopted and signed a number of international agreements related to environmental concerns, many of which are driving significant investment in new and emerging technologies such as renewable energy, which in turn is driving the demand for power lines. A range of international agreements refer to the need to mainstream biodiversity concerns across all sectors of government and in developing national strategies. Private enterprises and developers can play a leading role in helping achieve this, by integrating bird and biodiversity concerns into their operations.

BirdLife International, its Partners and its staff are committed to ensuring a lasting sustainable future for all. Working with and providing advice and recommendations on the appropriateness of routes and placement of power lines and pole design will require a continuous dialogue of mutual respect.

More details on the Migratory Soaring Bird Project can be found on the link below. Specific guidance in relation to wind energy, power lines and solar energy is to be published, and a sensitivity mapping tool is being developed and will be available over the coming months.