DEVELOPMENT CORRIDORS PARTNERSHIP

IMPACT ASSESSMENT FOR CORRIDORS: FROM INFRASTRUCTURE TO DEVELOPMENT CORRIDORS

Edited by:
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The Development Corridors Partnership

The Development Corridors Partnership (DCP) is a research and capacity development initiative. It is a collaboration between institutions from China, Kenya, Tanzania and the UK. The main objective is to deliver effective research and capacity-building to help improve corridor planning and management. It aims to ensure that development corridor decision-making is based on sound scientific evidence and effective use of available planning tools and procedures, to ensure that risks are avoided and opportunities exploited. The DCP comprises partners from the University of York, the University of Cambridge, London School of Economics, Sokoine University of Agriculture, the University of Nairobi, as well as the UN Environment Programme World Conservation Monitoring Centre (UNEP-WCMC), African Conservation Centre, the World Wide Fund for Nature (WWF), the Chinese Academy of Agricultural Sciences and the Chinese Academy of International Trade and Economic Cooperation (CAITEC).

DCP Partners:

For the purposes of this publication, DCP collaboration was extended to experts representing Netherlands Commission for Environmental Assessment, the Centre for Energy, Petroleum and Mineral Law and Policy at the University of Dundee, the University of Queensland, the Columbia Centre on Sustainable Investment, the GOBI Framework for Sustainable Infrastructure Initiative (comprising the University of Oxford, University of Central Asia and the Independent Research Institute of Mongolia), The Biodiversity Consultancy, the Wildlife Institute of India, the Endangered Wildlife Trust and Ecotecnia Ingenieros Consultores SRL.

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Foreword

In the course of a long and varied working life, I have been privileged to work with, or learn from, a stimulating panoply of individuals who are committed to contributing to the economic, social, and environmental development of all aspects of the United Nations Sustainable Development Goals.

Jon Hobbs and Diego Juffe-Bignoli are, thankfully, two of these individuals. I was delighted to learn that they had come together to produce, for the Development Corridors Partnership, a rich and stimulating collection of research reports, case studies and assessments relating to the array of efforts made under the rubric of 'development corridors'. They were determined to express the conviction that decisions made, primarily by governments, regarding the planning and building of Corridors, really must be informed by an evidence-based understanding of the consequences – positive or negative – of these decisions. And they have succeeded. But Jon Hobbs will never read these words. He was hospitalized after the bulk of the work was complete, and, to the deep sadness and regret of all who knew him, he passed away at the end of September, 2021.

Jon and Diego sought out and recruited a daunting array of researchers, scholars and stakeholders to shed light on the processes currently underlying the world of development corridors today. They certainly succeeded.

The work was initiated before the onset of the COVID-19 pandemic, and as governments turn to the formidable challenge of restoring economic vitality without further damage to the climate, it becomes even more imperative that impact assessment be understood, embraced and improved. Jon and Diego have shown us the way forward for a journey which absolutely must be embarked upon.

They would be first to recognise that the Development Corridors Partnership as a whole must be commended for showing – in many different ways and places – that, not only is the need for impact assessment clear and present, but so are the skills and commitment of researchers, scholars and stakeholders. These are to be found in an impressive coming together of universities, civil society organizations and business groups, and communities.

All are part of an outstanding initiative, funded by the UK Research and Innovation Council, and managed by the UNEP-WCMC. This initiative has been embraced by some of the best minds that have been turned to the task of ensuring that – while we attempt to bring economic and social benefits to people, in line with the United Nations Sustainable Development Goals – we do not risk significant environmental and social costs, and thus actually undermine long-term development successes.

So, I urge you to read this book, and figure out how you might improve your own contribution to the challenges ahead. Jon and Diego have set out a case. It needs to be taken up, not set aside; acted on, not just talked about. It is in your hands.

John Harker

Chair of the Development Corridors Partnership Independent Advisory Board,
Nova Scotia, Canada.

Dedicated to the memory of Jon Hobbs
who was the architect and driving force of this book

Executive Summary

Driven by increasing globalisation, the development aspirations of nations, and the need to access resources, an infrastructure boom is impacting many regions of our planet. New infrastructure projects are traversing diverse landscapes over hundreds of kilometres, often crossing international borders and penetrating into remote areas previously unaffected by industrialisation and urbanisation. These large-scale projects, mostly spanning several regions in a same country, but often linear and transnational in nature, are generically called corridors. Depending on the nature and objectives, they can be transport, infrastructure, growth, resource or economic corridors.

The rapid development of corridors globally presents environmental planning professionals with numerous challenges. **The primary need is to ensure that decisions about these developments are informed by an evidence-based understanding of their consequences – both positive and negative.** This will enable infrastructure development to meet development needs without adversely impacting ecological systems or human welfare. Improving the quality of infrastructure policies, plans, programmes and projects, by ensuring they include the necessary environmental and social scrutiny, is urgently required now - and will be for the foreseeable future. This challenge is the unifying theme of this publication.

Using insights from Africa, Asia and South America, this sourcebook compiles 24 contributed papers written in 2021, covering many facets of the opportunities and challenges presented by the rapidly growing number of infrastructure and corridor developments around the world. Prevailing planning practices are reviewed through case studies along with the efficacy of some of the available tools to conduct systematic and comprehensive impact assessments. The latter includes Strategic Environmental Impact Assessment (SEA) and Environmental Impact Assessment (EIA).

As the title suggests the underlying thesis of this publication is that, where they are justified, **there are significant benefits in ensuring that corridors that contain single purpose infrastructure developments (utility, infrastructure or transport) progress through a carefully planned sequential process of diversification and expansion to ensure the maximisation of benefits in full-blown 'development corridors'.** In this book, development corridors are therefore aspirational. They comprise areas identified as priorities for investment to catalyse economic growth and development. They should be developed with multiple stakeholders and social, economic and environmental interests and interdependencies in mind. With the integration of sustainability principles and appropriate environmental and social standards, development corridors could become true '(sustainable) development corridors'. They should be planned to maximise positive opportunities and minimise negative risks. Without this, today's short-term successes will become tomorrow's challenges and long-term human welfare and ecosystem integrity will be undermined.

Overview of contents

This book brings together a wide range of perspectives from experts, researchers, and practitioners around the world with the purpose to foster greater collaboration and increase our global understanding of corridors and their benefits and potential negative impacts. 13 of the 24 chapters are written by independent experts and researchers from Australia, Bolivia, Brazil, China, India, Kenya, Mongolia, South Africa, Tanzania, UK, and the USA. The book also includes 11 chapters containing material gathered by the Development Corridors Partnership, a programme of work led by UN Environment Programme World Conservation Monitoring Centre (UNEP-WCMC) and funded by the UK Government via their Global Challenges Research Fund.

The collection of papers in this sourcebook is divided into five sections. First an introductory section where we introduce some key terms and definitions that underpin this work (Chapter 1). We then explore some key principles and aspirations of corridors such as delivering the Sustainable Development Goals (Chapter 2), ensuring theory and practice align (Chapter 3), ensuring financial sustainability (Chapter 4), properly assessing environmental sensitivity (Chapter 5) respecting human rights (Chapter 6), or maximising, co-benefits (Chapter 7).

In the next three sections, we present 15 case studies from three continents: Africa, Asia, and Latin America. These case studies explore key challenges and lessons learned from specific planned, ongoing, and already implemented developments. They are presented as individual stories that readers can explore.

The final and fifth section aims to summarise lessons learned from a 4-year research and capacity building programme specifically aiming to understand the key challenges and opportunities around corridors and that has been the major driving force of this work: The Development Corridors Partnership project (DCP). DCP is a collaborative partnership across UK, Kenya, Tanzania and China, funded by the UK Research and Innovation Global Challenges Research Fund (see Chapter 23).

The book finishes with an overview of the lessons learned from the contributed papers included in this book and develops ten principles for corridor planning and delivering a meaningful and comprehensive impact assessment (Chapter 24), which we summarise here as ten key messages.

Key messages

1

Corridors must seek to achieve positive sustainability outcomes:

The mindset underwriting environmental planning of most infrastructure developments has been to mitigate negative impacts. The planning of few existing corridors is based on their role in supporting a sustainability vision for a country or region in which they are situated. Corridor developments must therefore be based on sustainability principles and support progress towards national, regional and international sustainable development goals. A true development corridor will seek to do good, as well as to mitigate negative impacts.

2

Integrated and inter-disciplinary approaches are needed:

Corridor developments are extensive, complex, multifaceted features traversing many landscapes. They can bring about significant transformational change to physical, economic, social, and cultural systems, and serve as interconnecting features. Yet engagement in corridor planning is often constrained by limited disciplinary and institutional involvement, with projects often superimposed upon communities. Corridor developments need diverse expertise and experience in their planning and management, including local stakeholder knowledge, avoiding disciplinary, institutional, or sectoral silos, that can result in policy conflicts, contradictions, and inconsistencies.

3

Corridor proponents should clearly demonstrate consideration of alternatives:

Corridor options should not be limited to a preferred proposal favoured by an elite. Corridor developments must consider all feasible alternatives (including maintenance of the status quo and no corridor development) and make the risks and opportunities of each option explicit and transparent through meaningful consultation. An important requirement in all corridor planning is to justify the need for a wide choice of options and an explanation of the potential benefits it will bring and to whom, in comparison with the alternatives. Any necessary trade-offs and how any significant potential negative impacts will be effectively managed, and opportunities created must be explained.

4

Public participation and stakeholder engagement should be at the core of corridor planning:

Corridor planning frequently fails to include meaningful participation of all stakeholders. Corridors can profoundly affect the lives and rights of indigenous peoples and local communities, potentially for generations. A common failing is that the first opportunity for local stakeholders to engage arises only after all strategic decisions have already been made and the only option remaining is for them to react negatively to a fait accompli. The meaningful engagement of all stakeholders is necessary to ensure their role is more than reactive. The way corridors are viewed by different stakeholders must be identified, understood, and addressed. Corridor developments must ensure that all interested and affected people are provided with adequate information about a proposal and have meaningful ways to engage in decision-making processes from the outset of strategic planning.

5

Mainstreaming and tiering are fundamental for corridor success:

Corridor planning requires a tiered assessment process, ensuring that environmental and social issues are considered alongside financial and technical considerations from the start of strategic planning or programme development, right though to project specifics. Conceptual corridor planning is frequently dominated by technical and financial suitability criteria with environmental, social, cultural, and human rights sensitivity issues being considered, at best, as externalities, retrospectively, once issues and problems arise. Strategic planning is important because it is when the full range of options is still open for discussion. It also establishes the parameters that will frame and implement a corridor plan or programme. Environmental and social considerations (and the interactions between them) should be considered early in strategic decision-making alongside (and to inform) technical, financial, and economic considerations.

6

An iterative process is needed:

Corridors exist in dynamic environments and need to be responsive to changing circumstances and priorities. Planning must adjust as circumstances and available information changes. The process should identify, map, and engage all interested and affected stakeholders from the earliest stage of corridor planning and throughout the planning and management of the corridor. New concerns and evidence will likely emerge as a corridor development progresses. Corridor planning frequently places undue emphasis on the production of a report (Environmental Impact Report) and its influence on the decision to proceed. The process may not be so linear in nature. It may involve many adjustments and decisions as new evidence emerges and predictions improve. A good-quality report and recommendations is necessary, but they are dependent upon a comprehensive process of ongoing dialogue and engagement with all stakeholders.

7

Corridors must ensure effective use of available tools:

Many corridor environmental impact assessments fail to meet required international standards. Corridor planning and management should make systematic and adequate use of available impact assessment procedures, methods, techniques, and tools to ensure good-quality decisions. The available procedures discussed in this publication (notably Strategic Environmental Assessment and Environmental Impact Assessment) and their associated methods, tools and techniques should be used when appropriate to help ensure that a systematic process identifies all significant potential benefits and development outcomes, and that they outweigh the costs and risks to affected people and their livelihoods and environments. The objectivity and quality of corridor decisions are dependent upon the effective use of the available tools.

8

Plan corridors with resilience and adaptability in mind:

Prevention will always be better than cure in addressing the negative impacts of corridors, and this should be the priority. However, some circumstances dictate an inevitability of negative impacts. Corridors, therefore, need to be designed to be made resilient to anticipated changes and adaptation measures may be necessary as 'coping' mechanisms or to offset unavoidable impacts, such as the impacts caused by climate change. The suitability of measures will require ongoing monitoring and adaptation as needs arise.

9

Seek impact, influence, and implementation capacity:

The decision to proceed with a corridor is ultimately the responsibility of decision makers. They are usually the representatives of all stakeholders' interests and custodians of their natural resources. Any impact assessment report must provide adequate information to ensure sufficiently good-quality decisions. If they are to be effectively implement the recommendations provided. Attempts to improve the performance of planning and associated assessment processes of corridors must tackle the ways in which outcomes are shaped by political contexts and institutional capacities. Approaches to working on assessment processes should integrate political economy analyses and institutional capacity assessment from the outset and on an ongoing basis. Resulting insights should inform the design and implementation of interventions intended to improve planning practice.

10

Evolve from Infrastructure to Development Corridors:

The prospects for linear infrastructure projects to evolve into comprehensive development corridors are often left to chance and spontaneity. Infrastructure projects are often developed in isolation and in an incremental way. For infrastructure projects to progress and become true development corridors, the transition must be systematically sequenced into planning from the start. Assessments must include consideration of potential induced, secondary, synergistic, transboundary, and cumulative impacts likely to result from the corridor development. The progression from infrastructure to development corridors must be based on a systematic, comprehensive, and integrated assessment of the potential positive environmental, social and economic opportunities and the rigorous avoidance or management of negative impacts.

CONTENTS

AFRICAN CASE STUDIES 129

14

Guidelines on Mitigating the Negative Impacts on Biodiversity of Road, Rail and Power Corridors: South African Experiences

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ABSTRACT

Driven by the desire to achieve growth in employment and income through investment, in 2014, a National Infrastructure Plan (NIP) was designed to strengthen the capacity of South African infrastructure, ultimately improving the lives of citizens as well as greening the economy. This plan ensures that infrastructure and assets allow reduced carbon emission and pollution, that energy and resource efficiency is enhanced and biodiversity is conserved. Under the NIP, 18 strategic integrated projects were developed, bringing together hundreds of separate construction projects, including several proposed economic corridors, improved access to – and greener – electricity and distribution, and upscaled transport programmes. However, it can be argued that practically all economic activity that involves construction, physical infrastructure or land use change has some level of impact on the environment that cannot be avoided or entirely mitigated on site. The South African National Environmental Management Act (NEMA) of 1998 provides the overarching legislative framework for defining institutional mechanisms such as those for environmental authorizations and Environmental Impact Assessments (EIAs). South Africa has a relatively progressive legislation governing development. However, certain flaws/loopholes in regulations have resulted in land being irreversibly transformed and extensive losses in ecosystem services. It is important to consider the various impacts that development has on biodiversity and ecosystems, since these are often non-specific, and a multitude of species may be adversely affected. Major linear infrastructure projects that comprise networks of roads, railways, power lines and pipelines, which improve efficiencies in trade and facilitate the movement of people and commodities, are of major concern, as many of these projects are slated to occur in environmentally sensitive areas.While much progress has been made in the last decade to, first, recognize the threats of infrastructure development and then to determine successful measures to reduce the negative impacts of corridors, much more scientific rigour is needed in the planning and routing of developments. Maintaining the integrity and functionality of the South African landscape in conjunction with infrastructure development should be integral to any development project.

14.1 Infrastructure development in South Africa

African economies are currently among the world's fastest growing (Edo, Osadolor and Dading 2020), with linear infrastructure within potential development corridors strongly related to socioeconomic drivers (Seto 2011). Although Agenda 2063 (African Union Commission 2015) recognizes that there will be environmental challenges associated with economic growth, there is little evidence to suggest that sufficient rigorous planning and management is (or will be) in place to mitigate the negative impacts of these developments (Politzer 2008; Laurance and Arrea 2017). EIAs are not always applied effectively when assessing the suite of potential impacts associated with corridor projects that cover large geographic areas. For example, the South Africa to Maputo, Mozambique (SANSEA 2020) multi-DCP illustrates the challenges of tangibly assessing cumulative impact, public participation and species risks when considering large-scale developments. This DCP will comprise multiple pipelines (~94km condensate [both oil and gas], ~1,293km gas, ~992km oil and ~1,460km refined products), from source to port, bisecting critical biodiversity areas (South African National Biodiversity Institute 2020).

In South Africa, the National Development Plan (Vision 2030) indicates how the country can eliminate poverty (United Nations Statistics Division 2017), reduce inequality and enhance economic development by 2030 (Trading Economics 2020). In 2011, the Presidential Infrastructure Coordinating Commission of South Africa was established to provide for the facilitation and coordination of the National Infrastructure Plan (2014) that aimed to strengthen the capacity of infrastructure, ultimately improving the lives of citizens, as well as greening the economy. As a result of the National Infrastructure Plan, 18 strategic integrated projects were developed, bringing together hundreds of separate construction projects, including several proposed corridors. This provided improved access to – (greener) – electricity and upscaled transport programmes. However, it can be argued that practically all economic activity that involves construction, physical infrastructure or land-use change has impacts on the environment that cannot be avoided or entirely mitigated. This means that actions to mitigate these impacts need to go beyond the site level and consider a landscape-level approach.

The effects of linear infrastructure on the biotic and abiotic components of the ecosystems through which it passes are usually indiscriminate (Coffin 2007), and their influence may be both subtle and profound. For example, a road may cause habitat destruction, disturbance and fragmentation (Benítez-López, Alkemade and Verweij 2010); the habitat fragmentation may strongly reduce individuals' dispersal among resource patches and hence influence population distribution and persistence, as well as impact genetic diversity (Kindlmann and Burel 2008). Land use, land cover and connectivity within the landscape may change due to expanding road networks (Perz *et al.* 2008; Liang *et al.* 2014).

By 2050, and with an allocated budget of US$ 920 million (National Treasury 2020), the Department of Transport (DoT), and the Department of Mineral Resources and Energy plan to "spur a major revolution" in South Africa's transport system through investments in public transport, including all forms of linear infrastructure, such as road, rail, power lines, pipelines and man-made waterways). As of 2017, road networks in the country are the 10th longest in the world (Central Intelligence Agency 2017) and comprise a total of ~750,000km (of which 158,124km are paved and 591,876km are unpaved). The rail network is ranked 13th longest in the world, and totals ~20,986km (Central Intelligence Agency 2017). The DoT has developed a Green Transport Strategy (GTS; 2018-2050), which aims to "provide a transport system that provides equitable and reliable access for all in an economically and environmentally sustainable manner to advance inclusive growth and competitiveness of the country" as well

as minimizing the adverse impact of transport on the environment. The upgrading of freight rail infrastructure is key to the objective of shifting more freight from the road network to the rail network, as well as finding the balance between road and rail in respect to transportation of goods. Plans have been proposed to upgrade the railway lines and the associated substations.

With 30 power stations, and a network of almost 400,000km, for both distribution and transmission lines (Eskom 2021), Eskom, the country's national power utility, is responsible for the longest network of linear infrastructure in the country. This linear network comprises high-voltage transmission lines (up to 765kV), as well as the lower voltage distribution grid that is constantly expanding, particularly in rural areas. Eskom plans to add ~6 500km of further high-voltage transmission lines and 46,000MVA of transformer capacity before 2028. This is in line with its Transmission Development Plan, for the period 2019-2028.

The wildlife impacts of such linear energy infrastructure include avifaunal collisions with conductors and electrocutions on structure (in addition to bird nesting activity), with significant ramifications for both wildlife and power supply. In the case of collisions, distribution lines are the more significant hazard than high-voltage transmission lines because of the closer distances between conductors. They may, however, be overlooked by EIA screening regulations that only require assessments for transmission lines.

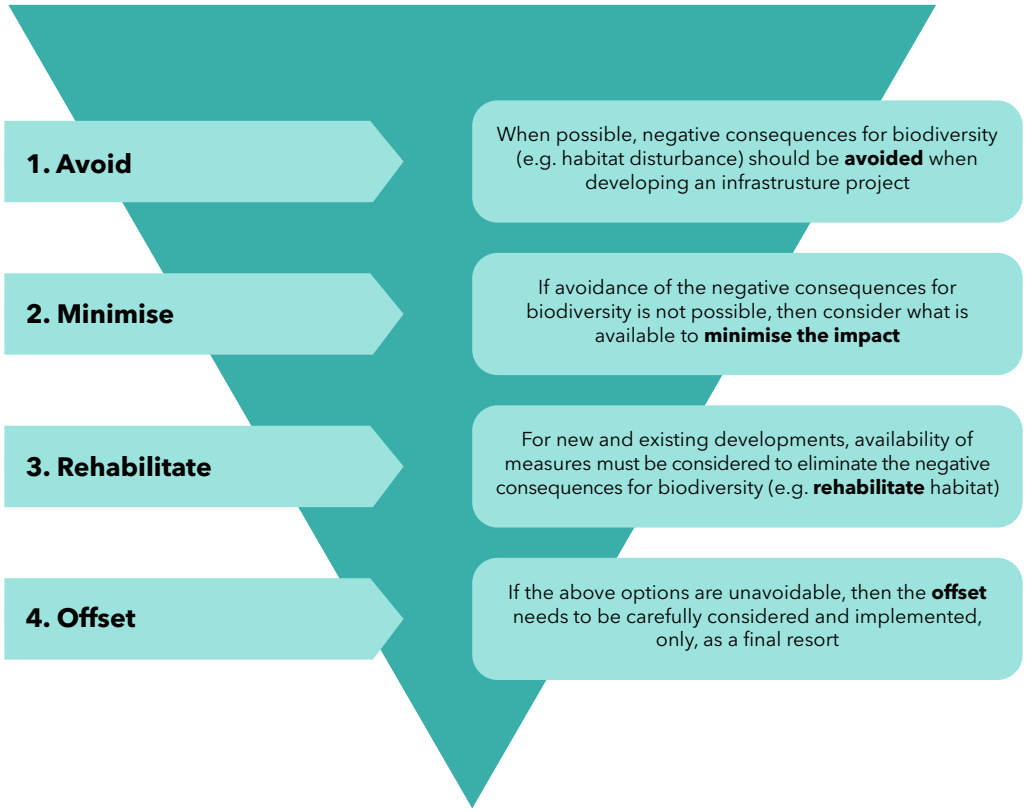
In this chapter, we review some of the tools available in South Africa to maintain the integrity and functionality of the South African landscape in conjunction with infrastructure development.

14.2 Legal framework for addressing the environmental and social impacts caused by development corridors

South Africa has relatively progressive legislation governing development and a well-developed regulatory process (see Appendix 1 for a summary on these regulations and commitments), of which the principles of environmental sustainability are encapsulated in the NEMA 109 of 1998. This overarching Act provides guidelines for conducting EIAs and, as part of the legislative framework, necessitates EIAs to be undertaken prior to any form of development (not just linear). This triggers a comprehensive set of listing notices to be issued (see Appendix 1). However, certain flaws, loopholes, and capacity limitations in the implementation of these regulations have resulted in unsustainable land-use change, causing irreversible transformation and extensive ecosystem service loss. In addition to providing the overarching legislative framework for the environmental sector, the NEMA defines the institutional mechanisms such as those for environmental authorizations and EIAs.

The mitigation hierarchy, which should shape the EIA process, seeks to minimize negative environmental impacts through the following steps: avoid, minimize, restore or rehabilitate, and finally, offset (Morrison-Saunders and Bailey 1999; Snell and Cowell 2006; Morrison-Saunders and Retief 2012). Biodiversity offsets are intended as the option of last resort in the mitigation hierarchy, only after comprehensive consideration of the other preceding steps, to address residual impacts on biodiversity and ecosystem services, but carry the most risk in terms of uncertainty of the outcome (Fig. 14.1).

Figure 14.1 The mitigation hierarchy model used to manage the impacts of infrastructure projects on biodiversity



The four stages of the mitigation hierarchy surrounding a development support the process of an EIA. These are: screening, scoping, assessment and the recommendations (report) phase. These ultimately inform the decision-making stage. The EIA process should be underpinned by public consultation to ensure transparency and the incorporation of local knowledge.

14.2.1 Screening

A screening process is initially required to establish if the nature of a development proposal and the sensitivity of the receiving environment indicates that an EIA is required. The information generated during the screening phase will determine the level of detail, the parameters of the scoping report and the nature of the specialist studies required. The recently developed Environmental Screening Tool (National Screening Tool 2019), supports this phase by detailing known and predicted threatened species' presence and informing site sensitivity. The reports produced by this system have been mandatory for all EIAs in South Africa since October 2019, and are underpinned by one of the world's most comprehensive national-level biodiversity data baselines, which is supported by the National Species Environmental Assessment Guideline (South African National Biodiversity Institute 2020).

14.2.2 Scoping and assessment

A scoping report that describes the main environmental issues to be addressed, identifies available resources and assets, and outlines what interventions and alternatives might lead to preferred outputs is required (Fig. 14.2). An initial scoping report will indicate if it is feasible and acceptable to continue with the development and/or upgrade, and provided there is no possibility of realignment, to avoid a negative impact on the environment and/or wildlife.

Figure 14.2 An example of the process to be followed when producing the scoping report

Identify the biodiversity impact to be addressed, through assessing the following:

- What linear infrastructures are present and planned as part of the development?
- What species are present and of potential concern (including non-threatened species)?
- What habitat types are present?

Consider existing infrastructure and surrounding land-use:

- Will this infrastructure have a negative/positive impact on biodiversity?
- What natural or man-made features can be adapted to allow connectivity? (e.g. a drainage culvert; Collinson & Patterson Abrolat 2016?)
- Is it a new development being built, an upgrade or a maintenance operation?

Options:

- Develop a risk profile for the impact which assesses the short and long-term and cumulative impacts of the development over its lifespan in terms of probability and severity.
- Recommend a mitigation strategy based on the techniques laid out in the EWT's handbook (Collinson & Patterson Abrolat 2016) and in line with the mitigation hierarchy (Fig. 14.1). This should be a multi-tool approach detailing what mitigation measures are to be used and where they are to be located.

14.2.3 Assessment

The outputs of the assessment phase are the EIA report or statement, and, if approved, recommendations will be included in an Environmental Management Plan. These documents must address the concerns raised during public participation undertaken throughout the EIA process. A mandatory stakeholder engagement process must include the possibilities of avoidance or feasible mitigation measures to address the concerns raised by potential negative impacts, including an evaluation of project alternatives.

The EIA Report or Statement will provide recommended mitigation measures, with impacts rated on their significance before and after the mitigation is applied. Assessment of the impacts that the development has on biodiversity can be difficult to quantify due to their non-selective impact on species, and the long lifespan of the infrastructure. As such, it is strongly urged that the steps as outlined in Fig. 14.1 be considered as levels of priority when working on any form of development EIA, with ongoing monitoring and evaluation being factored into the overall budget, along with mitigation and/or offset costs. The resultant Environmental Impact Report is submitted to the provincial authority to inform the decision they are responsible for making.

14.2.4 Public participation

Throughout the EIA process, it is necessary to engage all relevant stakeholders. One important advantage of this is the added value of local knowledge and proposed local solutions to address technical, social and environmental problems (Georgiadis *et al.* 2019).

14.3 Implementing and enforcing the mitigation hierarchy

It is now well established that in the application of the mitigation hierarchy, offsetting should not be the default option, but a last resort, especially when avoidance has failed. Offsets must only be used when all other options have been considered and ruled out. The mitigation hierarchy has the potential to be a driver for protecting conservation value, although low development costs could lead to substantial environmental damage (Stokes 2015). A key aspect of this is that there is often insufficient attention to fundamental thresholds and the assessment of significance by environmental assessment practitioners, mainly due to a lack of trained personnel in the field of assessing linear infrastructure and their ecological impacts (Ehrlich and Ross 2015; Singh *et al.* 2020). There is also often a lack of ability to enforce adherence to the conditions made in the Record of Decision (ROD), since the EIA often places the greatest emphasis on the stages leading up to the ROD, with little emphasis on the subsequent implementation and necessary monitoring and auditing of impacts (Hulett and Diab 2002).

The direct and indirect effects of corridors, and their potential cumulative effects on biodiversity, create an ongoing conflict between development and biodiversity objectives in South Africa, as elsewhere. To improve this, the South African National Biodiversity

Institute (SANBI), the Department of Environment, Fisheries and Forestry (DEFF) alongside non-governmental organizations (NGOs) have developed species guidelines and a national protocol for assessing sensitivity of proposed development sites. This framework links the high-level biodiversity monitoring in the National Biodiversity Assessment with the wide range of biodiversity-related monitoring projects that exist nationally and internationally.

Acknowledging these outputs for the mitigation hierarchy, and thus the potential benefits derived from infrastructure development is essential for a country's economic growth. One such example was launched by the Development Bank of South Africa (DBSA) in 2015, through an infrastructure investment programme for South Africa, to provide grant funding in support of loans for essential infrastructure projects. This highlighted a need, particularly during the EIA process, for the development of best practice guidelines and standards, which are adopted by relevant stakeholders to be incorporated into the planning and design stages of any proposed form of development. In South Africa, these measures are slowly being implemented through multiple national and regional initiatives. For example, the DEFF, is a signatory to the Convention on Biological Diversity (CBD) and the Global Partnership for Business and Biodiversity (South African Council for Natural Scientific Professions 2020a). As such, there is a national agenda to mainstream biodiversity into businesses practices, including the development of new projects such as infrastructure provision.

14.4 Tools and solutions to assess and manage environmental impacts

The importance of partnerships between infrastructure providers and science-based NGOs cannot be underestimated. These help to ensure developments that effectively consider and manage negative environmental impacts, working closely with corporations to generate solutions which are often win–win in character.

Two examples of such partnerships are described below:

1. With the transport and energy sector in which the Endangered Wildlife Trust has partnered with three of South Africa's toll road concessionaire companies, effective post-impact monitoring, which is necessary to improve the quality of future predictions, requires robust data-gathering on road kills and so on. The collection of data to inform such decisions depends upon trained staff using scientifically proven techniques and/or technology. For example, highway agencies conduct regular patrols to resolve any issues that could affect road user safety, and energy utility staff monitor wildlife collision rates along power lines. Such patrols can provide systematic data over long time periods, and have the dual benefit of raising awareness among the staff and institution. Therefore, partnerships and training of researchers and patrol agencies and their staff offer significant potential for more effective and robust data collection.

Further to this, the EWT's Central Incident Register for both roads and power lines manages data on wildlife collision mortalities. The Eskom-EWT partnership is the longest-running database of its kind in South Africa.

2. The country's national power utility, ESKOM. The partnership model includes several components, such as ensuring benefits to all parties and establishing an institutional framework for regular dialogue and sharing of ideas, as well as training relevant staff to develop the necessary skills and resources. One example is the production of a bird identification guide for Eskom lines inspectors to communicate

problematic incidents with avifauna. This helped to collect reliable data that could be used to test and develop bird friendly options for the future, such as:

- Corrective measures (such as different designs of high visibility audibility bird markers to prevent collisions with conductors)
- Informing better design of structures (to ensure adequate distances between conductors to prevent electrocutions when birds of large wing span use towers) and
- Bird friendly power line routes (such as ensuring avoiding dissecting high activity flight paths; Ledger and Annegarn 1981; Ledger 1984).

It is essential that data collected be communicated back to the utility in question and that it can be used to inform both policymaking and the implementation of mitigation measures.

For example, Eskom established a Biodiversity Centre of Excellence with a view to managing a long standing EWT-Eskom partnership, testing new ideas, and mainstreaming the adoption of best practices based on the information gathered and results generated.

NGOs such as the EWT can play a valuable role in the analysis and interpretation of data, drawing on their knowledge of a species' ecological needs, as well as ecosystem functioning.

BOX 14.1 THE BENEFITS OF MAINSTREAMING BUSINESS INTO BIODIVERSITY: A WIN-WIN PARTNERSHIP

Since 1980, the EWT has had a strategic partnership with Eskom, the country's national power utility. Initially established to address concerns about frequent electrocutions of the endemic, vulnerable cape vulture (Gyps coprotheres) and the associated threats to power supplies, this partnership has expanded to ensure a decrease in mortalities of other species and a more reliable supply of electricity to the benefit of the environment, power utility and end-users. This partnership is estimated to save Eskom some $3.5 million annually through improved network performance; a result of sound wildlife-interaction-management. Assistance has included retrofitting power lines constitute an electrocution or collision hazard with markers or extra insulation to make them 'bird friendly' and proactively finding ways to redesign or appropriately position power lines. The partnership helps plan routes and design electricity structure that takes account of the threat that ill-considered options pose to both avifauna and maintaining reliable power supplies.

BOX 14.2 STANDARDISED RESEARCH METHODOLOGY FOR WILDLIFE-ROAD MORTALITY

Robust data-gathering can be used for informed decision-making, and in 2011, the first national multi-species protocol for the monitoring of wildlife-road mortalities in South Africa was developed (Collinson et al. 2014); this ultimately led to mitigation trials for specific species. This protocol identified the factors affecting roadkill rates and was implemented in the Greater Mapungubwe Transfrontier Conservation Area (GMTFCA) in the northern Limpopo Valley of South Africa, a World Heritage Site. This protocol for data collection has since been adopted for use in other countries such as Tanzania, Ethiopia, and the USA (Collinson et al. 2017).

It is important that future research becomes more standardized to enable statistical comparisons between different studies and sites, and over time. The conservation implications of the multi-species protocol are far-reaching since roads are a necessary component of economic development and yet negatively impact upon biodiversity.

14.5 Conclusions

The South African government seeks to transform into a globally competitive industrial economy and it is clear that development corridor programmes have enormous socioeconomic value. However, in some cases, there could be irreversible, negative impacts for biodiversity and ecosystem services, and these impacts need to be avoided and minimized. This is especially true in a country of such rich natural heritage.

While much progress has been made in the last decade to identify the scope and scale of the threats from infrastructure development on biodiversity, further means to determine successful measures to reduce the negative impacts of corridors are needed in the planning, routing and operation of developments. It is important to consider the various impacts that developments have on species and ecosystems, since these impacts are largely non-specific, and a multitude of species and ecosystem functions may be under threat.

An ecologist specializing in the relevant sectors comprising linear infrastructure as well as the species impacted can provide valuable input to the overall EIA process and should be involved as early as possible in the process. Both the faunal and floral assessment components of the EIA process must evaluate all possible impacts of development, as well as cascade effects along the trophic hierarchy; that is, an unforeseen chain of events resulting from a development project that will have a negative impact in all biological communities (Manlick and Pauli 2020). Any form of development should consider the protection of ecological corridors and avoid any further loss of habitat connectivity. (Clevenger and Wierzchowski 2006). Ultimately, any form of linear infrastructure will threaten populations (Trombulak and Frissell 2000), species (Ferraras *et al.* 1992; Havlick 2004; Kroll 2015), and critical habitats (Liang *et al.* 2014), especially when appropriate mitigation measures are not put in place.

Maintaining the integrity and functionality of the South African landscape in conjunction with infrastructure development should be integral to any development plan and/or project. Following the mitigation hierarchy approach during the planning and implementation process will not only minimize negative environmental impacts, but should also lead to the path to achieving no net loss or net gain for biodiversity (Constitutional Court of South Africa 2018). To this end, SANBI coordinates several bioregional and ecosystem programmes that focus on priority actions for biodiversity in South Africa's most threatened biomes and ecosystems, identified through science and stakeholder consultation. Such information is essential for strategic spatial planning that can provide robust guidance to corridor planners for avoiding areas of irreplaceable biodiversity, while also identifying areas where infrastructure development is appropriate and should be encouraged.

South African partnerships that are developed with innovative business leaders to identify and manage the business risks and opportunities that result from interactions with the natural world can provide a platform for partnerships to discover solutions that lead to sustainable business growth (South African Council for Natural Scientific Professions 2020b). For example, the EWT-Eskom strategic partnership model has been internationally recognized as an effective approach to the management of wildlife interactions on power line infrastructure, and has been replicated in other countries (Ledger 1989; Ledger 1990). Several more power utilities across the African continent are currently targeted for implementation of the EWT-Eskom strategic partnership model, strongly supported by several financial institutions that increasingly recognize the need to ensure long-term environmental sustainability. There is a strong motivation to not only uplift the economy, but to ensure that our natural systems retain critical ecosystem services for the well-being of our people.

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References

African Union Commission. (2015). Agenda 2063. https://au.int/en/agenda2063. Accessed 29 October 2020.

Benítez-López, A., Alkemade, R. and Verweij, P.A. (2010). The impacts of roads and other infrastructure on mammal and bird populations: a meta-analysis. *Biological conservation* 143(6), 1307-1316.

Berenbaum, M. (2012). Thomas Eisner 1929–2012. *The Bulletin of the Ecological Society of America* 93(3), 191-196.

Biodiversity Disclosure Project. (2020). The Endangered Wildlife Trust – National Biodiversity and Business Network. https://www.ewt.org.za/what-we-do/what-we-do-people/. Accessed 29 October 2020.

Business Insider (2018). Earning you almost R375,000 per hectare, this must be SA's most profitable crop. https://www.businessinsider.co.za/sas-most-profitable-crop-2018-3. Accessed 29 October 2020.

Central Intelligence Agency (2017). The World Factbook. https://www.cia.gov/the-world-factbook/. Accessed 29 October 2020.

Clevenger, A.P. and Wierzchowski, J. (2006). Maintaining and restoring connectivity in landscapes fragmented by roads. *Conservation Biology Series*, *14*, 502.

Coffin, A. W. (2007). From roadkill to road ecology: a review of the ecological effects of roads. *Journal of Transport Geography* 15(5), 396-406.

Collinson, W.J., Parker, D.M., Bernard, R.T., Reilly, B.K., and Davies-Mostert, H.T. (2014). Wildlife road traffic accidents: a standardized protocol for counting flattened fauna. *Ecology and evolution* 4(15), 3060-3071.

Collinson, W., and Patterson-Abrolat, C. (2016). *The road ahead: guidelines to mitigation methods to address wildlife road conflict in South Africa*. Johannesburg: Endangered Wildlife Trust. https://handbookwildlifetraffic.info/another_book/the-roas-ahead-guidelines-to-mitigation-methods-to-address-wildlife-road-conflict-in-south-africa-the-endangered-wildlife-trust/. Accessed 23 July 2021.

Collinson, W.J., Davies-Mostert, H.T. and Davies-Mostert, W. (2017). Effects of culverts and roadside fencing on the rate of roadkill of small terrestrial vertebrates in northern Limpopo, South Africa. *Conservation Evidence*, 14, 39-43

Collinson, W.J., Marneweck, C. and Davies-Mostert, H.T. (2019). Protecting the protected: reducing wildlife roadkill in protected areas. *Animal Conservation* 22(4), 396-403.

Constitution of South Africa. (1996). Act 108 of 1996. https://www.gov.za/sites/default/files/images/a108-96.pdf.Accessed 29 October 2020.

Constitutional Court of South Africa. (2018). Helen Suzman Foundation v Judicial Service Commission. https://juta.

co.za/media/filestore/2018/06/Helen_Susman_Foundation_v_Judicial_Service_Commission.pdf. Accessed 25 March 2021.

Department of Environment, Forestry and Fishing. (2019). The Presidential Infrastructure Coordinating Commission. https://www.gov.za/sites/default/files/PICC_Final.pdf. Accessed 29 October 2020.

Development Bank of South Africa. (2015). DBSA EU Launched a multi-billion fund for Infrastructure Development. EU, DBSA launch R1.5bn infrastructure fund | Brand South Africa Accessed 29 October 2020.

Edwards, D.P., Sloan, S., Weng, L., Dirks, P., Sayer, J. and Laurance, W.F. (2014). Mining and the African environment. *Conservation Letters* 7(3), 302-311.

Edo, S., Osadolor, N.E. and Dading, I.F. (2020). Growing external debt and declining export: The concurrent impediments in economic growth of Sub-Saharan African countries. *International Economics* 161, 173-187.

Ehrlich, A. and Ross, W. (2015). The significance spectrum and EIA significance determinations. *Impact Assessment and Project Appraisal* 33(2), 87-97.

Eskom (2018). The Eskom Transmission Development Plan (TDP) 2021 – 2030. https://constructionreviewonline.com/news/south-africa/south-africa-to-increase-power-transmission-infrastructure-by-2028/#:~:text=Modified%20date%3A%20Oct%2031%2C%202018%20South%20Africa%20power,%28TDP%29%2C%20for%20the%20period%20from%202019%20to%202028. Accessed 8 April 2021.

Eskom (2021). Company information and overview. https://www.eskom.co.za/OurCompany/CompanyInformation/Pages/Company_Information.aspx. Accessed 24 March 2021.

Endangered Wildlife Trust. (2020). Endangered Wildlife Trust: Protecting forever together. www.ewt.org.za. Accessed 29 October 2020.

Ferreras, P., Aldama, J.J., Beltrán, J.F. and Delibes, M. (1992). Rates and causes of mortality in a fragment population of Iberian lynx, Felis pardina (Temminck). *Biological Conservation*

61(3), 197-202.

Forman, R.T. and Alexander, L.E. (1998). Roads and their major ecological effects. *Annual Review of Ecology and Systematics* 29(1), 207-231.

Georgiadis L., Ament R., Sjolund A., Hahn E., Boettcher M., van der Ree R. *et al.* (2019). The mainstreaming of biodiversity provisions in linear infrastructure by the transportation, energy, and mining sectors in Africa. Challenges and perspectives for an international strategy for engaging different stakeholders. Workshop in African Conference on Linear Infrastructure and Ecology: Building partnership and investing in nature. Book of abstracts. 10-15 March 2019. Skukuza Camp, Kruger National Park, South Africa. p82.

Gunson, K. and Teixeira, F.Z. (2015). Road–wildlife mitigation planning can be improved by identifying the patterns and processes associated. In *Handbook of Road Ecology 101*. van der Ree, R., Smith, D.J. and Grilo, C. Wiley. https://onlinelibrary.wiley.com/doi/10.1002/9781118568170.ch13. Accessed 21 July 2021.

Havlick, D. (2004). Roadkill. *Conservation in Practice* 5(1), 30-33.

Hulett, J. and Diab, R. (2002). EIA follow-up in South Africa: Current status and recommendations. *Journal of Environmental Assessment Policy and Management* 4(3), 297-309.

International Union for the Conservation of Nature. (2020). The IUCN Red List of Threatened Species. Version 2020-2. https://www.iucnredlist.org. Accessed 26 August 2020.

Kindlmann, P. and Burel, F. (2008). Connectivity measures: a review. *Landscape ecology* 23(8), 879-890.

Kroll, G. (2015). An environmental history of roadkill: road ecology and the making of the permeable highway. *Environmental History* 20(1), 4-28.

Laurance, W.F., Arreas, I.B. (2017). Roads to riches or ruin? Science 358(6362), 442-444.

Ledger, J.A. and Annegarn, H.J. (1981). Electrocution hazards to the Cape Vulture *Gyps coprotheres*. *Biological Conservation* 20(1), 15-24.

Ledger, J.A. (1984). Engineering solutions to the problem of vulture electrocutions on electricity towers. *The Certificated Engineer* 57, 92-95.

Ledger, J.A. (1989). Effects of Phase 1A transmission lines on birds and other wildlife, and the effects of birds on the transmission lines. Report to Lesotho Highlands Development Authority. p. 32.

Ledger, J. A. (1999). includes details of raptors nesting on transmission. *j. Raptor Res*, *33*(1), 49-52

Liang, J., Liu, Y., Ying, L., Li, P., Xu, Y. and Shen, Z. (2014). Road impacts on spatial patterns of land use and landscape fragmentation in three parallel rivers region, Yunnan Province, China. *Chinese Geographical Science* 24(1), 15-27.

Manlick, P.J. and Pauli, J.N. (2020). Human disturbance increases trophic niche overlap in terrestrial carnivore communities. *Proceedings of the National Academy of Sciences* 117(43), 26842-26848.

Morrison-Saunders, A. and Bailey, J. (1999). Exploring the EIA/environmental management relationship. *Environmental Management* 24(3), 281-295.

Morrison-Saunders, A. and Retief, F. (2012). Walking the sustainability assessment talk—Progressing the practice of environmental impact assessment (EIA). *Environmental Impact Assessment Review* 36, 34-41.

National Environmental Management Act. (1998). https://www.environment.gov.za/sites/default/files/legislations/nema_amendment_act107.pdf. Accessed 29 October 2020.

SANSEA, The South African National Security Employers' Association SANSEA | The South African National Security Employers' Association. Accessed 4 August 2021

South African National Biodiversity Institute 2020). https://gasnetwork.csir.co.za/project-summary/. Accessed 4 August 2021.

South African Government. (2014). National Infrastructure Plan. https://www.gov.za/issues/national-infrastructure-plan. Accessed 29 October 2020.

Appendix 1 International, national, and regional stipulations to address infrastructure development and DCPs for South Africa

#	Legislation	Description
		International
1	**United Nations Sustainable Development Goals**	The Sustainable Development Goals (SDGs) aim to build infrastructure that promotes economic growth demands, while protecting biodiversity and our environment into the future. From an international perspective, Development Corridor Partnerships (DCPs) should directly address three of the United Nations (UN) 17 SDGs: "to build resilient infrastructure through innovation (Goal 9), to protect and promote the persistence of life on land (Goal 15), and to promote partnerships for the goals (Goal 17)". https://sdgs.un.org/goals
2	**United Nations Convention on Biological Diversity**	The Convention on Biological Diversity's (CBD) Aichi Target 9 was signed by all African nations in 2011 and ranked South Africa as sixth out of the world's seventeen megadiverse countries. Subsequently the Unite Nations' 17 Sustainable Development Goals (SDG) and Aichi Targets of the CBD established that conflict between linear infrastructure and biodiversity is especially important where the last large tracts of unfragmented land with high biodiversity remain. In 2018 mainstreaming biodiversity in energy, mining, and infrastructure development, was a major goal in the framework of the CBD to achieve Aichi Biodiversity Targets by 2020. The desired aim of Aichi Biodiversity Target 5 was that the rate of loss of all-natural habitats and degradation and fragmentation is significantly reduced. However, according to Global Biodiversity Outlook 4 (Secretariat of the Convention on Biological Diversity 2014), the habitats' degradation and fragmentation reduction is still in negative trends. Furthermore, the Global Biodiversity Outlook 4 states that actions to enhance progress towards Target 5 (and other targets), if more widely applied relate to: "Identifying, at the national level, the direct and indirect causes of habitat loss as the greatest impact on biodiversity, to inform policies and measures to reduce this loss; » Developing a clear legal or policy framework for land use and spatial planning that reflects national biodiversity objectives (Target 2); and,

		» Aligning existing incentives to national objectives for land use and spatial planning, and the use of further incentives to reduce habitat loss, degradation, and fragmentation, including as appropriate, payments for ecosystem services and Reducing emissions from deforestation and forest degradation (REDD) mechanisms (Target 3)". » However, as the world, gears up to adopt a post-2020 Biodiversity Framework, there are concerns that while DCPs will likely improve some livelihoods, the scale of those that are adversely affected through reduced ecotourism opportunities could be as much as 70 per cent. https://www.cbd.int/
National		
3	**The Constitution of South Africa**	The Constitution of South Africa (Act 108 of 1996) states that everyone has the right: a. "to an environment that is not harmful to their health or well-being; and b. to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that i. prevent pollution and ecological degradation. ii. promote conservation; and iii. Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development". https://justice.gov.za/legislation/constitution/SAConstitution-web-eng.pdf
4	**The 2011 National Development Plan (2030)**	The vision of the National Development Plan (NDP) is that by 2030, investment in infrastructure development, (primarily the transport sector) will ensure that it serves as a key driver in empowering South Africa and its People, enabling, "greater mobility of people and goods through transport alternatives that support minimised environmental harm". https://www.gov.za National Development Plan 2030 | South African Government
5	**National Framework for Sustainable Development**	The National Framework for Sustainable Development (NFSD) Strategic Focus Area 5 clearly states that one must, "respond appropriately to emerging human development, economic and environmental challenges". https://www.environment.gov.za/documents/strategicdocuments/nfsd National Framework for Sustainable Development | Department of Environmental Affairs
6	**SANBI Biodiversity and Land Use Project**	The Biodiversity and Land Use Project, implemented by the South African National Biodiversity Institute (SANBI) together with its partners and funded by the Global Environment Facility (GEF) through the United Nations Development Programme (UNDP), was established to support municipalities in protecting critical biodiversity through better land management (Fig. 14.2). It was initiated in March 2015 and is in its second year of implementation. The overarching objective of the project is "to minimise the multiple threats to biodiversity by increasing the capabilities of authorities and landowners to regulate land use and manage biodiversity in threatened ecosystems at the municipal scale". https://www.sanbi.org Biodiversity and Land Use Project | SANBI

7	**Department of Forestry and Fisheries (DEFF) (Environmental Screening Tool – EST)**	The Department of Forestry and Fisheries have established an ongoing, open access national Environmental Screening Tool (EST), which by law, must be incorporated into the scoping phase of all EIAs (as of October 2019) to prevent threatened species being overlooked and reduce subjectivity inherent in previous assessment processes. The EST screens for environmental sensitivity on proposed development sites. In the case of the Terrestrial Animal Theme (which forms part of the greater Biodiversity Theme and includes data from birds, reptiles, amphibians, mammals and butterflies), a four-tiered sensitivity rating has been applied, namely, "low", "medium", "high" and "very high" sensitivity. These sensitivities are intended to indicate the presence of threatened species and guide development decisions. https://www.environment.gov.za Home | Department of Environmental Affairs
8	**National Environmental Management Act 107 & 109 of 1998**	The transport sector, especially in the context of environmental sustainability, is informed by several national policies, strategies, and legislation, as well as international agreements to which South Africa is a signatory. The National Environmental Management Act (NEMA) requires that an Environmental Management Programme (EMPr) be submitted where an EIA has been identified as the environmental instrument to be utilised as the basis for a decision on an application for Environmental Authorisation (EA). "NEMA 109 of 1998 also provides guidelines for conducting Environmental Impact Assessments (EIAs). Updated in 2010, South Africa's EIA regulations outline the process of assessing, investigating, and reporting potential environmental impacts of developments and activities. EIAs are governed by the following regulations: Environmental Impact Assessment EIA Regulations (Government Notice R.543 in Government Gazette 33306 of 18 June 2010; » Listing Notice 1 (Government Notice R.544 in Government Gazette 33306 of 18 June 2010) – activities requiring a basic assessment report (BAR); » Listing Notice 2 (Government Notice R.545 in Government Gazette 33306 of 18 June 2010) – activities requiring both scoping and Environmental Impact Reports (EIRs); » Listing Notice 3 (Government Notice R.546 in Government Gazette 33306 of 18 June 2010) – activities which require only an environmental authorization through a BAR if the activities are undertaken in a specified geographical area; and, » Environmental Management Framework Regulations (Government Notice R.547 Government Gazette 33306 of 18 June 2010)". » As an example of energy and NEMA, the scope of a generic EMPr applies to overhead electricity transmission infrastructure including and upward of 132kV requiring environmental authorization in terms of the NEMA. Lower voltage is currently only subjected to a Basic Assessment (BA) process with less stringent requirements placed on developers. However, despite efforts made for the provision of smaller clearances between phases, distribution networks contribute significantly to the countries overall bird collision mortalities. https://www.environment.gov.za National Environmental Management Act [No. 107 of 1998]

9	**National Forests Act 84 of 1998**	Chapter 1 (Introductory Provisions) of the National Forests Act 84 1998, establishes the purposes for which this Act is passed. It defines important words and terms used in the Act and guides its interpretation. The purposes of this Act are to: a. promote the sustainable management and development of forests for the benefit of all; b. create the conditions necessary to restructure forestry in State forests; c. provide special measures for the protection of certain forests and trees; d. promote the sustainable use of forests for environmental, economic. educational. recreational, cultural, health and spiritual purposes; e. promote community forestry; and, f. promote greater participation in all aspects of forestry and the forest products industry by persons disadvantaged by unfair discrimination". https://www.cer.org.za National Forests Act No. 84 of 1998 – Centre for Environmental Rights (cer.org.za)