



# CONVENTION ON MIGRATORY SPECIES

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## GUIDELINES ON MITIGATING THE IMPACT OF LINEAR INFRASTRUCTURE AND RELATED DISTURBANCE ON MAMMALS IN CENTRAL ASIA

### Summary:

A number of activities have taken place to reduce the negative impacts arising from the rapid growth of linear infrastructure such as fences, roads and railroads in Central Asia. Activities included the production of studies and reports, the organization of workshops as well as the development of guidelines.

The Conference of the Parties is invited to consider for adoption the Draft Guidelines on Addressing the Impact of Linear Infrastructure on Large Migratory Mammals in Central Asia, contained in the annex of this document.

## **GUIDELINES ON MITIGATING THE IMPACT OF LINEAR INFRASTRUCTURE AND RELATED DISTURBANCE ON MAMMALS IN CENTRAL ASIA**

*(Prepared by the UNEP/CMS Secretariat)*

1. CMS has been active in addressing the rapid growth of linear infrastructure in Central Asia in order to understand and reduce its impact on migratory mammals. Removing barriers to migration has become a key priority for the conservation and free movement of many CMS-listed steppe and mountain ungulates.
2. In 2011, the Secretariat initiated a study prepared by WWF Mongolia on the effects of infrastructure developments such as the construction of fences, roads and railroads on migratory ungulates in Mongolia, which was discussed at the 17<sup>th</sup> Scientific Council Meeting. Following this report, the Secretariat has continued to work towards addressing this critical and emerging threat to many terrestrial species in Central Asia.
3. In late 2012, the Secretariat in cooperation with and with funding from the Frankfurt Zoological Society and Flora & Fauna International, initiated another study to investigate the situation and the anticipated effects of infrastructure construction on Saiga in Kazakhstan (e.g. the fence along the Kazakh-Uzbek border and two new railroads) and to develop a set of recommendations to be presented to the Kazakh authorities. The results were discussed in meetings with the relevant authorities in Kazakhstan (Environmental Ministry, Transport Ministry and security/border offices).
4. The report “Saiga Crossing Options. Guidelines and Recommendations to Mitigate Barrier Effects of Border Fencing and Railroad Corridors on Saiga Antelope in Kazakhstan” was also presented in English and Russian at a one-day Technical Meeting under the Saiga MoU in June 2013 in Astana, Kazakhstan, in order to discuss the impact of such infrastructure construction on Saiga as well as possible mitigation solutions.
5. In late June 2013, together with the German and Mongolian Governments, and with funding from Germany, CMS organized a workshop to address the impacts of mining and infrastructure on migratory mammals. The workshop resulted in a Declaration of Intent and associated Action Plan. During the workshop, countries *inter alia* highlighted the need for international legally-binding guidelines outlining best practice and standards to mitigate the impact of linear infrastructure on migratory mammals.
6. Through a voluntary contribution from the Government of Switzerland, it has been possible to commission the Wildlife Conservation Society (WCS) to develop such guidelines, for presentation and adoption at the 11<sup>th</sup> Conference of the Parties (COP11). The Draft Guidelines are contained in the annex of this document. Given the region covered by these guidelines, they will not be translated into French and Spanish. However, a courtesy translation will be made available in Russian

### **Action requested:**

The Conference of the Parties is requested to:

- (a) Take note of and comment on the activities which aim to address the impact of linear infrastructure on migratory mammals in Central Asia; and
- (b) Adopt the Draft Guidelines contained in the Annex of this document.

# Convention on the Conservation of Migratory Species of Wild Animals (CMS)

## Guidelines for Addressing the Impact of Linear Infrastructure on Large Migratory Mammals in Central Asia

These guidelines have been written to provide guidance on avoiding and mitigating impacts of linear infrastructure development on large mammal migratory species in Central Asia and encouraging the development of international, regional and national policies.

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# Acknowledgments

In 2005, at the Eighth Meeting of the Conference of the Parties to the CMS (COP 8) the Scientific Council was requested, in cooperation with the UNEP/CMS Secretariat, Mongolia and other concerned Parties to initiate the Central Eurasian Aridland Concerted Action and Associated Cooperative Action (UNEP/CMS/Recommendation 8.23); the Action was adopted at COP 9 (UNEP/CMS/Recommendation 9.1) in 2008. In 2011, the Secretariat prepared a draft Central Eurasian Aridland Mammals Action Plan, intended to stimulate discussion and identify further action needed to finalize the document in consultation with Range States and other stakeholders, and to agree on next steps towards its implementation. The document was discussed at the 17<sup>th</sup> Scientific Council Meeting in 2011, and has become the basis for developing a coherent strategic framework for the conservation of migratory mammals in the Central Asian region: the Central Asian Mammals Initiative (CAMI).

As part of this initiative, and with funding from Switzerland, CMS has provided a grant to the Wildlife Conservation Society (WCS) to develop the following guidelines on mitigating the impact of linear infrastructure (including roads, railways, fences, pipelines, etc.) and related disturbance affecting ungulates in Central Asia. These guidelines describe the application of best practices addressing the impacts from linear infrastructure development at the project and national level to maintain connectivity for wildlife populations in the face of growing infrastructure development.

We would like to thank the many individuals who contributed their time and expertise to this assessment. We would like to thank Christiane Röttger, Aline Kühl-Stenzel, Madhu Rao, Aili Kang and Lkhagvasuren Badamjav for their constructive feedback and comments on this assessment and their advice. Special thanks also goes to Alyssa Campbell, research intern at Legal Atlas®, for the difficult task of compiling, organizing and reviewing related international and national policies (in multiple languages) to support the legal analyses.

# Introduction

Asia is the world's largest continent accounting for roughly 30 per cent of the Earth's land area. While it is one of the most populous parts of the world, its central region counts among the least populated. By some definitions, Central Asia stretches from the Ural and Caucasus mountains in the west, crosses the Tibetan plateau – which by itself is roughly half the size of the contiguous United States – and extends to the east through the deserts and grasslands that dominate northern China, most of Mongolia, and south-central Russia. It is one of the few regions anywhere, and especially in Asia, where large intact habitats and wildlife migrations, other than birds, can still be observed.<sup>1</sup> At the same time, it boasts some of the richest coal and mineral deposits, contains the largest volume of ice outside of the poles, acts as a primary watershed for more than two billion people, and has the largest natural reservoir of freshwater (Lake Baikal) holding an estimated 20 per cent of the world's unfrozen water. In brief, Central Asia is a globally important landscape for people and wildlife.

Figure 1: Map of Central Asia



Source: <http://www.orexca.com/centralasia.php>

It is not by accident that many large migratory and nomadic mammals can be found in this part of the world. Not only can they still move great distances (despite increasing development), but the seasonal extremes of heat and cold, the unpredictability of precipitation, and accompanying low and dramatically variable productivity in this region make their migratory use of the landscape necessary for survival. Without the ability to move in search of green areas and water, or to avoid extreme weather and deep snows, many local and regional populations, if not entire species, would cease to exist.

<sup>1</sup> Large mammals (>20 kg) have been eliminated from more than 80 per cent of the terrestrial ecosystems in which they were formerly present (Olson 2013, citing Morrison et al. 2007; see also Kaczensky et al. 2006, Mallon & Jiang 2009).

Linear infrastructure projects, such as roads, railways and pipelines may be important to the economic growth of the region, but they also create barriers to species movements. Not all of the triggers and methods for migratory and nomadic movement are fully understood, but it is clear that wildlife cannot always adapt to linear infrastructure development as it is either a literal barrier (i.e., they are physically unable to cross or go around it) or it is so unfamiliar and dangerous that it becomes a functional barrier; some pass, but not enough to prevent negative impacts to the population (Sawyer 2012). The impacts are not just limited to disruption of the migratory pattern. It also fragments habitat, splits populations, causes genetic isolation and alters behaviours that may be important to long-term survival. Transportation corridors also bring a wave of additional problems including increased human pressure from commerce, tourism and hunting, decreased animal health and reproduction due to exposure to dust, increased development, pollution, garbage and stress, not to mention direct mortality caused by fences and vehicles.

Without the ability to move in search of green areas and water, or to avoid extreme weather and deep snows, many populations [of migratory species], if not entire species, would cease to exist.

Studies have documented how linear infrastructure development in the region is already taking its toll on migratory species. Both the Qinghai-Lhasa highway and Qinghai-Tibet railway in China cut across key movement corridors of Tibetan antelope or chiru (*Pantholops hodgsonii*), Tibetan gazelle (*Procapra picticaudata*) and Tibetan wild ass or kiang (*Equus kiang*), altering migrations and negatively affecting populations (Xia 2007, Olson 2011). Fencing along the border between Mongolia and China has had an

impact on wild Bactrian camels (*Camelus ferus*), while livestock fences in the Qinghai Lake area have contributed to the decline of the already endangered Przewalski's gazelle (*Procapra przewalskii*) (Jiang 2006, Olson 2011). Mongolia's population of Asiatic wild ass or khulan (*Equus hemionus*) faces similar threats from the development of roads and rail lines that serve the country's mining operations. There is a need to learn from these examples and highlight effective approaches that can effectively prevent or mitigate the impacts of linear infrastructure.

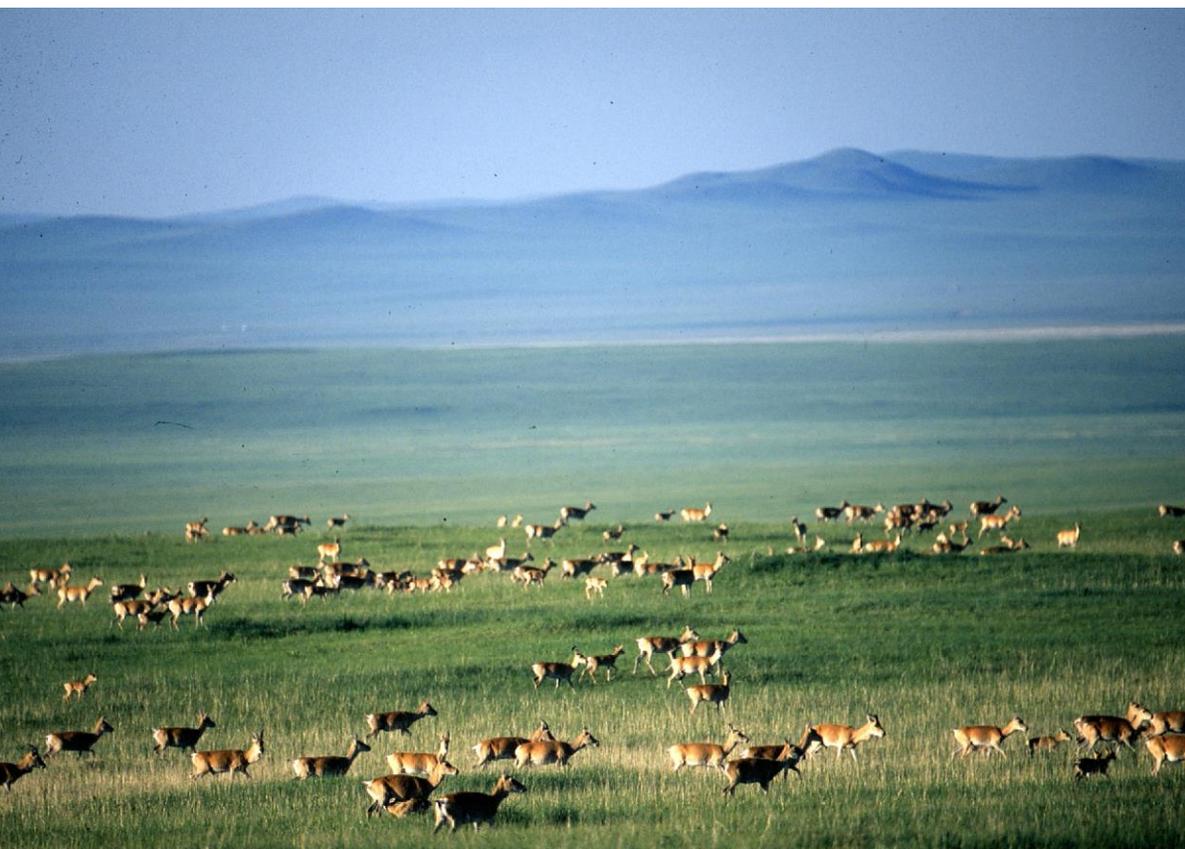
Mitigation standards that stress avoidance and minimization of development impacts have been released by lenders and incorporated to some degree into national legislation. However, with the exception of the IFC Performance Standards, few specifically mention the need to address linear infrastructure impacts. The IFC standards also define critical habitat as that which supports globally significant concentrations of migratory species, leading to stiffer requirements for project development including net gains in biodiversity. In the Central Asian region, Kazakhstan has the lone example of a national legal framework that specifically identifies the need to address impacts on migratory species in relation to the design and construction of linear infrastructure. For the remaining countries, these or similar requirements have yet to enter their national legislation or EIA guidelines. Only a few (e.g. Kazakhstan, Uzbekistan and Tajikistan) refer to transboundary impacts, a critical part of managing impacts to migratory species that by their nature must be addressed at the landscape level as these species often

cross national borders. More specificity in EIA requirements to avoid and minimize impacts of linear infrastructure within the project landscape will be important for the region.

These guidelines are important to the extent to which they promote specific practices and reduce the impacts of linear infrastructure development. The review is not exhaustive, but nonetheless shows that the relevant legal framework spans a wide variety of international agreements, national laws and regulations, but that much remains to be done to formalize and harmonize practices and provide the specificity needed to ensure that migratory species issues are addressed at the appropriate stages of planning and development.

Against this background and based on the different mandates, CMS has strengthened its engagement in Central Asia to conserve migratory mammals, their habitats and the vital role they play for intact ecosystems. In proposing an initiative for the conservation of Central Asian migratory mammals, CMS aims to provide a common framework to coordinate conservation activities in the region and coherently address major threats. It is based on activities focused on single species (including existing MOUs/Action Plans and those in development); and activities to address urgent and major threats faced by all or most of the species.

CMS provides the ideal international policy frameworks to facilitate close collaboration amongst stakeholders. CMS policies include the removal of barriers to migration, the building of transboundary ecological networks (e.g. Resolution 10.3) and the maintenance of animal migration in Central Asia as one of the last global “migration hotspots”. Through developing an initiative for Central Asian mammals, the treaty is acting as a catalyst to foster collaboration between all stakeholders, with the aim to harmonize and strengthen the implementation of CMS and its instruments targeting large mammals.



Mongolian gazelle travel long distances in large herds across Mongolia's steppe in a nomadic fashion in search of forage and to avoid winter weather. ©WCS/K. Olson

# Migratory Species and Linear Infrastructure

The following section outlines the basic principles concerning the relationship between linear infrastructure and migratory species. It first discusses the different forms of animal movement and how they have dissimilar implications for assessing potential impacts, and more importantly, designing avoidance and mitigation strategies. It then looks at the general impacts of linear infrastructure with a focus on four major types of infrastructure considered most problematic for migratory and large nomadic ungulates, including roads, rail lines, fences, and pipelines for oil and gas.<sup>2</sup>

## A. Understanding large mammal movements: migration, nomadism and dispersal

The term ‘migratory’ (or ‘migration’) in this text is being used for convenience to refer to several distinct forms of animal movement. However, any discussion of species movement, perhaps especially in the context of linear infrastructure development, is not complete without reviewing the implications that different types of movement have on species management. Three major types of movement with particular relevance to large mammals and their relationship to linear infrastructure are separately described as migration, nomadism and dispersal (Mueller and Fagan 2008).

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<sup>2</sup> Power lines are among those not addressed in these guidelines as they are primarily a concern for birds, although there is some research into the effect of UV light from power lines on avoidance and movement of mammals in their vicinity (see <http://www.theguardian.com/environment/2014/mar/12/animals-powerlines-sky-wildlife>).

## I. MIGRATION

Definitions for migratory species vary<sup>3</sup>, but generally refer to species that complete a cyclical movement (seasonal or annual) between two or more distinct geographical areas, one of which is usually the area in which they breed. Migration is a form of adaptation to environments that, for one reason or another, either cannot support a population year round, are too hot or cold for part of the year, or are not suited to a particular need, e.g. mating or birthing grounds (Dingle and Drake 2007). This means that most of or the entire population is adapted to and dependent on specific movements.

Most populations of saiga antelope, for example those in the Range States of Kazakhstan, Uzbekistan and the Russian Federation (Singh et al. 2010a) complete long migrations from north to south and back again within loosely defined ranges (Bekenov et al. 1998, Singh et al. 2010b). These routes can change due to environmental conditions, but appear to have some consistency. The Ustyurt saiga population whose range normally straddles northern Uzbekistan and south-western Kazakhstan has been observed migrating as far south as Turkmenistan during extreme winters (Bekenov 1998). The Betpak Dala saiga population also migrates along a north-south axis, a pattern that appears to follow a precipitation gradient that in turn defines the quality of available forage (Bekenov et al. 1998, Singh et al. 2010).

Although migrations can vary in length and timing, they generally follow long-established and well-documented routes, making it easier for developers to predict and plan for the location of necessary avoidance and mitigation strategies. Depending on the species and reasons for migration, avoidance and mitigation measures may be able to be localized.

## II. NOMADISM

Nomadism differs significantly from migration, and most importantly for linear infrastructure development, in the degree of unpredictability in the timing and location of animal movement. One definition calls it “[m]ovement in which a population shifts from site to site between seasons in a relatively unpredictable manner... individuals do not move each year to defined breeding and wintering ranges, and may not even move every year” (Sibley 2009). It is a form of movement most often adapted to arid regions with high variability in the location of precipitation and vegetative growth. Nomadic species adapt to this variability by constantly moving to new areas in search of food and water.

Nomadic species in Central Asia include Mongolian gazelle and khulan, whose movements are dependent on a suite of conditions – in all seasons a search for food (localized rains and vegetation green-up in summer, avoidance of deep snows in winter); in winter it is also the avoidance of deep snow as an impediment to movement. While they are typically found within certain geographical areas, they can nonetheless move long distances. Khulan, for example,

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<sup>3</sup> CMS defines “migratory species” as “the entire population or any geographically separate part of the population of any species or lower taxon of wild animals, a significant proportion of whose members cyclically and predictably cross one or more national jurisdictional boundaries.”

have been proven to move across an area as large as 80,000 sq km over a few weeks (P. Kaczensky unpublished data).

The implication for linear infrastructure development is that if nomadic species are present in the area of interest, mitigation strategies will need to be similarly spread out. However, some nomadic species tend to use specific movement corridors more often than others. Local research is therefore a useful tool to determine if there are areas of special interest/sensitivity.

### III. DISPERSAL

Dispersal is an even less predictable form of movement than nomadism, although it is just as certain to occur over the long term. It refers to instances where one or more individuals, or entire groups, leave one area to occupy new areas. It is considered a response mechanism to environmental changes as well as a cornerstone of long-term species survival. It is the “process that ultimately causes gene flow through space or time” (Gibbs et al, 2009). The most common forms of dispersal are 1) young adults leaving the natal area to find a home territory of their own, 2) adults looking for mates and 3) individuals moving due to a lack of food.

All three forms for dispersal are seen in snow leopards, especially in the Mongolian Gobi and Tibetan highlands where they are often found on small, ‘isolated’ mountains. For snow leopards everywhere, young animals must move significant distances to find a home territory, but both young and adults may also have to move to find a mate or food. With small and widely separated ranges, snow leopards may be forced to cross extensive flatlands when dispersing, which can put them at risk from linear infrastructure.

As with migration and nomadism, this type of movement relies on the functional connection between habitats that can be broken by linear infrastructure, even ones that act as partial barriers. The problem in managing impacts is the infrequency and relative unpredictability. Khulan, for example, may cross a road in a valley once or twice per year, while a snow leopard may wander between mountains once every few years. Given that outside of China, most countries have 100-300 snow leopards in total, the threat from linear infrastructure can still be important despite the relative infrequency of events.

Governments and development proponents are faced with the serious challenge of considering not just where a species is likely to encounter a development based on known movements, but where it is likely to go now and in the future in search of new habitat. This is potentially where local knowledge can play role in helping governments and developers



Goitered gazelle live in desert environments and must have access to large areas in order to find adequate food in this hostile environment. ©WCS/B. Buuveibaatar

account for such movement, making the stakeholder process a key part of any linear infrastructure impact assessment and mitigation plan.

#### IV. MIGRATORY AND NOMADIC SPECIES OF CENTRAL ASIA

Understanding the types, causes and consequences of movement is not only of keen interest to biologists, but it must be a fundamental concern for multiple government agencies and project developers and managers (Nathan 2008, Mandel et al. 2011). No matter how a given species moves through and uses its environment, movement itself is a “vital process linking [wild animals] to their ecosystems in space and time” (Lundberg and Moberg 2003). Ultimately, it is a means of survival for individuals and populations as whole, and perhaps this is nowhere as true as in the harsh environmental conditions found in Central Asia. Knowing how, when, and why animals move is a prerequisite to developing appropriate avoidance and mitigation strategies.

##### **Migratory and Nomadic Species of Central Asia**

Over 100 mammal species are listed in Appendices I and II of the Convention on Migratory Species. Twelve of them are the focus of these guidelines. A brief introduction to each, its range, habitat, movement patterns, status and threats follows, in this order:

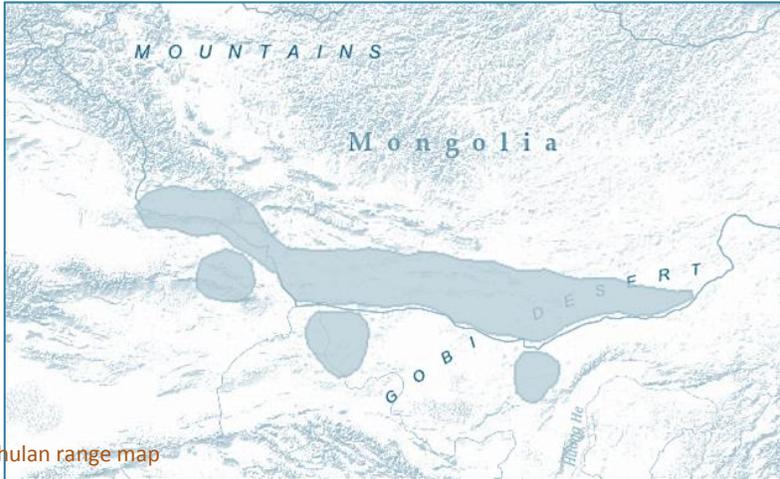
- |                               |                              |
|-------------------------------|------------------------------|
| 1. Asiatic Wild Ass or Khulan | 2. Saiga Antelope            |
| 3. Tibetan Wild Ass or Kiang  | 4. Tibetan Antelope or Chiru |
| 5. Mongolian Gazelle          | 6. Wild Yak                  |
| 7. Tibetan Gazelle            | 8. Bactrian Camel            |
| 9. Przewalski’s Gazelle       | 10. Argali                   |
| 11. Goitered Gazelle          | 12. Snow Leopard             |

It is critical for planners and developers to know which species are likely to occur in an area under consideration for development, especially in planning for linear infrastructure, as well as the habitats, types of movements, and likelihood of impact for each species. For example, seven species under consideration are found in both the Tibetan highlands (kiang, Tibetan gazelle, Przewalski’s gazelle, chiru, yak, argali and snow leopard) and western Mongolia (khulan, Mongolian gazelle, goitered gazelle, saiga, Bactrian camel, argali, and snow leopard). However, not all species ranges overlap (for example Przewalski’s gazelle, yak, and camel all have very limited distributions, while argali and snow leopard are usually in mountainous habitats).

The following descriptions are only meant as an introduction to the species under consideration for these guidelines. More information on each species can be found in the CMS “Assessment of gaps and needs in migratory mammals conservation in Central Asia”<sup>4</sup>. Maps used in this publication were sourced from the IUCN Red List Species maps available at

<http://maps.iucnredlist.org>.

<sup>4</sup> <http://www.cms.int/en/document/assessment-gaps-and-needs-migratory-mammal-conservation-central-asia>



Khulan range map

**Khulan (*Equus hemionus*)** – The khulan or Asian wild ass is found today in southern Mongolia and parts of northern China. Historically, they were also present in Kazakhstan before being exterminated through hunting. Khulan are now listed as an endangered species on the IUCN Red List and scientific evidence suggest that abundance has declined globally by more than 50 per cent over the past two decades (Moehlman et al. 2008). They are also included in Appendix I of CITES, and Appendix II of CMS. Mongolia’s population comprises 80 per cent

of the total global population, with an estimated population of 35,000-40,000 individuals (Ransom et al. 2012, Buuveibaatar and Strindberg 2014). Although fully protected, wild asses are actively chased away or illegally killed by people and the mere presence of people and their livestock at water points can limit or block access for Asiatic wild asses (Kaczensky et al. 2006). Competition with domestic livestock on resources may also pose a threat to this equid (Campos-Arceiz et al. 2004).

Khulan move in a nomadic pattern, tracking unpredictable resources in their desert environment. Some of their movements can be enormous, travelling thousands of kilometres in just a few weeks in search of food and water, and their annual range can cover up to 70,000 km<sup>2</sup> (Kaczensky et al. 2011a). They are directly impacted by fenced railroads, which form the absolute eastern border of their range in Mongolia (Kaczensky et al. 2011a). They may also be impacted by border fences between Mongolia and China, which appear to have separated remaining animals into distinct subpopulations on either side of the border. Their movements are also affected by developing roads and railway lines associated with increasing resource extraction (Lkhagvasuren et al. 2012, Batsaikhan et al. 2014).

**Kiang (*Equus kiang*)** – The kiang or Tibetan wild ass (CMS Appendix II) is the largest of the wild asses and a native of the Tibetan Plateau. Its current range is restricted to Ladakh in Jammu and Kashmir, the plains of the Tibetan Plateau and northern Nepal along the Tibetan border (Shah 2008). Within this broad range, kiang distribution has become increasingly fragmented. The most recent population assessments were completed in 2008, showing 90 per cent of the population of 60,000-70,000 animals in



Kiang range map

China (Shah 2008).

No regular migration pattern has been observed in kiang. They do, however, make seasonal movements between different habitat types, often dispersing in small groups into hilly terrain in summer, and concentrating in basins and flat terrains during winter (Schaller 1998). Livestock fencing may be a threat as it fragments habitat on the plateau and can limit movement.



Mongolian gazelle range map

**Mongolian gazelle (*Procapra gutturosa*) –**

The Mongolian gazelle (CMS Appendix II) is one of the last ungulates in Asia still to exist in large numbers. They occur in eastern Mongolia and adjacent areas of Russia and north-eastern China. The species has disappeared from Kazakhstan and has been nearly eliminated from its range in China and Russia (Lhagvasuren and Milner-Gulland 1997). Up to 4.5 million Mongolian gazelles may have existed around 1900, but by the mid-1960s a severe decline in range size and population began occurring, which was attributed to heavy harvesting during World War II and the blocking of seasonal

movements by the fenced Trans-Mongolian Railroad (Milner-Gulland and Lhagvasuren 1998). A recent population estimate suggests about 1 million individuals remain (Olson et al. 2011).

Although regularly described as migratory, Mongolian gazelle movement patterns suggest that they do not necessarily demonstrate return movements between seasons. Instead they appear to undertake long-distance nomadic movements (Fleming et al. 2014) in herds of up to 200,000 individuals (Olson et al. 2009) in search of green-up (newly growing vegetation after local rains) and to avoid deep snows or other inclement weather. Border fences and fences along railways are a major impediment to gazelle movement, and hundreds of gazelle have been found dead along railway fences (Ito et al. 2008, Olson et al. 2011, Ito et al. 2013, Batsaikhan et al. 2014).

**Tibetan gazelle (*Procapra picticaudata*) –**

Tibetan gazelle are small antelopes that have black-tipped tails on their white rumps. Also known as goa, they live on the Qinghai-Tibet Plateau, on high-altitude plains, hills and stony plateaux. The lack of ecological information on this species hinders conservation planning (Namgail 2008). They are classified as Near Threatened on the IUCN Red List, since their population is estimated to have declined by 20 per cent over three generations. Their population on the Qinghai-Tibet Plateau is estimated to be 100,000, with some degree of uncertainty (Schaller, 1998). They are considered under threat from the continued increase in habitat loss and fragmentation from land alteration for agriculture, increasing livestock numbers and the fencing of land on the Tibetan Plateau.



Tibetan gazelle range map



Przewalski's gazelle range map

**Przewalski's gazelle (*Procapra przewalskii*) –**

The Przewalski's gazelle, which is considered rare and endemic to China, is a close relative of the Mongolian gazelle. Ten fragmented distributions occur in the Qinghai Lake area in Qinghai Province of China (Jiang et al. 1995). This gazelle is protected by the Government of China under the Category I classification, in addition to a critically endangered classification on the IUCN Red List.

The population has seen heavy declines as a result of hunting, predation, and habitat loss as a result of increased fencing and

settlement development (Zang et al. 2010). A further description of these threats can be found in Case Study 2 on page 22.

**Goitered Gazelle (*Gazella subgutturosa*) –**

Goitered gazelle (CMS Appendix II) occur in the Arabian Peninsula across the Middle East and Asia to Kazakhstan, Mongolia, China and Pakistan. They are distributed in approximately 20 countries. Found in arid desert and desert-steppe habitat, they move seasonally in search of pasture and water, and they can cover up to 30 km per day in the wintertime. In the summertime, their average travel distance is substantially less. With a running speed of up to 60 km/h, they are prone to flee when in contact with humans and other creatures with which they seek minimal association.



Goitered gazelle range map

The goitered gazelle has been hunted for its meat and as a trophy, and it has experienced habitat loss due to expanding infrastructure development, agricultural conversion, and increasing livestock numbers. It has a patchy distribution as a result of anthropogenic activities taking over their natural habitat. Overhunting and habitat loss in all of its range countries have led to a serious decline in its population in recent years.

The most recent count states that the global population of goitered gazelle is 120,000-140,000. However as mentioned, it is estimated that this number has seen dramatic declines among most populations (Mallon and Kingswood 2001).



Saiga antelope range map

**Saiga antelope (*Saiga tatarica*) –** There are two distinct subspecies (Kholodova et al. 2006), found in five populations in the Russian Federation, Kazakhstan, Uzbekistan and Mongolia. While the nominate subspecies undertakes large-scale migrations tracking greenness of vegetation (Bekenov et al. 1998, Singh et al. 2010), the Mongolian subspecies does not show classic migratory behavior with pronounced seasonal movements (Bannikov 1954). The Mongolian saiga does appear to perform a seasonal movement through a narrow corridor that connects the two subpopulations north of the Altai Mountains in western Mongolia (Berger et al. 2008).

The saiga has undergone one of the most dramatic population declines of any species in the world, with numbers plummeting from an estimated 1.5 million just 20 years ago to ~50,000

individuals in the early 2000s, a decline of 95 per cent (Milner-Gulland et al. 2001). Saiga are listed as a critically endangered in the IUCN Red List and included in Appendix II of both CITES and CMS.

The main threat to saiga is from illegal hunting for their horns, used in traditional medicine, especially in China. Saiga are also threatened by harsh natural conditions and competition with livestock both for forage and habitat (Milner-Gulland et al. 2003, Berger et al. 2013). Saiga are threatened by the installation of border fences between Kazakhstan and Uzbekistan (Olson 2013). Currently, the Mongolian saiga subspecies is not affected by infrastructure developments; however, paved roads and railways are planned through its range, which could fragment their habitat (Lkhagvasuren et al. 2012).

**Tibetan antelope or Chiru (*Pantholops hodgsonii*)** – Tibetan antelope are an endemic species of the Tibetan Plateau (Schaller 1998). Also known as chiru, they live on alpine and desert steppe at elevations of 3,250-5,500 metres. It is estimated that there are at least five migratory populations, which travel up to 400 km/year (Leslie and Schaller 2008). Some of these antelopes migrate into India from Tibet. Due to extremely high levels of poaching for their fine fur, called shatoosh, the population decreased to approximately 75,000 individuals in recent years, down from over a million (Schaller 1998). Although poaching still occurs at unknown levels, enforcement efforts have seen the population increase to perhaps as many as 150,000 today.



Most chiru are seasonal migrants. Females travel over 300 km, often in large herds numbering several hundred individuals, to give birth in the desert steppes (Miller and Schaller 1996, Schaller 1998). Most males move shorter distances, and some herds do not migrate at all. Fencing for pasture threatens to block these seasonal migrations, as does the Golmud-Lhasa railway and highway.

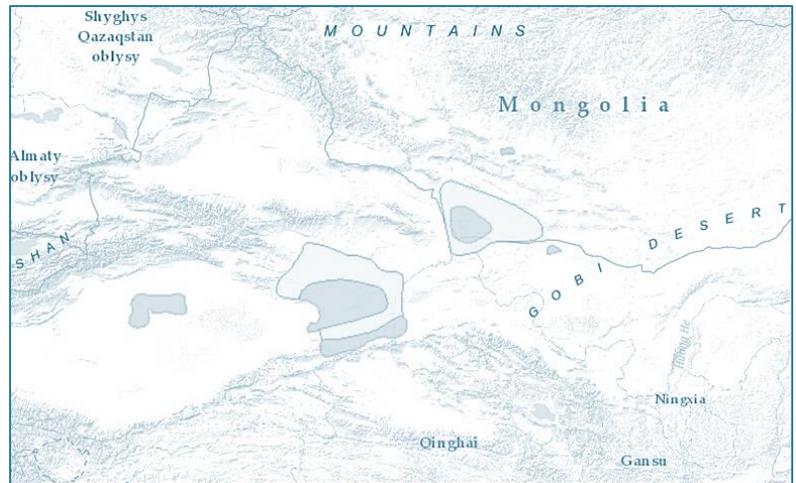


Wild yak range map

**Wild yak (*Bos mutus*)** – Wild yak live on remote, high-elevation alpine steppe and meadows primarily on the Tibetan Plateau at 3,000-5,500 metres in elevation (Leslie and Schaller 2008). Their range consists of Tibet, Qinghai and Gansu provinces in China. They are listed as Vulnerable by IUCN, included in Appendix I of CITES (and listed on Appendix I of CMS as *Bos grunniens*), and they are considered one of the most endangered species in the Tibetan Plateau. It is estimated that there are less than 15,000 wild yak today.

Threats to wild yak include loss of habitat as villages and livestock spread across the Tibetan Plateau. Another major threat is genetic hybridization with domestic yak-cow crosses. While yak do not make extensive migratory movements, they can travel 50 km or more, especially up and down slopes, in search of forage and to avoid deep snows (Miller and Schaller 1996).

**Bactrian Camel (*Camelus ferus*)** – The Bactrian camel is only found in three locations in northern China (one in the Taklamakan and two in the Lop Nur Desert) and one location in southern Mongolia (Transaltai Gobi; Hare, 2008). The species' distribution in Mongolia is reported to have shrunk by ~70 per cent since the last century, and possibly as early as the 1940s (Adiya et al. 2012, Bannikov 1975).



Bactrian camel range map

The most recent population estimate in 2012 suggests approximately 800 wild camels exist in Mongolia (Institute of Biology, unpublished data). They are categorized as Critically Endangered on the IUCN Red List and listed on Appendix I of CMS. Several factors are assumed to threaten wild camel persistence, including human disturbance, poaching and competition from, hybridization with and disease transmission from domestic camels (Blumer et al. 2002, Silbermayr and Burger, 2012). Increasing human encroachment into remaining camel range includes increasing numbers of herder camps and livestock density in the buffer zone of the Great Gobi A Special Protected Area (Enkhbileg et al. 2006) and escalating incidents of illegal mining within the protected area (Adiya 2008). Other threats to wild camel conservation suggested by various conservationists include habitat fragmentation by the

Mongolian-Chinese border fence, climate change resulting in drying oases and deteriorating water and forage quality (Clark et al. 2006).

Wild camels are highly mobile and can travel over 75 km in a single day (Kaczensky et al. 2014). Their home ranges cover >12,000 km<sup>2</sup> (Kaczensky et al. 2014). Their long-distance movements suggest that wild camels can react quickly to local food or water shortages, or to avoid adverse weather conditions and other threats.

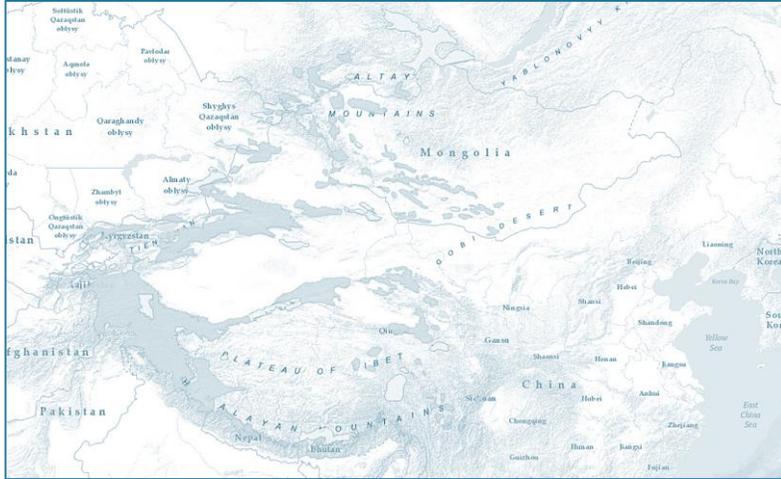
**Argali (*Ovis ammon*)** – The argali sheep is the largest of the world’s wild sheep, with a range covering eleven countries in Asia. Argali sheep live on highlands, consisting of mountains, steppe valleys, and rocky outcrops (Reading et al. 1998). Very few scientifically accredited population counts exist for argali in their range countries (Mallon et al. 2014). There are currently nine different recognized subspecies, seven of which are listed in Appendix II of CITES and CMS. They are classified as vulnerable on the IUCN Red List Category.



Argali range map

Argali are highly proficient at moving up and down steep, rocky outcrops as one of their defense mechanisms that keep them out of harm’s way. Thus, their movement is often in reference to changes in altitude as they search for water and pasture resources and to avoid deep snows. Herds may travel long distance in a classic migratory pattern, and often cross borders. They are thus frequently affected by border fences between countries.

Subsistence-based poaching by miners and herders, trophy hunting, and habitat and forage competition with livestock have been identified as critical threats, with fragmentation and disturbance (from humans and livestock) seen as further significant threats (Wingard et al. 2011, Mallon et al. 2014). Linear infrastructure and large-scale development activities are seen as local but growing threats in the argali’s mountain environment, with border fences believed to be a significant barrier to movement.



Snow leopard range map

**Snow Leopard (*Panthera uncia*)** – The snow leopard lives on the mountain ranges of South and Central Asia, comprising twelve countries and 1.2 million km<sup>2</sup> of potential habitat. With an estimated population of 3,000-7,500 individuals, they are listed as an endangered species on the IUCN Red List, and are included in Appendix I of CITES and Appendix I of CMS (as *Uncia uncia*).

Wide-ranging but apparently territorial animals, snow leopards are known to make long-distance movements on occasion, even across relatively flat terrain between mountains. Border fences in mountainous areas have affected their movement. Additionally, railroads and roads are also suspected to restrict their movement when they occasionally cross lowlands in search of prey and mates.

## B. Types and Impacts of Linear Infrastructure

Linear infrastructure, as the name suggests, refers to infrastructure constructed in a line and across long distances. It includes roads and rail lines, power and communications lines, oil and natural gas distribution lines, border and other types of fencing, canals and irrigation ditches, and more. Linear infrastructure is the lifeblood of urban environments and the great connectors between cities, allowing people, goods and information to move back and forth, while also bringing resources from remote locations to the population centres that rely on them. Because of its linear nature, it creates a unique set of political, technical and social challenges. Unlike most commercial, urban and residential projects that have localized impacts and are easier to measure, linear infrastructure typically traverses multiple jurisdictions (local, regional, and even international borders), can cross protected lands and sensitive landscapes, and has the potential to disturb livelihoods and health in rural communities.

In the mountains and plains of Central Asia, these challenges are compounded by their potential impacts on some of the few remaining large populations of large mammals. Each type of infrastructure poses different problems requiring different solutions. The following section draws together leading research on different types of linear infrastructure and discusses what is known about their impacts.

### I. GENERAL IMPACTS

All forms of linear infrastructure have the potential to have an impact on large mammal movements. The following are principles that apply to types of linear infrastructure.

### a) Habitat fragmentation

Habitat fragmentation is defined as “the dissection of the Earth’s surface into spatially isolated parts” (Hobbs et al. 2008). It is a major contributor to the decline of biodiversity (Krausse et al. 2010) and a global issue associated with all forms of infrastructure development. There are three distinct types of habitat fragmentation:

- 1) habitat dissection;
- 2) habitat conversion or loss; and
- 3) compression or sedentarization (Hobbs et al. 2008).

Of these, the first (dissection) and third (compression) are the principal concerns associated with linear infrastructure, e.g., transport corridors, fences and pipelines. While all of these result in some level of habitat destruction, the main impact is their barrier effect (Boone and Hobbs 2004, Foreman and Alexander 2008). The consequences for species under these conditions are multiple. With dissection and compression come crowding and increased competition when animals are forced to remain on smaller remnant patches of habitat. An even greater threat to their survival is the sudden inability to access new pasture or avoid seasonal environmental threats such as drought or adverse winter weather. These habitat fragments are rarely representative of the original landscape and thus do not support the same size population. Isolation of large populations into smaller, isolated populations can alter both demographic and genetic factors, increasing the likelihood of extinction due to local stochastic or deterministic events (Rosenzweig 1995, Harrison and Hastings 1996).

### b) Partial barriers are still barriers

Even though linear infrastructure does not always create a complete barrier, it can nonetheless be enough to affect the continuing viability of a population negatively. Semi-permeable barriers have been shown to cause wildlife to change, delay or lengthen routes and otherwise to make migratory movement harder (Olson 2013). Wildlife can also be affected by additional disturbances associated with the infrastructure. The presence of people and vehicles on or near roads, for example, can cause animals to avoid their vicinity altogether or significantly delay or impede movements (Sawyer et al. 2013). This reduces the time animals have to rest, as well as affects foraging when they are near the intrusion. All of these stresses can add to the environmental challenges that drive animal migration in the first place (e.g. the need to access suitable habitat), in turn weakening them and leading to mortality. Animals that are unable to cross these barriers face the challenges of finding adequate food and shelter and suffer a reduction in fitness caused by being forced to remain in less than optimal conditions.

### c) Altering natural processes

Linear structures built across an otherwise undisturbed and connected landscape have an effect on natural processes that in turn have an impact on wildlife. Among these are influences on hydrological regimes, the introduction of invasive species, and the altering of natural fire processes. Transportation corridors of necessity create a hard surface capable of handling vehicular traffic. This new surface does not absorb precipitation and as a result alters runoff processes the entire length of the intrusion. These same corridors also act as conduits for invasive species (IFC PS6). Finally, roads and rail lines can have two types of impact relative to natural fire regimes – acting as an additional ignition source and thereby introducing more fire into a landscape, or creating a firebreak that prematurely stops the spread of natural fires. In either case, the altered fire regime can have an impact on a steppe grassland ecosystem, eventually resulting in changes to vegetation composition, which can then affect grazing ungulates.

### d) Indirect and cumulative impacts

For some forms of linear infrastructure there is the potential for various significant indirect impacts. This includes an increase in human population (e.g., new or growing settlements along new roads) that can increase disturbance and alter habitat, and poaching as transportation corridors increase ease of access (Wingard and Zahler 2006). Developers also need to be aware that there are cumulative effects that can occur from multiple forms of linear infrastructure that can greatly increase the overall impacts on migratory species. These cumulative impacts need to be taken into account at a regional level, as multiple individual projects may each have their own separate infrastructure concerns with no project-level considerations about the cumulative effects of the different forms of development.

## II. ROADS

Of all the linear infrastructure types, roads are among the more common and most problematic for large ungulates. Unlike all of the other types mentioned, transportation corridors are alive with the movement of vehicles and people. Even if they can be crossed by wildlife (i.e. there is no physical barrier preventing their movement such as a fence or a wide ditch), with enough traffic roads can nonetheless become literal barriers in addition to posing a constant threat of mortality.

**Barrier Effects** – This is a problem even in areas where wildlife has already habituated to traffic over many decades. Studies in North America have shown that traffic volumes of > 2,000 vehicles/day can have a barrier effect on wildlife (Sawyer and Rudd 2005, Clevenger and Huijser 2011), becoming “strong to complete barriers” at volumes of >4,000 vehicles/day (Mueller and Berthoud 1997). A “functional” barrier to wild ungulates (meaning, some individuals cross but not enough to prevent loss of functional ecological and genetic connectivity), is likely to be reached at much lower traffic volumes for species in Central Asia, where wild animals have a

much clearer view of long stretches of road and are very wary of vehicles due to hunting pressure and harassment (Huisjer et al., 2013).

The collection of studies gathered by Huisjer et al. (2013) in a report on wildlife mitigation requirements for the Oyu Tolgoi mining road point to strong road avoidance behavior for several species in the region. For example, density levels for Tibetan antelope, Tibetan gazelle and kiang are markedly lower within 500 m of the Qinghai-Lhasa highway when compared to densities 1,000-3,000 metres from the road (Yin et al. 2007). Documented avoidance distances for other species of concern are similarly high (wild yak - 999 metres  $\pm$  304 metres; kiang - 568 metres  $\pm$  83 metres; Tibetan antelope - 286 metres  $\pm$  27 metres; and Tibetan gazelle - 177 metres  $\pm$  14 metres) (Lian et al, 2012). Kaczensky (2011a) has estimated a serious barrier effect for khulan at traffic volumes as low as 400 vehicles/day and a complete ecological barrier at 1,000 vehicles/day.<sup>5</sup> To overcome strong avoidance behaviour, Huisjer et al. (2013) emphasize the need to minimize visual and other human disturbances near crossing opportunities, ranging from 200-300 metres for gazelle species to as much as 500-600 metres for khulan.

**Wildlife Strikes** – Direct mortality to wildlife caused by being struck by a moving vehicle is a common occurrence. In the United States, there are a reported 300,000 wildlife vehicle collisions (WVCs) just with deer every year. Accounting for gaps in reporting, unofficial estimates put this figure at 1 million-2 million per annum (Huisjer et al. 2007). In a study focused on collisions with deer, several factors were found to play a role in the likelihood of WVCs, including:

- Time of day – WVCs can be more frequent when animals are active and traffic volume is relatively high.
- Season – WVCs occur more frequently in spring and especially in autumn, when animals move around more due to migration or mating.
- Vehicle speed – WVCs can be affected both by high speeds and by speed dispersion. High speeds make it more difficult for drivers to avoid impacts by breaking or swerving out of the way. Speed dispersion refers to situations where some vehicles are traveling at a slower posted limit, while others travel at higher operating speeds. This ‘dispersion’ of vehicle speed has been shown to increase WVCs as well (Huisjer 2007)

**Fences** – Fences are also part of major road construction, which adds another barrier element. The impacts of fences when not connected to other infrastructure, such as a border fence or livestock fence, are discussed in a separate section on fencing. In combination with roads, fences have the added impact of restricting animal movement into and across the transportation corridor, as noted by Olson in connection with rail lines (Olson 2011). Not only does the fence slow or prevent adequate movement, once inside a fenced corridor animals can be surprised by an approaching vehicle and injured or entangled in the fencing when panicked.

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<sup>5</sup> The figure of 400 is based on fleeing distances of c. 1 km and a need for a break in traffic of 15 minutes for an animal to feel comfortable crossing. This equates to an average of 96 vehicles/day if evenly spaced. Assuming vehicles are not evenly spaced (i.e. bunched), perhaps four times as many cars could still leave similar gaps in traffic; i.e. 400. These are of course very rough approximations, and based on continued hunting (and thus car avoidance). They do, nonetheless, provide some level of assessment tailored to the situation in the area.

**Poaching** – A significant issue with roads is the opening of previously difficult-to-access areas to poachers. Many of the species under consideration in these guidelines are highly attractive to poachers, be it for fur (e.g. snow leopard, Tibetan antelope), meat (e.g. Mongolian gazelle), the traditional medicinal market (e.g. saiga), or sport (e.g. argali). Numerous studies have proven a direct link between the building of roads and increases in poaching, and this can have significant impacts on local and global populations.

### III. RAIL LINES

Single rail lines typically do not present the same level of disturbance represented by roads, but high levels of traffic, embankments, multiple tracks, the frequent use of fencing and other disturbances can lead to similarly high impacts.

**Barrier Effects** – As described by Olson (2011), an unfenced rail line has at least three barrier components 1) the embankment constructed as the rail bed, 2) the tracks, and 3) the traffic volume. Each of these represents a separate barrier effect that can prove difficult, even impossible, for some species. Rail line embankments are the first barrier and can either be too high to climb, constructed of material (e.g. loose gravel or large stones) unsuited to some species, or simply discourage crossing because of their visual effect to species used to long lines of sight. Even if the embankment is passable, the rails can represent a potential deterrent to larger mammals unused to crossing ‘broken ground.’



Railway berms can be a significant barrier to migratory steppe ungulates unused to steep inclines. ©K. Olson

However, for most large mammals a single, unfenced rail line with low traffic volumes and no other disturbances “is a crossable feature and habitat connectivity for large bodied mammals

### Case Study 1. Mongolian gazelle

On the Mongolian steppe is Asia’s and one of the world’s last great migratory wonders, the Mongolian gazelle (*Procapra gutturosa*), still estimated to number over a million animals. Mongolian gazelles move across the landscape in search of good forage while avoiding insect pests in summer and deep snows and ice in the cold Mongolian winter (Olson et al. 2006). Many of these movements are over significant distances; Mongolian gazelle movements may exceed 1,000 km, and the ability to move unimpeded across this landscape is considered a key aspect for the survival of the species.

In the 1950s the Beijing-Ulaanbaatar railroad was built with a parallel barbed-wire fence. This became a significant barrier to gazelle movements in their efforts to reach seasonal pastures in that region. This resulted in a significant bifurcation of the population, with the vast majority (over a million) of gazelle being found on the east of the railroad, with only about 25,000 found to the west.

Ito et al. (2013) tracked 24 Mongolian gazelles and 12 wild asses (*Equus hemionus*) near the Ulaanbaatar–Beijing Railroad and the fenced international border between Mongolia and China between 2002 and 2012. None of the tracked gazelles crossed the railroad, even though gazelles were captured on both sides of the tracks at the start of the study. A total of 241 gazelle carcasses were found trapped in the fences in one year (Ito et al. 2008). However, two gazelles crossed another railroad with a lower traffic level and incomplete fencing to the north of the main railroad, suggesting that railroads themselves were not acting as complete barriers – rather, it was some combination of the fencing and amount of traffic on the main route that was the issue.

should remain relatively high” (Olson et al. 2010). In a study of moose (*Alces alces*) and roe deer (*Capreolus capreolus*) movements across a railroad in Sweden, there was little evidence of a barrier effect across a single-track railroad. For this type of construction, the more frequently reported problem is collisions and the impact this can have on a local population (Olson 2011 citing Wells et al. 1999, Van Der Grift 2001).

As with roads, a significant barrier effect even for large mammals begins with increasing widths and higher traffic volumes. One study has shown that single-track corridors with traffic volumes of 100 trains per day begin to reduce the willingness of wildlife to cross (Hart et al. 2008). Double-tracked rail corridors can support up to four times this volume and have an even greater impact the willingness and ability of some species to cross (Amos 2009). The same study in Sweden that showed little effect on moose and roe deer from single-track lines did show an impact caused by double-tracked railroads with higher traffic volumes (Olson et al. 2010).

Fenced rail lines add a fourth barrier element, the fence itself, which has both stand-alone and cumulative effects. The

stand-alone effects are those that occur whether or not the fence is next to a rail line. These types of impacts are discussed in the section on fencing that follows. In combination with rail lines, fences have the added impact of restricting animal movement into and across the rail corridor (Olson 2011). As well, once inside a fenced corridor animals can be surprised by an approaching train and injured or entangled in the fencing when panicked.

**Wildlife strikes** – Whether fenced or unfenced, wildlife is more vulnerable to train strikes in regions that experience deep snows (Wells et al. 1999). The corridor is kept clear to facilitate year-round use, making them an attractive and convenient pathway. Similar to the effect of fencing, once inside the snow-cleared corridor, wildlife can become unwilling or unable to jump to the side into deep snow to avoid an oncoming train (Rea et al. 2010).

Collisions with wildlife can also be a factor on tracks frequented by trains carrying grain. Faulty discharge gates can result in spills leaving food in the centre of the track that becomes an attraction to wildlife (Wells et al. 1999, Pissot 2007, Dorsey 2011). Research has not uncovered reports of this outside North America, but there is the potential for this problem in Central Asian countries that transport harvested grain by rail, as is done in Kazakhstan (Olson 2011).

Other factors that can contribute to wildlife strikes are the speed of the train and the straightness of the track. Curves in the track slow trains down and thus offer wildlife more opportunities to escape (Rea et al. 2010), but may also result in trains surprising wildlife when the train comes around a curve.

**Poaching** – although little if any poaching can be directly attributed to railroads in Central Asia, it should be noted that ancillary road development, such as for maintenance roads that can run the length of a rail line, can create access routes for poachers. Given that railroads often cause migratory animals to pause or stop for significant periods, this can create an especially easy opportunity to locate and harvest animals.

#### IV. FENCING

Fencing is a very serious problem for migratory mammals. Even fences that are not large enough to be absolute barriers can still be a partial barrier, bringing with them physical stresses and behavioural changes that threaten survival. The impacts of fencing can be so severe that they have been linked to mass mortality during periods of drought and population reductions that occur over time due to lower fecundity and reduced life expectancy (Ben-Shahar 1993, Boone and Hobbs 2004, Newmark 2008).

**Barrier Effects** – For open steppe ungulates, fences are an especially challenging intrusion. Even though many of these species are capable of jumping over low fences, they prefer to walk through or under to the other side. In a landscape otherwise devoid of obstacles, fences act like a dry-land version of a gill net, trapping and injuring animals and subjecting them to

### Case Study 2. Przewalski's gazelle

The Przewalski's gazelle (*Procapra przewalskii*) is endemic to China where it is critically endangered. Once the species occurred in parts of Inner Mongolia and Gansu, but it survives now only in a few small scattered populations in Qinghai, mostly near the shores of Qinghai Lake, with a total population of less than a thousand individuals.

The high density of fences in this region negatively affects gazelle movement and has been correlated with higher calf mortality (You et al. 2013). There are other negative consequences of fencing, including that much of the rangeland is considered overgrazed and degraded due to the increasing number of livestock, especially sheep. Gazelles do not have access to rangeland that is not already impacted by livestock, and this has an effect on their food supply and subsequent survival. Wolves also kill gazelles, and this appears to occur frequently in fenced pastures from which they cannot escape.

Gazelles can jump over fences up to 100 cm high, crawl through gaps underneath, and sometimes wriggle through the mesh. Such fences can be especially dangerous if they have barbed wire as part of the structure. Pregnant, old or young animals may not be able to jump well and become entangled, or they are unable to leap high enough when chased by a wolves or domestic dogs.

Not surprisingly, gazelles are most abundant in areas—Tianjun Shengge, Haergai River, Hudong—where pastures are large and fences few, and least abundant in places with small, fenced pastures (Schaller et al. 2006). Many conservationists believe that unless an effort is made to address and alleviate these problems, the continued survival of the Przewalski's gazelle is in severe jeopardy.

forms of predation they might otherwise escape. This has been shown in Central Asia and elsewhere including with the pronghorn antelope (*Antilocapra americana*) found in the western United States and Canada, the Przewalski's gazelle in China, the khulan in Mongolia, and the saiga across its Range States (Olson 2013).

Beyond habitat fragmentation and the effects of partial barriers, additional impacts associated with fencing include the following.

**Entanglement Mortality** – Entanglement occurs when an animal fails to clear the top wire or attempts to manoeuvre between strands. The chances for entanglement increase with fences using barbed wire or that are in disrepair and have loose, sagging wires and leaning posts. Animals unable to extract themselves suffer fatality as a frequent consequence, with newborns and yearlings being especially vulnerable (Harrington and Conover 2006).

**Injuries** – In addition to fatiguing animals, the act of crossing can result in wounds from which the animal may not recover. This includes broken or damaged limbs and open wounds that can lead to infection, all of which can lower the likelihood of survival for animals for which movement is a necessity due to the droughts and long, hard winters that are part of the Central Asian region (Olson 2011).

**Poaching and Predation** – For both humans and wildlife predators, fences become another tool to use in the hunt. Domestic dogs, coyotes (*Canis latrans*), wolves and human hunters have all been shown to use fences to funnel and even entrap wildlife (Fox et al. 2009, Schaller et al. 2006).

## V. OIL AND GAS PIPELINES

Impacts to migratory mammals caused by oil and gas pipelines can be among the least severe of the infrastructure types discussed. This is due largely to the limited levels of additional human disturbances (little traffic or additional installations). The most significant disturbances occur during the construction phase, and because pipelines can be buried it is possible to avoid a barrier effect. After burying and once re-vegetation occurs, at least one study has shown little impact to the continuing migration of caribou (*Rangifer tarandus*) in North America.

**Barrier Effects** – Pipelines are not buried across their entire length and there is evidence that, where not buried, deflections of wildlife will result causing at least a partial barrier effect. It is not known how severe avoidance would be in the Central Asian context as the issue has not yet



Pipelines can be significant barriers to large mammal movements. However, placement of pipelines underground can often solve this problem.  
©WCS/K.Murphy

been studied there. Outside of caribou (see Case Study 3), deflection has been seen in movement by moose (*Alces alces*) in relation to pipelines in North America (Webster 1997).

### Case Study 3. Caribou

Very few studies have looked at large mammal movements in relation to oil pipelines. The exception is for the caribou (*Rangifer tarandus*) in the Alaskan region of the United States. Although the caribou is not a species under consideration for this Guideline, there are useful lessons to be learned from research on this migratory ungulate and its responses to pipelines.

Research on Alaskan caribou and pipelines has occurred since at least the 1970s. Smith and Cameron (1985) found that herds of caribou were badly affected by oil pipelines. For one large herd of almost a thousand animals, only 59 per cent managed to cross one pipeline, while only 63 per cent of another large herd managed to cross another one. Many of those that crossed made repeated attempts before being successful (up to 36 attempts). Most crossings occurred at specific points of egress – buried portions of pipeline or elevated sections – with by far the greatest success occurring at a buried pipe section. Cameron et al. (1992) also found that distribution of calving caribou was negatively affected by an oil field road constructed through the calving grounds. Calving success was also negatively correlated with breeding success in female caribou near oil fields, which was believed to be attributed to decreased foraging due to disturbance (Cameron et al. 2005).

It is clear from these studies that ‘normal’ pipelines and oil field disturbances can strongly affect caribou in both movements and breeding. However, it is also clear that pipeline burial or elevation helped in crossing. Pipeline burial whenever possible appears to be the best solution to avoid impeding migratory ungulate movements.

**Trap Mortality** – the potential for pipelines to cause direct mortality to migrating species has been associated with the time that trenches created during the burying process are left open. Given their depth, trenches act as complete barrier and can result in high rates of mortality of wildlife. However, pipelines can act as an indirect cause of mortality if they impede or stop animal movements that are critical to finding new food sources, reach breeding grounds, or avoid droughts or deep snows.

**Wildlife Strikes** – Typically there is little traffic associated with a constructed pipeline, as they are usually located in remote areas. Adjacent roads often see only maintenance traffic once the project has been completed. In the construction phase, however, wildlife strikes have been associated with the higher volumes of traffic during those times (Webster 1997).

## VI. SUMMARY OF POTENTIAL IMPACTS

The previous sections show how each type of linear infrastructure has some shared, but also some differing types and degrees of, potential impact to wildlife. The following table summarizes this information by listing impact types and then rating the relationship to each infrastructure type as either high, medium, low or not applicable. For example, ‘wildlife strikes’ is a type of impact associated with roads, rail lines, and pipelines, but not with fencing. For each of the first three, wildlife strikes are a concern, but the level of impact is not necessarily equal. The table is intended to help orient policy makers and project developers to these likely impacts without attempting to represent empirical evidence of the degree of impact. The relationship between a given species and a particular infrastructure in a particular location is a complex

subject that should be studied carefully and with caution as part of regional and project-level planning processes aimed at mitigating impacts.

Table 1: Potential Impacts to Wildlife by Type of Linear Infrastructure

Potential Impact	Roads	Rail Lines	Pipelines	Fencing <sup>6</sup>
Wildlife strikes	High	Medium	Low	Not applicable
Entanglement/trap mortality	Not applicable	Not applicable	Low	High
Habitat fragmentation	High	High	Low	High
Altering behaviour	High	High	Low	High
Barrier to movement	High	High	Low	High
Altering use of habitat	High	High	Low	High
Increased human presence	High	Medium	Medium	Not applicable
Increased hunting	High	Low	Low	Not applicable
Conduits for invasive alien species	High	High	Low	Not applicable
Effects on population genetics	High	High	Low	High
Air pollution	High	Low	Not applicable	Not applicable
Altering natural processes	Low	Low	Low	High
Changed discharges in water bodies	High	High	Medium	Not applicable

Relationship rating: high - ■ medium - ■ low - ■ not applicable – ■

<sup>6</sup> Fences have impacts independent from other linear infrastructure and are rated separately. Roads, rail lines or pipelines constructed with an adjacent fence should be considered as having the combined potential impacts listed for both infrastructure types.

# Legal Frameworks

This section provides orientation to international and national legal frameworks relevant to linear infrastructure development. It is not an exhaustive review, but nonetheless outlines many general policy requirements, as well those that are specifically directed at linear infrastructure. A surprising number of international agreements, national laws and regulations contain relevant mandates and there are certainly more than the ones listed here. However, as this review makes apparent, much remains to be done at the national level to ensure that these frameworks can adequately respond to the needs of migratory species through clearer and more comprehensive statements that integrate an understanding of the biology and ecology of species and how they can be affected by various types of linear infrastructure.

This review is divided into three parts – international agreements, national laws, and lender requirements. The first two, international agreements and national laws, are further divided into two sub-categories – ‘primary’ and ‘related’ – in Annexes starting on page 70. This distinction is for convenience to create a focus on particular assessment and development standards that are specific to linear infrastructure.

Primary agreements and laws are therefore those that expressly regulate linear infrastructure development either by requiring an impact assessment of some kind or providing relevant construction standards. This set may not have the greatest number of documents, but by virtue of its content it invariably contains the bulk of the legal framework governing linear infrastructure.

Related agreements and laws contain provisions that are applicable, but whose primary purpose is the regulation of some other resource or activity. Perhaps counter-intuitive to some, this means that the Convention on Migratory Species (CMS), its Resolution 7.2, and related CMS MOUs are not part of the ‘primary’ set. While CMS and Resolution 7.2 call for assessments to migratory species through both strategic and project-based processes, the majority focus is overarching wildlife conservation, and not linear infrastructure itself. Similarly, a protected area

or wildlife conservation law at the national level will come under the heading 'Related' because of its conservation orientation and lack of standards directed at linear infrastructure.

Being in one or the other category is not intended to imply any difference in the applicability or enforceability of a particular mandate, or its importance in the overall management scheme. A single provision in a related law may indeed prove to be the most important for a given species or linear infrastructure development. Nor is it intended to suggest that because one type of law (e.g., an endangered species law) is considered 'Related' for one country, that it must be in this category for all other countries. The distinction is entirely content-dependent.

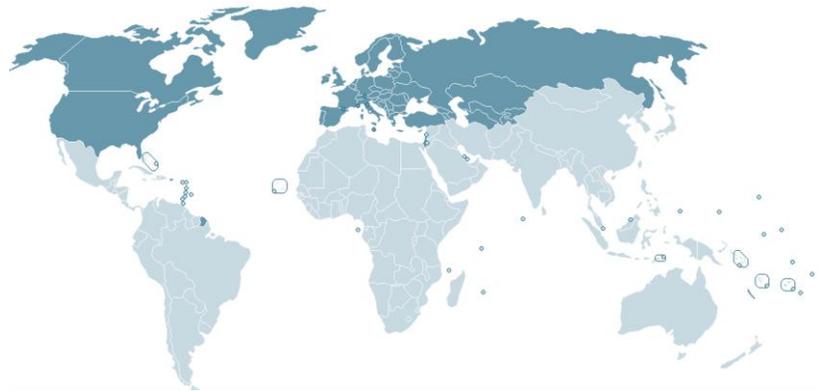


Saiga antelope make long-distance southern migrations to avoid harsh winter weather and return to the north in the spring to find good forage and calving grounds. ©WCS/B. Buuveibaatar

## A. Introduction to Legal Frameworks

At the international level, the United Nations Economic Commission for Europe (UNECE) is the custodian of more than 50 agreements with potential relevance to linear infrastructure development. Several Central Asian countries are members of the UNECE,<sup>7</sup> while others can be ‘contracting parties’ to certain of these agreements. Among the most relevant UNECE agreements are the Espoo Convention on Environmental Impact Assessments in a Transboundary Context (Espoo Convention) and the Protocol to Strategic Environmental Impact Assessments (Kiev Protocol). In addition to these are another 49 agreements specific to the construction and use of roads and rail lines.<sup>8</sup> However of these, only two mention the need to assess environmental impacts and none provides any specific guidance for impact assessments or

Figure 2: Map of UNECE Member Countries



Source: <http://www.unece.org/oes/nutshell/ecemap.html>

construction standards in response to the needs of wildlife, migratory or otherwise. To date, only two Central Asian countries<sup>9</sup> have signed the Espoo Convention, no country has signed the Kiev Protocol, and only two have signed the relevant transportation agreements.

STRATEGIC ENVIRONMENTAL ASSESSMENT (SEA)	laws/regulations
	public policies
	public plans
	public programs
ENVIRONMENTAL IMPACT ASSESSMENT (EIA)	public and private investment projects

At the national level, environmental impact assessments are the most common legally mandated tool for reviewing projects and identifying mitigation measures. There are two distinct types – strategic environmental assessments (SEA), which require the review of ‘strategic’ processes such as policies, plans and programmes; and environmental impact assessments (EIAs), which require the review of individual projects. Building the consideration of the impact of migratory species into both the SEA and EIA processes is urgent. Even though SEAs operate at a landscape scale, making sure that these are tightly coupled with appropriate EIA processes and standards will ensure that planning decisions are effectively implemented at the project level. A

<sup>7</sup> Central Asian UNECE members include Uzbekistan (1993), Turkmenistan (1993), Kyrgyzstan (1993), Kazakhstan (1994) and Tajikistan (1994).

<sup>8</sup> Available at <http://www.unece.org/trans/conventn/legalinst.html>

<sup>9</sup> Uzbekistan and Kazakhstan.

recent review shows that SEA legislation has been integrated at least partially into all of the countries reviewed for these guidelines. In some instances, SEA provisions are limited in scope to covering just ‘plans’ or potentially only regulations, but not major legislation. Of those, there is little consistency in the language used and no certainty that linear infrastructure is in fact included. Where one country requires a review of ‘industrial development plans,’<sup>10</sup> another refers to ‘industry’ and ‘urban planning.’<sup>11</sup> Moreover, for most governments, SEAs are given less importance than project-level EIAs, which are financed generally by the project developer. In fact, the application of SEA outside OECD countries is currently limited.<sup>12</sup>

NOTE on importance of United Nations Economic Commission for Europe (UNECE) in this review.

The UNECE is the custodian of numerous agreements that are either generally or specifically applicable to linear infrastructure. Among the most important are the Espoo Convention on Environmental Impact Assessments in a Transboundary Context (Espoo Convention), and the Protocol to Strategic Environmental Impact Assessments (Kiev Protocol). UNECE is also the custodian of 58 legal instruments related to transport (transport conventions), 49 of which are in force.

Five Central Asian countries are members of the UNECE and therefore within the geographic coverage of its treaties and conventions. Non-ECE member States are also Contracting Parties to 29 transport conventions, meaning that roughly 60 per cent of the UNECE transport conventions have a geographical coverage beyond the UNECE territory.

For the most part, national laws are focused on assessing project-level impacts. However, ‘linear infrastructure’ per se is not explicitly referenced by any of them. The almost uniform practice is to provide a static list of project categories for which an impact assessment is required. Among these are types of linear infrastructure – but not necessarily all and with inconsistent requirements from one country to another. Most EIA requirements do not take into account broader landscape-level impacts, and do not effectively address indirect impacts. While impacts to wildlife are part of a typical assessment process, the special needs and concerns of migratory species are being assessed in a piecemeal fashion, if at all.

## B. International Agreements and Standards

This review identified four primary and six related international agreements relevant to the linear infrastructure types covered in these guidelines and the Central Asian region. Of the

<sup>10</sup> Kyrgyzstan

<sup>11</sup> Kazakhstan

<sup>12</sup> Business and Biodiversity Offsets Programme (BBOP). 2009. The Relationship between Biodiversity Offsets and Impact Assessment: A BBOP Resource Paper. BBOP, Washington, D.C.

primary agreements, two are concerned with transboundary and strategic environmental impact assessment practices with express application to linear infrastructure development. The remaining two agreements establish the international legal framework for inland transportation (road and rail), as well as inland waterways. The related treaties are for the most part directed at environmental and wildlife conservation efforts, with four focused on migratory species in particular. In some instances, these treaties help make the link between migratory species (or biodiversity as a whole) and the need for adequate assessments by providing much needed baseline data or stipulating additional assessment requirements.

The following table provides a quick reference to the application and signatory status for each of the agreements reviewed. Application status refers to whether a given country is eligible to join a given agreement, many of which are limited in geographical scope and therefore not ‘applicable’ to one or more of the countries considered in these guidelines. Signatory status refers to whether an eligible country has in fact signed the agreement.

The table uses three colours as follows: Green indicates ‘signatories.’ This is a general reference to indicate countries that have, through whatever process, agreed to be bound by the terms of the agreement.<sup>13</sup> Red is for non-signatories. These are countries who are within the geographical coverage of the treaty, but which have not yet signed. Blue is used when a country is not within a treaty’s geographical coverage and therefore not eligible to join.

For all of the primary agreements listed, China and Mongolia are not eligible. Among the remaining six Central Asian countries, only Kazakhstan and Russia have signed the majority of them (three of four). Kyrgyzstan has signed one. The others have yet to sign any. While these agreements are not the only ones to address assessment practices that can apply to linear infrastructure, they are nonetheless key instruments with directly applicable standards and processes. The application gap leaves almost all of the large mammals identified in these guidelines outside the scope of these agreements for at least part of their range.

The selected ‘related international agreements’ have substantially more acceptance among the Central Asian nations. All of them, for example, have signed the Convention on Biological Diversity, which makes conservation-oriented planning and development part of their international obligations. Although not all have formally signed the Convention on Migratory Species (five of eight), two of the non-signatories (Turkmenistan and the Russian Federation) have signed related MOUs for migratory large mammal species that occur within their territory and are therefore voluntarily participating in efforts to better manage the resource. China is the only exception in this regard (although it is noted that China is signatory to the Siberian Crane MOU).

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<sup>13</sup> Treaties and conventions use different terms and processes to determine which countries have formally agreed to their terms. The term ‘signatories’ is intended as a simplified reference for use with all of the international agreements listed in this document.

Table 2: Primary and Related International Agreements

Agreement Name		Signatory Status							
		Kazakhstan	Kyrgyzstan	Tajikistan	Turkmenistan	Uzbekistan	Mongolia	China	Russia
<b>Primary Agreements</b>									
1	Convention on Environmental Impact Assessments in a Transboundary Context (Espoo Convention)	Signatory	Signatory	Non-signatory	Non-signatory	Non-signatory	Not eligible	Not eligible	Not eligible
2	Protocol to Strategic Environmental Impact Assessments (Kiev Protocol)	Non-signatory	Non-signatory	Non-signatory	Non-signatory	Non-signatory	Not eligible	Not eligible	Non-signatory
3	European Agreement on Important International Combined Transport Lines and Related Installations	Signatory	Non-signatory	Non-signatory	Non-signatory	Non-signatory	Not eligible	Not eligible	Signatory
4	European Agreement on Main International Traffic Arteries	Signatory	Non-signatory	Non-signatory	Non-signatory	Non-signatory	Not eligible	Not eligible	Signatory
<b>Related Agreements</b>									
1	Convention on Migratory Species (Bonn Convention)	Signatory	Signatory	Signatory	Non-signatory	Signatory	Signatory	Non-signatory	Non-signatory
2	CMS Resolution 7.2 on Impact Assessments and Migratory Species	Signatory	Signatory	Signatory	Non-signatory	Signatory	Signatory	Non-signatory	Non-signatory
3	CMS Memorandum of Understanding concerning Conservation and Restoration of the Bukhara Deer	Signatory	Not eligible	Signatory	Signatory	Signatory	Not eligible	Not eligible	Not eligible
4	CMS Memorandum of Understanding (MOU) concerning Conservation, Restoration and Sustainable Use of the Saiga Antelope	Signatory	Not eligible	Not eligible	Signatory	Signatory	Signatory	Not eligible	Signatory
5	Convention on Biological Diversity	Signatory	Signatory	Signatory	Signatory	Signatory	Signatory	Signatory	Signatory
6	Amsterdam Declaration	Signatory	Non-signatory	Signatory	Non-signatory	Signatory	Non-signatory	Non-signatory	Signatory

**Legend:**    signatory    ■    non-signatory    ■    not eligible    ■

## C. National Legislation

The fact that many of the international agreements referred to in the previous section either have not been signed or do not apply to some Central Asian countries places even more importance on the adequacy of national laws. This section examines two principal types of law particularly important to assessing the impacts of linear infrastructure on migratory species: Strategic Environmental Assessments (SEAs) and Environmental Impact Assessments (EIAs). Both instruments are concerned with the same thing – examining potential impacts caused by proposed actions and providing enough data and analysis to support sound decision-making. However, they are focused on different parts of the decision-making process – one on early legal drafting, planning, and programme development stages; the other on specific projects. They are equally important, but for different reasons.

The second instrument mentioned – EIAs – was actually the first policy concept to be developed and then adopted around the world. Each country uses a different format, but they all prescribe processes and standards for evaluating the potential impacts (both adverse and beneficial) of a particular project or development. In some countries, this means a special focus only on environmental impacts, as the name suggests, but most have expanded this to include a review of impacts to human health, local livelihoods and economies, culture and more. As conceived and implemented, EIAs are generally regarded as a valuable management tool, which have the ability to affect decision-making positively.

SEAs came later and were created to correct a major flaw in the EIA process. The flaw was timing, in that an EIA is completed too late in the overall decision-making process to be fully effective. By the time a project is proposed, a variety of decisions have typically already been made, making it sometimes impossible or too costly to design alternatives or build in appropriate avoidance and mitigation measures. Land use zoning decisions, for example, establishing a transportation corridor will be made long before a road-building project is actually proposed. By then, the opportunity to recommend alternate routes that might avoid crossing critical habitat for a migratory species will have passed, substantially reducing the effectiveness of the later EIA process. SEAs operate at the level of planning, programmes, and policy to ensure that these early opportunities to measure impacts and make adjustments are not lost. In this sense, SEAs are forward-looking assessments and therefore are often described as ‘sustainability driven’ instruments, while their counterpart – EIAs – are ‘reactive’ in nature.

In addition, SEAs are focused at what occurs at a landscape or regional level and will look at the impacts across different areas. Project-level EIAs often do a poor job at assessing landscape-level impacts, especially indirect and cumulative impacts, and therefore an SEA-type assessment is necessary to address impacts to migratory species.

Components of SEA legislation for the first of the two major areas are described by Lovei – impact-centred SEAs (see I. Strategic Environmental Assessments, p. 82 for a discussion). As the table shows, the integration of strategic assessments into national legislation in Central Asia has

been widely adopted at least for planning and programmes, with China and the Russian Federation being exceptions. China’s SEA provisions are limited only to the assessment of ‘plans.’<sup>14</sup> Programmes and policies are not mentioned in any form. The Russian Federation has not yet incorporated SEA-type provisions into its impact assessment frameworks. Four for the eight countries reviewed have explicit references to all three categories – Kazakhstan, Kyrgyzstan, Tajikistan and Mongolia. However, the language used in Turkmenistan’s and Uzbekistan’s laws raise questions about their applicability to more than minor policies. Both laws use similar language requiring the review of ‘technical’ and ‘methodological’ documents that regulate the economy. It is unclear from the language alone whether this would include major legislation and whether the type of legislation would include standards and practices related to linear infrastructure. Kazakhstan’s law, in contrast and as an example of clear legislation, references without limitation “**draft laws and regulations** elaborated by central government agencies” as well as “**draft legal acts of local authorities.**”

Table 3: SEA Components by Country

Component Type		Kazakhstan	Kyrgyzstan	Tajikistan	Turkmenistan	Uzbekistan	Mongolia	China	Russian Fed.
		Impact-Centered							
1	Plans (including feasibility studies, mapping, and zoning)	referenced	referenced	referenced	referenced	referenced	referenced	referenced	not referenced
2	Programmes (referencing development of any type)	referenced	referenced	referenced	referenced	referenced	referenced	referenced	not referenced
3	Policies (including international agreements, laws, regulations, standards and guidelines)	referenced	referenced	referenced	unclear	unclear	referenced	not referenced	not referenced
4	Mentions linear infrastructure (including any specific reference to roads, rail lines, pipelines or fences)	not referenced	not referenced	unclear	not referenced				
5	Mentions natural resources	referenced	referenced	referenced	not referenced	referenced	not referenced	referenced	not referenced
6	Mentions wildlife (using the term fauna, wildlife, animal or other equivalent)	referenced	not referenced	not referenced	not referenced	not referenced	not referenced	not referenced	not referenced

Legend: referenced ■ not referenced ■ unclear ■

All of the countries reviewed have project-level environmental impact assessment legislation. There are, however, few direct references to linear infrastructure, migratory species or transboundary impacts within any of the frameworks. The most common reference among

<sup>14</sup> The Law of the People’s Republic of China On Environmental Impact Assessments, Chapter II, Environmental Impact Assessment on Plans, 2002.

them (five of eight countries) is to wildlife, but only one country (Kazakhstan) explicitly mentions migratory species and further requires consideration of migratory species for the construction of linear infrastructure. Half of the countries require the assessment of transboundary impacts (Kazakhstan, Kyrgyzstan, Tajikistan and the Russian Federation). Only three (Kazakhstan, Kyrgyzstan and Uzbekistan) provide some guidance concerning linear infrastructure with the inclusion of related project types in their static screening lists. However, none identify fencing as a type of linear infrastructure for which an assessment is may be required.

Table 4: EIA Components by Country

Component Type		Kazakhstan	Kyrgyzstan	Tajikistan	Turkmenistan	Uzbekistan	Mongolia	China	Russia
1	Includes transboundary Impacts	referenced	referenced	referenced	not referenced	not referenced	not referenced	not referenced	referenced
2	Mentions roads (referencing any type such as motorways, highways, transportation corridors etc.)	referenced	referenced	not referenced	not referenced	referenced	not referenced	not referenced	not referenced
3	Mentions rail lines (using terms such as railways, railroads, rail corridors, transportation corridors etc.)	referenced	referenced	not referenced	not referenced	referenced	not referenced	not referenced	not referenced
4	Mentions pipelines (in reference to oil, gas and water pipelines)	referenced	referenced	not referenced	not referenced	referenced	not referenced	not referenced	referenced
5	Mentions fences (whether border, livestock or used in connection with transportation corridors)	not referenced							
6	Mentions wildlife (using terms such as wildlife, animal(s) or animal resources, fauna, etc.)	referenced	referenced	not referenced	not referenced	not referenced	referenced	referenced	referenced
7	Mentions migratory species	referenced	not referenced	not referenced	not referenced	not referenced	not referenced	not referenced	not referenced
8	Expressly requires consideration of migratory species during the construction of linear infrastructure.	referenced	not referenced	not referenced	not referenced	not referenced	not referenced	not referenced	not referenced

Legend:   referenced      not referenced      unclear   

## D. Lender Rules and Expectations

The following is a listing of rules and expectations of four major lending institutions that provide funds for major development projects and that operate in the Central Asian region. These are:

- International Finance Corporation (IFC)
- World Bank (WB)
- European Bank for Reconstruction and Development (EBRD)
- Asian Development Bank (ADB)

## I. IFC PERFORMANCE STANDARDS

The **International Finance Corporation (IFC)** is a member of the World Bank Group which offers international investment, advisory and asset management services to encourage the growth of the private sector in developing countries. IFC has developed a sustainability framework that articulates the organization's strategic commitment to sustainable development and defines its approach to risk management. Performance standards form a key component of that framework.

The IFC Performance Standards are directed towards clients, providing guidance on how to identify risks and impacts, and are designed to help avoid, mitigate and manage risks and impacts as a way of doing business in a sustainable way, including stakeholder engagement and disclosure of the obligations of the client in relation to project-level activities. Together, the eight Performance Standards establish criteria that the client must meet throughout the life of an investment by IFC. IFC revised its Performance Standards in early 2012, including significant changes to its biodiversity standards. Later that year the Equator Principles Association, whose members include 80 financial institutions, adopted the IFC Performance Standards. Equator Principle Financial Institutions apply the Performance Standards as part of their internal environmental and social review and due diligences processes.

Performance Standard 1 (PS1) – *Assessment and Management of Environmental and Social Risks and Impacts*, and Performance Standard 6 (PS6) – *Biodiversity Conservation and Sustainable Management of Living Natural Resources*, are the most relevant to addressing impacts on migratory species.

Performance Standard 1 creates the framework for the management of environmental and social risk. Under PS1, the client is required to develop an Environmental and Social Assessment and Management System and develop appropriate plans and actions to identify and address direct, indirect and cumulative impacts. PS1 includes the adoption of a mitigation hierarchy where avoidance of impacts is favoured. Where impacts cannot be avoided, the client agrees to explore other mitigation measures including minimization of impacts, and then the compensation for any residual impacts, ensuring that that the actions taken are in compliance with the applicable laws and regulations and with the requirements of the other performance standards.

Performance Standard 6 specifically addresses biodiversity conservation and sustainable management of living natural resources. It recognizes that protecting and conserving biodiversity and maintaining ecosystem services are fundamental to sustainable development, and its requirements are guided by the Convention on Biological Diversity and the Convention

on the Conservation of Migratory Species, among others. It further requires adherence to the mitigation hierarchy, but specifically adds that to meet the objective of protecting and conserving biodiversity the mitigation hierarchy includes biodiversity offsets, which may be considered only after appropriate avoidance, minimization and restoration measures have been applied. A biodiversity offset should be designed and implemented to achieve measurable conservation outcomes that can reasonably be expected to result in no net loss and preferably a net gain of biodiversity; however, a net gain is required in critical habitats. PS6 defines natural habitat and critical habitats (see below) and requires no net loss where feasible when impacts affect natural habitat, and a net gain where the impacts affect critical habitat.

IFC defines critical habitat in the following way: *Critical habitats are areas with high biodiversity value, including (i) habitat of significant importance to Critically Endangered and/or Endangered species; (ii) habitat of significant importance to endemic and/or restricted-range species; (iii) **habitat supporting globally significant concentrations of migratory species and/or congregatory species**; (iv) highly threatened and/or unique ecosystems; and/or (v) areas associated with key evolutionary processes.* Projects that affect critical habitat would not be approved unless: there was no viable alternative; the project did not cause measurable impacts on the biodiversity values for which the critical habitat was designated; and the project did not lead to a net reduction in the global and/or national/regional populations of any critically endangered or endangered species over a reasonable period of time. Where clients can meet the criteria, the mitigation actions need to be described in a Biodiversity Action Plan.

For migratory species, PS6 establishes criteria to determine whether the project falls into Tier 1 or Tier 2 critical habitat. Both tiers would qualify as critical but IFC indicates that the likelihood of a project investment in a Tier 1 habitat is substantially lower than in Tier 2 given the greater sensitivity.

For migratory and congregatory species, IFC defines Tier 1 habitat as habitat known to sustain, on a cyclical or otherwise regular basis,  $\geq 95$  per cent of the global population of a migratory or congregatory species at any point of the species' life-cycle where that habitat could be considered a discrete management unit for that species. Tier 2 habitat is known to sustain on a cyclical or otherwise regular basis  $\geq 1$  per cent but  $< 95$  per cent of the global population of a migratory or congregatory species at any point of the species' life cycle and where that habitat could be considered a discrete management unit<sup>15</sup> for that species, where adequate data are available and/or based on expert judgment. For species with large but clumped distributions, a provisional threshold is set at  $\geq 5$  per cent of the global population for both terrestrial and marine species.

A significant number of companies are in the process of applying PS6 as way to comply with lending requirements for project finance, but also on a voluntary basis to demonstrate a commitment to best practice. PS6 provides useful guidance for companies and governments alike with regard to how best to reduce the risk to biodiversity and conserve important

<sup>15</sup> An area with a definable boundary within which the biological communities and/or management issues have more in common with each other than they do with those in adjacent areas (adapted from the definition of discreteness by the Alliance for Zero Extinction).

resources in the face of growing development pressures. Adoption of these or related requirements will be necessary to protect migratory species in the region.

## II. WORLD BANK ENVIRONMENTAL IMPACT ASSESSMENT POLICY

The World Bank's environmental assessment policy and recommended processing are described in Operational Policy (OP)/Bank Procedure (BP) 4.01: Environmental Assessment. This policy is considered to be the umbrella policy for the Bank's environmental 'safeguard policies' which among others include: Natural Habitats (OP 4.04), Forests (OP 4.36), Pest Management (OP 4.09), Physical Cultural Resources (OP 4.11) and Safety of Dams (OP 4.37). Environmental Assessment is one of the ten environmental, social and legal Safeguard Policies of the World Bank. Environmental Assessment is used in the World Bank to identify, avoid and mitigate the potential negative environmental impacts associated with Bank lending operations.

In its Operational Policy 4.04 concerning projects with impacts on natural habitats, the World Bank policy states in the relevant part:

4. The Bank does not support projects that, in the Bank's opinion, involve the significant conversion or degradation of critical natural habitats.

This limitation on World Bank financing is weighed against other factors, including where it considers that “there are no feasible alternatives for the project and its siting, and comprehensive analysis demonstrates that overall benefits from the project substantially outweigh the environmental costs”. If the required environmental assessment concludes that a given project would “significantly convert or degrade natural habitats”, the World Bank requires the project to include mitigation measures such as minimizing habitat loss (e.g. strategic habitat retention and post-development restoration) and establishing and maintaining an ecologically similar protected area. Similar to ADB’s requirements, the World Bank requires that projects with natural habitat components include environmental expertise to ensure adequate design and implementation of mitigation measures.

## III. EBRD DRAFT ENVIRONMENTAL AND SOCIAL POLICY

The European Bank for Reconstruction and Development (EBRD) was established to help build a new Central and Eastern Europe in the post-Cold War era. The EBRD is currently active in 35 countries, including five of the eight countries that are the focus of these guidelines. It recently issued its draft Environmental and Social Policy (draft ESP) for public comment. Consistent with general SEA and EIA legislation, the draft policy contains a list of projects that will be subject to an assessment.<sup>16</sup> Category A projects, listed in Annex 2 to the draft agreement, include the following linear infrastructure types, using language identical to the Espoo Convention (numbered as in the draft ESP):

7. Construction of motorways, express roads and lines for long-distance railway traffic; airports with a basic runway length of 2,100 metres or more; new roads of four or more

<sup>16</sup> EBRD draft Environmental and Social Policy, Articles 23 and 24, 2014.

lanes, or realignment and/or widening of existing roads to provide four or more lanes, where such new roads, or realigned and/or widened sections of road would be 10 km or more in a continuous length.

8. Pipelines, terminals and associated facilities for the large-scale transport of gas, oil and chemicals.
26. Projects<sup>17</sup> which are planned to be carried out in sensitive locations or are likely to have a perceptible impact on such locations, even if the project category does not appear in this list. Such sensitive locations include, *inter alia*, national parks and other protected areas identified by national or international law, and other sensitive locations of international, national or regional importance, such as wetlands, forests with high biodiversity value, areas of archaeological or cultural significance, and areas of importance for indigenous peoples or other vulnerable groups.

In addition, the draft ESP states that the EBRD will not “knowingly finance” projects involving the following:

(c) Activities prohibited by host country legislation or international conventions relating to the protection of biodiversity resources or cultural heritage.<sup>18</sup>

In the footnote to this provision, it specifically references several conventions relevant to migratory species including the:

- Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention);
- Convention on Wetlands of International Importance, especially as Waterfowl Habitat (Ramsar Convention);
- Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention);
- World Heritage Convention;
- Convention on Biological Diversity and Protocols.

#### IV. ASIAN DEVELOPMENT BANK’S SAFEGUARD POLICY STATEMENT

The Asian Development Bank is a regional multilateral financial institution established in 1966. Currently it has 66 member countries, 48 of which are Developing Member Countries (DMCs) and 18 non-regional donor countries. The Bank provides loans and grants through its two mechanisms: (1) low-interest funds from the Asian Development Fund (ADF), and (2) high-interest funds through the Ordinary Capital Resources (OCR).

In 2009, ADB revised its former Environment Policy, combining it with other policy statements to create a single Safeguard Policy Statement (SPS). Annex 5 contains the list of prohibited

<sup>17</sup> Including, without limitation, environmentally or socially oriented projects (such as renewables).

<sup>18</sup> EBRD draft ESP, Appendix 1, paragraph (c), 2014.

investment activities. Projects in this list do not qualify for ADB financing. Included in the list are the following:

- (ii) production of or trade in any product or activity deemed illegal under host country laws or regulations or international conventions and agreements... such as...(d) wildlife or wildlife products regulated under the Convention on International Trade in Endangered Species of Wild Fauna and Flora.

Linear infrastructure such as roads is mentioned in a few locations in the document, identifying them as subject to its assessment requirements. Impacts to be considered include cumulative impacts,<sup>19</sup> and transboundary impacts.<sup>20</sup>

With respect to migratory species, the SPS also expressly prohibits project activities in critical habitats that do not meet the following requirements:

- (i) There are no measurable adverse impacts, or likelihood of such, on the critical habitat, which could impair its high biodiversity value or the ability to function.
- (ii) The project is not anticipated to lead to a reduction in the population of any recognized endangered or critically endangered species or a loss in area of the habitat concerned such that the persistence of a viable and representative host ecosystem be compromised.<sup>21</sup>

‘Critical habitat’ includes “sites that are critical for the survival of migratory species.”<sup>22</sup> In the event a project involves critical habitat, the project proponent is required to retain qualified external experts to assist with the assessment.<sup>23</sup>



<sup>19</sup> ADB SPS Appendix 1,

<sup>20</sup> ADB SPS Appendix 1,

<sup>21</sup> ADB SPS Appendix 1,

<sup>22</sup> ADB SPS Glossary, 20

<sup>23</sup> ADB SPS Appendix 1,

# Guidelines for Reducing Impacts of Linear Infrastructure

These guidelines provide both quick reference and detailed descriptions for avoidance, mitigation and compensation practices to manage the direct and indirect impacts of linear infrastructure on migratory species. Some of these practices are generally applicable to the planning phase when the assessment activities occur; others are directed at implementation and construction practices; and still others address design standards and other practices for linear infrastructure itself.

The guidelines take into account important considerations that need to be made prior to the design and approval of linear infrastructure projects or projects with significant linear infrastructure components that could affect migratory species. Some of the key considerations include:

- **Understanding the species affected** – Project developers need to know if the proposed project will have a direct or indirect impact on migratory species and the extent of those impacts. Project proponents need to obtain the information from available sources or else collect that information as part of baseline studies that support an EIA. Given seasonality factors, these studies will need to be carried out well ahead of the conclusion of the project design. A good understanding of the affected species will help design successful mitigation measures.
- **Planning for mitigation early in the process** – the development of effective mitigation strategies as outlined below will be most successful when applied early in the project cycle. Effective early mitigation based on good baseline information will be more cost-effective for the project proponent than addressing impacts through retrofitting or project modification.

- **Applying the mitigation hierarchy** – the guidelines are based on the need to reduce impacts on migratory species through the application of a mitigation hierarchy where project proponents work to avoid impacts first and foremost and then minimize impacts through project design features. All residual impacts would then need to be compensated to achieve net benefits for those species.
- **Taking into account all forms of impact - direct, indirect and cumulative** – it is important to understand the landscape level impacts of a particular project as well as any contribution to impacts of other existing or proposed projects.
- **Following best-practice in project design** – all project proponents need to follow, at a minimum, country EIA requirements and existing environmental laws. However, existing legislation may not be sufficient to protect project proponents from the risk arising from impacts to migratory species, many of which may be threatened or endangered. Following lender guidelines, such as those proposed under IFC PS6, will help mitigate risk and will help companies with their social licence to operate.

Together, these principles establish a framework for designing and implementing linear infrastructure and verifying the success of all avoidance, mitigation and compensation measures. These recommendations are made with the understanding that their integration into national policy and laws should be done in manner consistent with the relevant national legal framework, as well as planned and implemented in accordance with the Convention on Migratory Species and any CMS Memoranda of Understanding in effect for potentially affected species in the project’s host country.

Principles have been organized as follows:

- **Mitigation** – contains the overarching concepts that apply to all other principles, as opposed to specific mitigation practices.
- **Planning and Design** – outlines major elements that must be incorporated at early stages to ensure that migratory species have been adequately considered.
- **Assessments** – discusses specific practices, as well as considerations and adaptations that apply to migratory species.



- **Construction Standards and Solutions** – lists specific construction standards and solutions that either avoid conflicts, or mitigate a variety of potential impacts.
- **Monitoring and Evaluation** – considers the current methods of ensuring all measures implemented continue to have targeted results and that new conflicts and changes are appropriately managed as they arise.

Table 5: Summary Table of Guidelines

	PRINCIPLE	REQUIREMENT
<b>A. Mitigation</b>		
I	Mitigation Hierarchy	Adherence to the mitigation hierarchy of avoid, mitigate and compensate. The strongest goal must be to first avoid impacts wherever possible, selecting techniques most likely to achieve this ahead of options that will only mitigate or compensate.
II	Species Specific	Each species is unique, with different needs, capacities, behaviour patterns and responses to linear infrastructure. All avoidance, mitigation, and compensation measures must be designed on a species-specific basis.
III	Place Specific	Migratory species in Central Asia occupy an open environment where they have long lines of sight and little contact with human development, but where they are nonetheless subject to significant hunting pressure. Therefore their flight distances tend to be long. Mitigation efforts need to consider the place as much as the species and design in ways that best consider local conditions and likely site-specific behaviours.
IV	Durability	Guidelines to ensure the long-term viability of the physical elements of the infrastructure, and ensure that policy and planning aspects have been integrated into governance processes so that all measures can be reviewed over the long term across the landscape and facilitate the assessment of cumulative impacts.
<b>2. Planning and Design</b>		
I	General Principles	These are the overarching principles as they apply to planning and design processes to support sound decision-making.
II	Inter-Agency Coordination	Includes guidelines to ensure that the project proponent knows and has access to all affected agencies, understands the mandates and builds them into the planning and design phases as appropriate.
III	Landscape View	‘Landscape’ is a flexible term that should be adapted not only to the size of the project but also in part to the habitat, range, and migratory routes of the species potentially affected by the proposed linear infrastructure.
IV	Strategic Planning Processes	Guidelines for strategic planning components are divided into impact-centred and institution-centred provisions. Impact-centred provisions outline key elements and content of assessments to be conducted. Institution-centred provisions show how these assessment need to be integrated into governance structures and processes.

	PRINCIPLE	REQUIREMENT
V	Species of Interest and Movement Identification	While linear infrastructures typically cross multiple habitats, they nonetheless will be associated with a limited number of species. This section is directed at the basic steps required to ensure that potentially affected species have been identified and their movements considered.
3. Assessments		
I	Multi-Stakeholder Participation	The wide-ranging impacts of linear infrastructure make stakeholder participation more difficult than for localized projects. Practices must be incorporated into the planning and assessment processes that ensure all potentially affected stakeholders have adequate opportunity to participate and provide input into the decision-making.
II	Screening	This set of guidelines has two goals – to ensure that all forms of linear infrastructure are included in both strategic and project-level assessment. It is also to ensure that each infrastructure type is handled according its level of potential impact.
III	Scoping	Scoping includes the standards and practices used to determine what must be studied during an assessment. The goal is to prevent unnecessary burden by focusing on understanding impacts to migratory species.
IV	Cumulative Effects	The identification and review of “cumulative” impacts is essential to ensure that assessments do not look solely at the individual effects of a single linear infrastructure project, but consider it in a broader context.
V	Secondary Effects	Linear infrastructure has the potential to create secondary effects as or even more important as the primary effects of habitat fragmentation and barriers, such as increased hunting or human pressure that in turn have additional impacts on migratory species.
VI	Climate Change	A changing climate brings with it significant challenges to migratory species. Steps must be taken to maximize the ability to understand how these impacts, coupled with linear infrastructure development can best be managed now and over the long term.
4. Construction Standards and Solutions		
I	Construction Practices	The following practices are directed at the construction process. These are relevant to minimizing immediate impacts on migratory species caused by the process of construction, and are to be considered separate from guidelines aimed at reducing impacts from the infrastructure itself.
II	Wildlife Fencing	Fences have a significant barrier effect, disrupt daily, seasonal, and dispersal movements, causing direct mortality and contributing greatly to habitat fragmentation, reduced gene flow and population declines.
III	Overpasses and Underpasses	This section outlines the major principles associated with the use of overpasses and underpasses as avoidance and mitigation measures.
V	Influencing Driver Behavior	The principles are directed solely at roads and are relevant primarily to reducing wildlife-vehicle collisions. However, in some instances, they can help

	PRINCIPLE	REQUIREMENT
		reduce the barrier effect that roads have and therefore play a role in facilitating animal movement.
IV	Influencing Animal Behaviour	These include measures to help wildlife be aware of traffic, create incentives to move and cross in designated areas, and move them away from other areas. However, many of these techniques are aimed at wildlife species that differ substantially from large ungulates moving across an open steppe landscape and should therefore be tested before implementation. A list of techniques can be found in Huijser et al. (2007).
5. Monitoring and Evaluation		
	Monitoring and Evaluation	This section has no sub-sections; instead it lists 10 major principles for monitoring and evaluation as they apply to linear infrastructure development.

## A. Mitigation Principles

The following mitigation principles are based on the application of a mitigation hierarchy that stresses avoidance, minimization and compensation of impacts, with a clear focus on avoidance of impacts whenever possible. The mitigation hierarchy was formalized more than 20 years ago within the Convention on Biological Diversity (CBD 1992). The mitigation hierarchy is the framework by which biodiversity and ecosystem services are incorporated into the project life cycle, and its application represents best international practice for the mitigation of environmental and social risk and should be applied throughout the design, development, construction and monitoring of all linear infrastructure projects. The mitigation hierarchy should be incorporated effectively into a country’s normal EIA processes and procedures. The promotion of the mitigation hierarchy along with the principles developed in this section are consistent with related assessment and impact management principles, including the IFC PS6, the BBOP Standard on Biodiversity Offsets, the International Council on Mining and Minerals, the International Association of Impact Assessment, AEWA Conservation Guidelines, No. 11m, and the decisions and results of the CMS COP9 related to climate change.

### I. MITIGATION HIERARCHY

All other principles described in these guidelines should maintain strict adherence to the mitigation hierarchy of 1) Avoid, 2) Minimize, and 3) Compensate.

- i. **Avoidance:** The first option must always be to avoid impacts wherever possible to the migration routes and critical habitat for migratory species, even if the total length of the intrusion is increased, to ensure avoidance is achieved.

- ii. This principle recognizes that linear infrastructure has unavoidable short-term (caused by construction) and long-term impacts and that in virtually all cases, an appropriate and sustainable alternative can be found.
- iii. The primacy of this first principle applies equally to policies, plans, programmes and projects. Detailed consideration of alternative routes and construction options for linear infrastructure must be an integral part of the strategic and project level design and assessment practices.
- iv. **Minimization** – minimization includes all measures designed to reduce the immediate and long-term impacts of linear infrastructure development on migratory species.
- v. Where avoidance cannot be achieved, project proponents must be responsible for investigating all possible design and construction standards and options, including alternatives for consideration during the approval process that will reduce and mitigate impacts.
- vi. The decision that avoidance cannot be achieved must be taken in the context of transparent decision-making processes, with input from wildlife experts, all involved agencies, and other stakeholders.
- vii. Further, decisions must be based on clear and convincing evidence that avoidance is impossible.
- viii. All proposed measures aiming to minimize impacts including alternative mitigation ones, must be included in the project planning, design, budget and assessment processes and be based on good data, science, and local knowledge.
- ix. The objective is to reduce to the extent possible project impacts in order to minimize any residual impacts.
- x. **Compensation** – Compensation includes all measures designed to offset the residual adverse impacts to migratory species after all avoidance, minimization and other mitigation measures have been taken. Compensation or offsets specifically address residual impacts to achieve no net loss, or a net gain of biodiversity.
- xi. The decision-making principles that apply to mitigation also apply to planning, design, budget and assessment processes to deliver the offset. A biodiversity action plan should be developed or amended to guide design and implementation of linear infrastructure.
- xii. Through the assessment process, the project proponent shall be responsible for identifying circumstances and assessing the degree to which residual impacts may not be fully compensated due to unavoidable fragmentation, habitat loss or other impact.
- xiii. In such instances, the project proponent shall be required to propose and assess design and construction measures intended to minimize such risk.
- xiv. The resulting project plan and risk assessment must show how the linear infrastructure's residual impacts can and will be offset through specific measures and commitments, taking into account the level of risk and uncertainties regarding the delivery of the offset.

## II. SPECIES-SPECIFIC

While the range and distribution of the large mammals of Central Asia often overlap, each species is unique, with different physiology, nutritional needs, behaviour, movement patterns and responses to linear infrastructure.

- i. All avoidance, minimization and compensation measures, therefore, must be designed on a species-specific basis with input from wildlife experts whose competency includes the species potentially affected by the proposed linear infrastructure.
- ii. Mitigation and compensation measures must be designed to contribute to the conservation, rehabilitation, and reintroduction of target species as defined by priorities identified at the landscape, eco-regional and national levels.
- iii. To facilitate the development of species-specific design, governments must engage in and make publicly available baseline and monitoring studies that assess the status, ecology and trends of all migratory species occurring within their jurisdiction.
- iv. Where such data are lacking and a project may potentially affect migratory species, the project proponent must collect the necessary baseline data as part of the EIA process.
- v. To facilitate planning efforts, migratory species data collected through independent studies or as part of an EIA process should be collected in a standardized format and managed by an appropriate government agency so that species information is available and can be shared with interested stakeholders.

## III. PLACE-SPECIFIC

The same species may be affected by different conditions across its range (e.g. more or less pressure, exposure to human developments, etc.), such that measures appropriate for a given species in one area may not be appropriate in another.

- i. All mitigation and compensation measures, therefore, must be adapted to the place as well as the species.
- ii. Assessments shall clearly document baseline information available for avoidance, minimization, other mitigation and compensation measures, outlining the expected need, means and methods of adaptation to the conditions present in the location of the planned infrastructure.
- iii. Monitoring plans should be developed to assess the success of all mitigation measures and designed to allow for adaptive management as conditions at the site change.

## IV. DURABILITY

Durability refers to two distinct aspects – the physical structure itself as well as the policy and planning elements.

- i. The physical aspects of all avoidance, mitigation and compensation measures must meet or exceed construction standards that ensure its viability over the same time frame as the infrastructure itself.
- ii. Similarly, governments must ensure that the policy and planning aspects of the development have been sufficiently documented and anchored in the host country's decision-making structures so that all measures can be reviewed over the long term across the landscape and facilitate the assessment of cumulative impacts.
- iii. The responsible government authority must ensure that all avoidance, mitigation and compensation measures have been incorporated into all relevant local, regional, national and, where possible, transboundary land use, resource use or other similar plans.
- iv. All avoidance, mitigation and compensation measures must be designed and implemented taking into consideration other likely developments (e.g. competing land use pressures) on a scale commensurate with the target species.
- v. All mitigation and compensation measures must target outcomes that are greater than the expected losses and that would have occurred if the measure had not been implemented.
- vi. All development plans and assessments shall address sources of uncertainty and the potential for failure, and include contingency plans and budgets accordingly.
- vii. The potential impacts of climate change on species as well as on the viability of any offsets should be taken into account.
- viii. Legal and financial mechanisms need to be identified and put in place to ensure the long-term viability of the proposed offset. The offset should be designed to last at least as long as the project impacts with guarantees in place to ensure adequate financing over the long-term.
- ix. Adequate financial plans must be in place to ensure that the required funds are available over the long-term for oversight, maintenance, and implementation of any planned offsets.

## B. Planning and Design Principles

This section outlines the major practices and concepts that help ensure migratory species have been adequately considered during the early stages of the planning and design process.

## I. GENERAL PRINCIPLES

The following outlines planning and design principles applicable to all linear infrastructure projects regardless of type, size and location.

- i. Government agencies should consider prohibiting linear intrusions in migratory species habitat, in all instances where alternatives, including relocation, have not been explored or considered in the design and planning (i.e., migratory species habitat as no-go areas).
- ii. Governments should consider an explicit prohibition of any linear infrastructure project potentially impacting migratory species that do not incorporate wildlife-friendly designs.
- iii. Consistent with the mitigation hierarchy stated in the previous section, such prohibition should be taken in preference to permission-with-mitigation or with-compensation.
- iv. In cases where there is no alternative and the project is of important national interest, the highest standards for critical habitat should be employed with an emphasis on avoidance of impacts to the species in question.
- v. Project proponents should be required to clearly identify all wildlife and migratory species designs for mitigation in the project proposal and budget documentation.
- vi. For all compensation measures, the project proponent shall include an explicit calculation of loss and gain consistent with the principles outlined in the Business Biodiversity Offset Program's Biodiversity Standard, demonstrating the manner in which no net loss or a net gain for migratory species can be achieved. At a minimum, this should include the following:
  - a. Identification of a set of key biodiversity components at species, habitat and ecosystem levels, including landscape features and components related to migratory species.
  - b. Explanation and documentation of the rationale for selecting these key components and how they relate to affected migratory species.
  - c. Identification, explanation and documentation of all methods for:
    - i. determining the equivalence of residual losses and gains (assessing like for like or better) in any compensation design, and
    - ii. calculating the net balance of losses due to the development project and gains due to the compensation activities.
- vii. When each linear intrusion cuts its own path through migratory species' ranges independently of one another, the resulting habitat fragmentation can multiply the impact many times over that of a single alignment. Efforts should therefore be made during planning to stages to minimize the overall footprint of linear infrastructure by

locating other infrastructure along the same alignment (e.g. locating power lines along established roads, up-grading existing infrastructure).

## II. INTER-AGENCY COORDINATION

The following outlines guidelines to ensure that the project proponent knows and has access to all affected agencies, understands the mandates, and builds them into the planning and design phases as appropriate.

- i. A decision to move forward on a project in a sensitive area for migratory species should be made through a multi-agency or multi-stakeholder process to ensure no alternative exists and confirm the efficacy of proposed mitigation efforts.
- ii. It should be the responsibility of the primary government agency and project proponent to jointly identify and organize the involvement of all agencies responsible for the resources through which a given linear infrastructure project will potentially pass.
- iii. Consultations should clearly identify the competencies, reasons and forms of coordination required between the various agencies.
- iv. Each agency should be given access to all relevant planning and design documents to ensure that input is based on full disclosure, affording the greatest opportunity for each agency to understand potential impacts and make appropriate recommendations.
- v. Mechanisms for inter-agency review should be in place for any project that would impact sensitive areas for migratory species and is deemed to be in the national interest and thus will be implemented despite impacts. The major focus of such review should be on avoidance of impacts and then all necessary mitigation efforts to reduce impacts to the greatest degree possible (see previous section).

The application of these guidelines will require coordination among government bodies in charge of approving projects for implementation. It is recommended that when a proposed project will affect threatened migratory species, a committee be created that includes each of the relevant agencies that address environment, planning, the specific sector meet to review the project in light of the recommendations included in these guidelines. The inter-sectoral committee will review the project and make recommendations with regard to how the project can avoid and minimize impacts, taking into account the landscape in which the project will operate, other potential development plans and the needs of the species in question.

## III. STRATEGIC PLANNING

Guidelines for strategic planning components are divided into impact-centred and institution-centred provisions. Impact-centred provisions outline key elements and content of assessments to be conducted. Institution-centred provisions show how these assessment need to be integrated into governance structures and processes.

### a) Impact-Centred SEA Provisions

- i. Governments should review strategic environmental assessment policies with a view to incorporating, to the extent consistent with their legal system, provisions that expressly address the need to review the potential impact of policies, plans, and programs on migratory species.
- ii. SEA implementing regulations and/or instructional guidelines should provide guidance on key migratory species, known impacts, assessment methods, and reporting practices to ensure that impact-centred assessments are conducted in a timely, cost-effective and credible manner, and that they are available for review by the public.
- iii. SEAs should explicitly require the consideration of a range of alternatives, consistent with the mitigation hierarchy.
- iv. SEAs should provide appropriate opportunities for the involvement of key stakeholders and the public, beginning at an early stage in the process and carried out through clear procedures.
- v. SEAs should require the determination of whether policies, plans and programmes meet the conditions outlined by these guidelines, including specifically whether project proposals include adequate consideration of:
  - a. the cumulative impact of the various policies, plans and programmes in contributing to fragmentation of critical habitat, migratory routes and nomadic or dispersal movements.
  - b. potential realignments and re-routing that will avoid or minimize impacts to migratory species;
  - c. the likely impacts of climate change, future development and other potential factors.

### b) Institution-Centred SEA Provisions

- i. Governments should ensure that SEAs relevant to migratory species and linear infrastructure are undertaken with the involvement of the responsible authorities. Depending on the type of infrastructure these may include those responsible for landscape-scale land-use planning, wildlife management, transportation systems development and management, energy, water, as well as transboundary relations.
- ii. Governments should ensure that impact-centred assessment processes are coupled with institution-centred provisions that integrate assessment processes and results into all relevant governance structures, including the policy-, plan- and programme-making processes of the agencies concerned.

- iii. Governments should incorporate provisions into SEA legislation that outline the timing for initial assessments, as well as the requirement for and timing of ongoing monitoring and evaluation of policies, plans and programmes.
- iv. Governments should ensure the participation of sub-national governments in the SEA process to ensure effective coordination of land use plans for infrastructure development and offsets.

#### IV. LANDSCAPE VIEW FOR LAND USE PLANNING

Linear infrastructure development has impacts across multiple habitats, species ranges, watersheds and land-use zoning, requiring an approach equal to the size and extent of its potential impact.

- i. Landscape must be defined by the size and extent of the linear infrastructure, as well as by the size and extent of the area used by the migratory species potentially impacted by the development.
- ii. Governments must further ensure that all information is made available during design, planning and assessment processes that will allow for an understanding of the larger landscape of the project.
- iii. Government and/or project components should map the important biodiversity and sensitive areas and ensure that projects plan do not compromise the most sensitive areas.

#### V. SPECIES OF INTEREST AND MOVEMENT IDENTIFICATION

While linear infrastructures typically cross multiple habitats, they nonetheless will be associated with a limited number of species. As noted in the section on Migratory Species and Linear Infrastructure, each species has relatively well-defined areas where they occur, and some have relatively well-defined movement patterns. Planning of linear infrastructure should therefore involve the following to ensure that the best information is available upon which avoidance, mitigation and compensation strategies can be designed:

- i. A review of national and international literature concerning migratory species whose range and distribution are known to occur in or near the area.
- ii. Wildlife scientists and conservationists working in the landscape are directly engaged to identify which species are present in the area, the type of movement, frequency of presence, and use of the area.
- iii. Local communities living in the area are directly engaged to include their knowledge of the current and historic presence of species in the area.

## C. Assessment Principles

The following principles are intended to complement the preceding section. While they are directed at special considerations for project-level assessments, these are still restricted to general principles applicable to all assessments and are not specific solutions for individual species or types of infrastructure.

### I. MULTI-STAKEHOLDER PUBLIC PARTICIPATION

The wide-ranging impacts of linear infrastructure make stakeholder participation more difficult than for localized projects. Potential stakeholders can include communities that live a great distance from the proposed intrusion and cross borders into neighboring countries, presenting numerous challenges.

- i. Governments should ensure that public participation practices outlined in project-level EIA legislation clearly identify the need to provide information and receive input from affected communities within the range and distribution of the species and not only those communities living in and around the planned infrastructure.
- ii. Similarly, governments should incorporate clear consultation requirements and procedures for communicating and sharing information with counterpart agencies in neighboring countries that are also range states for potentially affected species.
- iii. To facilitate the broadest participation possible across the landscape affected by the infrastructure, governments should identify and project proponents should use all possible means to best reach affected communities.
- iv. Project-level EIAs should also ensure that participation is open to civil society organizations, including community-based organizations (CBOs), non-governmental organizations (NGOs) and individuals working on social, environmental and wildlife issues.
- v. Participation by all stakeholders must coincide with all decision-making concerning site selection, infrastructure design, avoidance, mitigation and compensation measures, as well as implementation, and ongoing monitoring and evaluation.
- vi. The design of any compensation or offset project should take into account the impacts on any communities to ensure that the offset does not negatively affect communities.

### II. SCREENING PRACTICES

Not all projects have equal impacts to migratory species. Requiring them to complete the same level and type of study would be both inefficient and unnecessary. Effective project screening can save time and money for both the project proponent and the government. This set of

guidelines is intended to ensure that all forms of linear infrastructure are identified and appropriately managed at this stage of the assessment process.

- i. To this end, relevant EIA legislation should include a comprehensive list of linear infrastructure types that will be subject to assessment requirements – referred to as a ‘static screening’ process.
- ii. The static list should be harmonized between neighbouring states and include, among others, fences as a form of linear infrastructure whether used as a border control, livestock management system or for other purposes.
- iii. Such legislation should also provide a way to distinguish between the types – and extent – of impact assessment studies that would be required based on impact levels, species affected and type of habitat (i.e. critical habitat designation).
- iv. Regulators should also consider the use of ‘dynamic screening’ processes to manage the review of works directed at rehabilitating existing linear infrastructure to determine whether a full study is warranted even in minor upgrades or improvements. Dynamic screening is considered a best practice as it:
  - a. allows for some flexibility in the development process;
  - b. can respond to new and developing scientific understanding to determine the appropriateness of the study required;
  - c. with adequate public participation procedures, can take into account and rely on the needs and priorities of local and community interests; and
  - d. captures projects that might otherwise escape review.
- v. Whether incorporated into law, regulation or guideline, screening processes specific to linear infrastructure should be designed with input from wildlife biologists, engineers and land use managers.

### III. SCOPING PRACTICES

Scoping, sometimes called the Plan of Study or Terms of Reference, is the second major step<sup>24</sup> in the EIA process after Screening. Once it is determined that a project must conduct a study under the screening procedures, the scoping process should be used to clarify and narrow the subject areas to be included. In relation to linear infrastructure and migratory species, this process can be aided by the following:

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<sup>24</sup> Because much of the information in screening and scoping is the same, in some jurisdictions these two steps are joined into a combined procedure that considers whether or not a study is required and, if so, the extent of such study. Whether or not the procedure is combined, the concepts themselves are still separate. As a matter of practice, screening is the first question presented – is the project subject to an EIA? This is followed by scoping – what is the form, content and structure of the report? These guidelines treat them as separate best practices, outlining components of each that are relevant to linear infrastructure and migratory species regardless of how they may be managed by a particular administrative system.

- i. Project-level EIA legislation should include pre-defined components (referred to as ‘static scoping’) that state with specificity to the types of impacts (e.g., historic and current ranges for potentially affected species, degree of habitat fragmentation, potential for barrier effects and partial barrier effects) what must be documented in the study process.
- ii. Such legislation should also include standards and procedures for identifying the additional components (dynamic scoping) that a given linear infrastructure project must review relative to migratory species.
- iii. The law may allow project proponents to be involved in the dynamic scoping process, but it would be a conflict of interest to grant them legal authority to make or be involved in the final decision on which issues must be addressed. This decision must rest with the authority responsible for determining what information it needs to make a fully informed decision on approving, amending or denying a linear infrastructure project.
- iv. As with static scoping, a list of possible impacts to consider should be included to help guide decision makers in providing adequate guidance to the project proponent’s study efforts.

#### IV. CUMULATIVE EFFECTS

One of the few clearly articulated tools applicable to single-project assessments, but which opens the door to assessing and understanding larger-scale impacts, is the identification and review of “cumulative” impacts. This is essential to ensure that assessments do not look solely at the individual effects of a project, but consider it in a broader context. These cumulative effects are important because ecological systems sometimes change abruptly and unexpectedly in response to what appear to be small incremental stresses (perhaps even of no significant concern on their own), and as such the potential accumulation and interaction of multiple impacts on the functions of the environment must be taken into consideration.<sup>25</sup>

- i. Relevant provisions of EIA legislation should therefore require the review of cumulative effects of past, present, and reasonably foreseeable actions to migratory species, whether or not caused by linear infrastructure.
- ii. The definition of “cumulative” should be extended beyond consideration of compounded impacts caused by other development to consider interactions among dissimilar kinds of environmental disturbance, with the potential to have an adverse impact on migratory species such as climate change, habitat fragmentation not associated with linear infrastructure, environmental pollution, etc.

<sup>25</sup> Alberta Environment, Cumulative Effects Assessment in Environmental Impact Assessment Reports Required under the Alberta Environmental Protection and Enhancement Act.

## V. INDIRECT IMPACTS

Assessing cumulative impacts may be insufficient to adequately understand all potential impacts, and thus design and implement accordingly. The problem is that ‘cumulative’ as typically defined is not the same as assessing landscape-scale impacts. “Cumulative impacts” are the additional impacts of a single project when added to a larger context; e.g., one road’s impact when taking into consideration other existing or planned roads and development. This definition does not necessarily target an understanding of the ‘scale’ of a single project in the absence of other projects.

- i. To ensure that all impact types are considered, assessments should be designed to examine reasonably anticipated secondary effects such as increased poaching facilitated by road access.
- ii. Assessing the impact of linear infrastructure means understanding how it may affect patterns of human behaviour that in turn have an additional impact on migratory species.

## VI. CLIMATE CHANGE

Climate change is a global challenge and a significant threat to migratory species that are in some ways more vulnerable than non-migratory species as they rely on multiple habitats and sites for breeding and feeding, and are exposed to climatic variations during their migration.

- i. For the implementation of appropriate avoidance, mitigation and compensation measures, it is important to develop regional scenarios for the future.
- ii. Such scenarios should be based on today’s knowledge of the ecology and habitat preference of migratory species, as well as the global climate and its variations, and expected future changes and potential impacts to those species, including indirect impacts such as changes in plant communities, green-up timing, etc.
- iii. Policies and laws need to demonstrate a commitment to long-term monitoring necessary to detect the long-term impacts of climate change and to assess the abilities of different species to adapt to it.
- iv. To facilitate effective monitoring on a landscape scale, Range States should make efforts to standardize data collection on migratory species.

- v. Monitoring systems should be devised including a unified system of alerts to identify future problems and thresholds to target conservation action.



The khulan's range has been reduced to the Gobi Desert and similar environs, where access to adequate grazing and water means traveling long distances. ©WCS/B. Buuveibaatar

## D. Construction Standards and Solutions

The following standards and solutions build on a growing body of guidelines and research. They have been reproduced here and commentary added where necessary to explain their adaptation to the Central Asian context and the migratory species found there.

### I. CONSTRUCTION PRACTICES

The following practices are directed at the construction process. These are relevant to minimizing immediate impacts to migratory species caused by the process of constructing, and are to be considered separate from guidelines aimed at reducing impacts from the infrastructure itself.

- i. Relevant legislation and/or project approval documents should consider placing a ban on certain activities typically associated with linear infrastructure construction activities. These may include, but are not limited to:
  - a. dumping of wastes (all wastes should be segregated and carried to nearby townships or cities for safe disposal);
  - b. soil or water pollution and open burning of wastes;
  - c. dumping of solids and any wastes, including waste water, oils, and liquids from washing and domestic uses, into rivers, streams, or any water bodies;
  - d. camping of workers and parking of vehicles inside known migratory routes;
  - e. washing vehicles and equipment at or along streams, rivers, or water bodies;
  - f. cutting or destruction of vegetation other than what is necessary to construct the infrastructure;
  - g. other activities as may be specified in writing at the time of project approval.



Trash is often associated with linear infrastructure development, negatively impacting the environment and species health. ©WCS/K. Murphy

- ii. Ecological restoration of linear intrusions should follow international principles and meet the following minimum requirements:

- a. road removal through ripping, re-contouring or other intensive methods must follow best practice (e.g. Switalski et al. 2004) and be carried out with collaborative advice from ecologists and engineers;
- b. incorporate the use of a diverse mix of local native species that correspond to the natural vegetation cover;
- c. ensure that restoration minimizes any additional temporary disturbance, particularly soil erosion and loss of adjoining regenerating natural vegetation.



Ditches created during the construction of pipelines or as a measure to prevent vehicles from leaving established roads represent another hazard and potential barrier to wildlife movement. ©WCS/K. Murphy

- iii. The construction of the linear intrusions should be performed as efficiently and quickly as possible, with minimum disturbance and adequate design and technology to minimize the long-term impacts. This may include but not necessarily be limited to the following:
  - a. using prefabricated and special methods to reduce the time taken in the erection/ construction of the intrusions;
  - b. avoiding work during nights to facilitate movement of many species, especially large mammals;
  - c. avoiding camping of people/workers and use of domestic animals;
  - d. closing trenches (e.g. for pipeline construction) at the end of each day to avoid potential injuries to wildlife.
- iv. All vehicles delivering loose construction material and any such material gathered at the site must be covered by appropriate material such as tarpaulins to prevent dust spreading, pollution, or wastage.
- v. Movement of vehicles should be strictly restricted to existing roads and tracks, and creation of new roads and tracks or off-roading should be prohibited in connection with linear infrastructure development.
- vi. Movements of vehicles and use of heavy machinery along riverine areas and watercourses should also be avoided.
- vii. Management strategies to detect and prevent encroachments or construction of new structures and homesteads along linear intrusions need to be adopted.

- viii. All outside material left over after construction or repair (including stones, sand, cement, packaging material, papers, cartons, oils, cans, bags, wires, metal objects, housing sheds, plastics and glass) should be removed from the site for safe disposal or reuse.
- ix. While structures may be permitted to be installed along existing linear infrastructure (e.g. fences), they should not be installed as a matter of policy, unless their installation is subject to evaluation and alteration to ensure the passage of wildlife as advised by a competent wildlife scientist and based on a field assessment.

## II. WILDLIFE FENCING

Wildlife fencing is a common form of linear infrastructure associated with transport corridors used to prevent or reduce collisions with large mammals. It is also used as a stand-alone infrastructure to control borders between countries and across landscapes as a livestock management measure. In all cases, fences have a significant barrier effect, disrupt daily, seasonal, and dispersal movements, causing direct mortality, and contributing greatly to habitat fragmentation, reduced gene flow, and population declines.

- i. The foremost principle in this section is that while fences may be necessary along some linear infrastructure (e.g. roads or rail lines) to prevent collisions that can endanger animals as well as people, their use should always be carefully designed to avoid or mitigate barrier effects.

The following should also be considered:

- ii. Remove all fencing that is obsolete and no longer needed.
- iii. Construct the least amount of fencing required to achieve management objectives.
- iv. Fence design should respond to the following:
  - a. local topography;
  - b. local weather conditions (e.g. heavy snows or rains);
  - c. wildlife present in the area or likely to use the area during migration, ensuring that both adults and young can safely cross;
  - d. daily and seasonal movements of wildlife in the area.
- v. Legally require wildlife-friendly fence designs. Even if intended as a complete barrier, for example to prevent access to a transportation corridor, fences can be constructed so they do not trap animals. Wildlife-friendly fences that allow passage should be highly visible to wildlife and allow them to pass from one side to the other easily without injury and without damaging the fencing structure (Paige 2008).
- vi. Wherever feasible, alternatives to standard fencing should be considered a priority. Among the growing list of options are:

- a. **Virtual Fences.** Technology to develop a ‘virtual fence’ is now available that allows a border to be remotely monitored.
- b. **Normandy Fences.** Normandy fences are steel structures designed to prevent vehicles from crossing, but that still allow animals to pass. Tests have shown that Normandy-style fence can successfully stop a 4,500 kg vehicle moving at 65 km/hour. The cost of Normandy barriers along the US-Mexico border was approximately US\$ 621,000 per kilometre.
- c. **Other vehicle barriers.** Other vehicle barriers include bollards. These are steel or wooden posts anchored into the ground using concrete and spaced so that cars cannot pass, but which provide ample room for wildlife to cross.



Fences block large mammals from access to critical food resources and breeding grounds, separate populations and affect gene flow, and can result in high mortality due to animals trapped along fence lines in bad weather or actually caught in the fence structure. ©WCS/K. Olson

- vii. Whether constructed to prevent animals from accessing a transportation corridor or for other non-wildlife related purposes, fences should be designed to prevent wildlife mortality.
- viii. Loose fencing materials and posts are more difficult for wildlife to navigate. Fencing should therefore be designed to ensure it remains upright.
- ix. Fence maintenance must be regularly scheduled and the necessary budget included in fence design to prevent deterioration of the structure that can lead to wildlife mortality.
- x. If constructed to exclude wildlife from a transportation corridor, fencing must nonetheless be accompanied with safe crossing opportunities. Studies have shown that where safe crossings are not provided, are too few, small, or far apart, wildlife is likely to break through, damaging the structure and reducing its effectiveness.
- xi. Animals may end up in between the fences that line a transportation corridor after finding or creating gaps. Fences should therefore always be accompanied with escape opportunities for animals that end up in between the fences. Escape opportunities can be created through the use of:
  - a. Jump-outs or “escape ramps” consisting of sloped mounds constructed at regular intervals on the inside of the corridor, effectively lowering the height of the fence and enabling animals to jump to the other side.

- b. One-way gates are gaps constructed in fencing allowing animals to pass only in one direction, in this instance from the inside to the outside of a fenced transportation corridor.
- xii. Wild animals will move along a fence until they find a gap or the fence ends. This means that there can be a concentration of animals at the end of fences and consideration should be given to managing crossing and potential collisions in these areas.
- xiii. Any constructed fences and gaps should be accompanied with other measures to facilitate safe passage of animals across the intrusion. These may include one or more of the following depending on local conditions:
  - a. Overpasses
  - b. Underpasses
  - c. Wildlife warning signs
  - d. Crosswalks for wildlife
  - e. Mandatory or advisory speed limit reductions
  - f. Animal detection systems

### III. OVERPASSES AND UNDERPASSES

This section outlines the major principles associated with the use of overpasses and underpasses as avoidance and mitigation measures. As used in this text, overpasses and underpasses are broad terms that actually comprise a wide variety of passages constructed either above or beneath linear infrastructure, that are designed to allow wildlife to safely move from one side to the other and, in the case of road and rail lines, also decrease the potential for collisions with wildlife. The following is a list of various types from Huijser (2007):

- i. **Landscape bridge** – Designed exclusively for wildlife use. Due to their large size they are used by the greatest diversity of wildlife.
- ii. **Wildlife overpass** – Smaller than landscape bridges, these overpass structures are designed exclusively to meet the needs of a wide range of wildlife.
- iii. **Multi-use overpass** – Generally the smallest of the wildlife overpasses. Designed for mixed wildlife–human use. This wildlife crossing type is best adapted in human disturbed environments and will benefit generalist-type species adapted to regular amounts of human activity and disturbance.
- iv. **Viaduct** – The largest of underpass structures for wildlife use, but usually not built exclusively for wildlife movement. The large span and vertical clearance of viaducts allow for use by a wide range of wildlife.
- v. **Large mammal underpass** – Not as large as most viaducts, but the largest of underpass structures designed specifically for wildlife use. Designed for large mammals but small- and medium-sized mammals use them readily as well.

- vi. **Multi-use underpass** – Design similar to large mammal underpass, however the management objective is use by both wildlife and humans. These structures may not be adequate for all wildlife, but usually results in use by generalist species common in human-dominated environments.
- vii. **Underpass with waterflow** – An underpass structure designed to accommodate the needs of moving water and wildlife. These underpass structures are frequently used by some large mammal species, but their use depends largely on how it is adapted for their specific crossing needs. Small- and medium-sized mammals generally use these structures, particularly if riparian habitat or cover is retained within the underpass, but such vegetation may serve to block large migratory ungulates that are used to moving across open landscapes.

First used in France and the United States in the 1950s, a wide variety of these structures has now been successfully implemented in countries across Europe, North America, Canada, and Australia. The benefits of overpasses and underpasses include:

- preserving access to natural wildlife habitat and migration corridors for wildlife;
- habitat fragmentation which hinders genetic diversity and health among wild animal populations is reduced;
- preserving healthy wildlife populations by reducing animal deaths and injury caused while crossing roads and rail lines;
- preventing human injuries and deaths caused by vehicle-animal collisions and drivers swerving to miss an animal;
- reducing costs of vehicle, property and infrastructure damage caused by vehicle-animal collisions and drivers swerving to miss an animal.

Bank et al. (2002) estimates that including wildlife crossings increases a road project by 7-8 per cent, a figure that is outweighed by the benefits just listed. As noted in the previous section, these structures are often implemented in conjunction with wildlife fencing that prevents crossing in certain areas while directing wildlife to cross at the constructed overpass or underpass.

The following general considerations should be applied in all instances:

- i. First, areas where animals naturally cross should be preferred over funneling or directing animals to a constructed crossing. Natural crossing sites should have modifications that allow and encourage crossings at those locations (e.g. lowering of berms, fence removal).
- ii. Constructing overpasses or underpasses should be considered only after all options to restore connectivity using natural means have been exhausted.
- iii. Where natural crossings cannot be retained, regenerated or encouraged, and adequate justification exists for construction of artificial structures, they should be installed on the basis of proper field assessments, an understanding of the behaviour of the targeted species, and with the advice of qualified wildlife scientists and engineers.

- iv. As noted the location, type, and dimensions of wildlife crossing structures must be carefully planned with regard to the species and surrounding landscape. The sensitivities and habits will vary from place to place (for example, animals regularly hunted will be much more shy and have a greater tendency to avoid humans and infrastructure than those animals that are well-protected) and these will influence their movements, reactions to linear infrastructure, where they are most likely to cross an intrusion, and the type of structure they are most likely to use.
- v. In addition to species-specific questions, additional factors that should be considered include:
  - a. vegetation leading up to, in and around the crossing structure, and
  - b. the time it takes for wildlife to learn of the structure and understand that it is safe to use.
- vi. While not always necessary, in some cases the success of these structures has been linked to the use of wildlife fencing that helps direct wildlife to the crossings.
- vii. In some instances, it may be possible to rely on landscape features to help direct wildlife to the structures and thereby reduce the need for, as well as the costs and impacts associated with, wildlife fencing.
- viii. Size matters when it comes to crossings intended for use by large species sensitive to the presence of humans. There are, however, only suggestions concerning minimum requirements, making it necessary for crossing options to be field-studied.
- ix. Incorporating wildlife crossings is most economical when other road construction, expansion, or upgrades are occurring. Governments should look at the planning and budgeting processes for these activities as opportunities to integrate overpasses and underpasses.
- x. Wildlife crossings should not lead to ecological “dead-ends” or “cul-de-sacs,” where wildlife has nowhere to go, but must link to a larger regional landscape and habitat complex that allows them to disperse, move freely, reach historic migratory destinations, and meet their daily and life requisites.
- xi. The location and frequency of wildlife crossings should, to the extent possible, be generated by an assessment that covers an area much larger than just the transportation corridor itself. Ideally, this would involve a regional landscape assessment of wildlife connectivity needs around a nationwide or provincial road system or regional transportation corridor.
- xii. Linkages and potential wildlife crossing locations should be prioritized based on future transportation investments, scheduling, ecological criteria and changing climate regimes to form a regional or ecosystem-level strategic mitigation plan.
- xiii. Deciding where to locate wildlife crossing structures can be substantially aided by the use of geospatial information. Data and map layers that may be useful include:
  - a. aerial photos

- b. land cover/vegetation maps
- c. topographic maps
- d. land ownership maps
- e. land zoning maps, including protected areas, wildlife refuges
- f. transportation planning maps and road network data
- g. water and hydrology maps
- h. urban and built area maps
- i. species-specific habitat maps
- j. wildlife movement model data
- k. wildlife ecology field data
- l. wildlife road-kill data

Combining multiple resources will provide greater accuracy in identifying habitat linkages and finalizing site selection for wildlife crossing structures.

- xiv. Other data can aid in the process of determining the best location for wildlife crossings. The following are potential information sources. Where applicable the value and limitations of such data to the process of site location have been noted:
  - a. **Road-kill data.** For existing roads and where data has been collected with sufficient rigour to be useful, it can help locate where wildlife attempt to cross. However, this type of data masks areas where wildlife already crosses safely and may lead to selecting an area that is less appropriate than another.
  - b. **Road surveys.** When there is fresh snowfall, or in areas with beds of sand or other tracking media, road surveys can be carried out to identify animal crossing locations. They can also be used to determine the duration of monitoring required to detect a proportional change in crossing rates after construction.
  - c. **Camera traps.** Camera systems can provide information on wildlife distribution and abundance. They should not be relied on to determine where animals cross as they have limited detection range. Where used, Huisjer (2007) suggests that stations can be placed using a grid or stratified sampling approach that will provide the best results per unit of effort.
  - d. **Linkage Assessments.** Linkage assessments review where habitats are connected and help identify where wildlife use the landscape and may therefore come into conflict with linear infrastructure. While this type of study is too broad to determine exact locations, it can nonetheless help narrow the scope and provide a basis for agency and community stakeholder consultations.
- xv. In all cases, the actual placement of a wildlife crossing must be done on a site-specific basis involving field visits to ground-truth data and map-based assessments, as well as

examine conditions that cannot be observed through remote sensing techniques or revealed through data analysis.

- xvi. The spacing of wildlife crossings on a given section of roadway will depend largely on the variability of landscape, terrain, population densities, the juxtaposition of critical wildlife habitat that intersects the roadway and the connectivity requirements for different species.
- xvii. A range of wildlife crossing types and sizes should be provided at frequent intervals along with necessary habitat elements that enhance movement.

#### IV. INFLUENCING DRIVER BEHAVIOUR

The following list of techniques is aimed at influencing driver behaviour on roads primarily to reduce the potential for wildlife-vehicle collisions. They do not apply to any other form of linear infrastructure. Nonetheless, given the significant impact that roads can have, these types of measures should be considered as one part of a suite of measures to reduce impacts, and in some cases they may reduce the barrier effect (for example, changing traffic volume and patterns). To the extent they are applicable for a given area, they should be incorporated into government policies and practices. They can also be reinforced, or even augmented, by private companies whose business operations are associated with either the construction or use of the infrastructure.

##### a) Driver Awareness and Training

- i. Driver education programmes by themselves may not significantly reduce wildlife-vehicle collisions, but when coupled with other measures can at least raise awareness of the issue as well as related problems such as habitat fragmentation, off-road travel, wildlife harassment and poaching.
- ii. Driver education courses are one opportunity to incorporate messages about migratory wildlife conservation, as are many other forms of public awareness programmes, including billboards, internet sites, hotlines and more.
- iii. Private companies can play a role in this effort by incorporating driver behaviour standards into employment contracts that require an understanding of the issues and include contractual obligations to abide by related standards.

##### b) Seasonal and Permanent Roadway Warning Signs

- i. Both seasonal and permanent roadway signs can be used to increase driver awareness of the possibility that wildlife crosses the road in the area indicated.

- ii. However, the value of signs should not be overestimated. While warning signs in general are expected to decrease the potential for accidents, they do not necessarily result in a decrease in wildlife-vehicle collisions (Huisjer et al. 2013).
- iii. Warning sign effectiveness improves when:
  - a. location is more precisely associated with actual crossing points;
  - b. they are posted seasonally during peak animal movement times;
  - c. they are combined with sensors to detect animals as they approach the road (Huisjer 2009).

### c) Reducing and Altering Traffic Patterns

- i. Reducing speeds, traffic volumes and patterns are all measures that can have a positive impact on the potential for lessening barrier effects and reducing wildlife-vehicle collisions. As with all of the other measures in this section, however, they should be considered as additional efforts whose effectiveness is limited.
- ii. Speed control systems (or ‘governors’) may be installed in company vehicles to prevent or warn of vehicle speeds in excess of the posted limits as a means of improving compliance.
- iii. Other measures to reduce or alter traffic patterns include:
  - a. Temporary road closures to reduce or eliminate traffic during critical periods;
  - b. Speed humps, rumble strips and raised medians to slow vehicles in certain areas;
  - c. Restricting the times during the day or night when certain types of vehicles (e.g. trucks, company vehicles) can access the road (e.g. evening and night when many species are active).

## V. INFLUENCING ANIMAL BEHAVIOUR

There are numerous techniques aimed at influencing animal behaviour in the vicinity of transportation corridors. While many of them have been designed solely with the limited intent of preventing collisions, they can also be considered as counterpart measures to other techniques such as overpasses and underpasses. They include measures to help wildlife be aware of traffic, create incentives to move and cross in designated areas, and move them away from other areas. However, many of these techniques are aimed at wildlife species that differ substantially from large ungulates moving across an open steppe landscape (for example, changing vegetation patterns that would influence smaller mammals that travel along particular vegetative structures such as hedgerows, or removing carcasses that would only influence species that feed on carrion). Most of these techniques also have not been tested in the Central Asian context. Their appropriateness should therefore be tested before implementation. A list of techniques can be found in Huisjer et al. (2007).

## E. Monitoring and Evaluation Principles

Monitoring and evaluation (M&E) represents a key component of project implementation, especially given the long time-frame of the impacts caused by most linear infrastructure projects. According to the World Bank's 1998 *Guidelines for Monitoring and Evaluation for Biodiversity Projects*, M&E plans are "a detailed program of work which defines what monitoring activities will take place, when and by whom, and how that information will feed back into management decisions". It is important to note that the monitoring and evaluation results should be used to inform how management or operations may need to change (or adapt) to meet differing conditions over time.

The following guidelines will help project developers and regulators determine the success of mitigation measures.

- i. **Establish goals and objectives.** Generally these will be formulated around reducing habitat fragmentation and barrier effects to movement, maintaining genetic interchange and, for roads and rail lines, also reducing the potential for wildlife-vehicle collisions. They should also incorporate the landscape-level movements of migratory species and not just site-specific mitigation. These goals should be specifically stated with respect to the potentially affected species so that more specific targets can be created that in turn direct monitoring and evaluation activities.
- ii. **Establish baseline conditions.** Determine the extent, distribution and intensity of impacts to wildlife in the area of concern covering both direct and indirect impacts. These must be done before any construction occurs.
- iii. **Identify specific management questions to be answered by monitoring and indicators that can help answer those question.** These questions will be formulated based on the goals and objectives identified and the baseline conditions. Some questions might include:
  - a. Is animal movement across the road increasing or decreasing?
  - b. Are animals able to disperse and are populations able to carry out migratory movements?
  - c. Is road-related mortality increasing or decreasing as a result of the mitigation measures?
  - d. Are animals responding positively to the mitigation measures developed for the project? If not, what issues have been identified as constraints?
  - e. Are threats to migratory species being managed appropriately? (e.g. hunting or poaching not expanding, access to food and water sufficient, etc.).
- iv. **Select indicators.** Identify indicators at the appropriate level(s) of biological organization (i.e., genes, species/population, and community/ecosystem) that correspond to the specific goals and objectives and that help to answer the management questions.

- v. Some indicators should be species specific while others may be broader (e.g. related to habitat). Examples of indicators to consider include:
  - a. Gene flow and genetic structure may indicate whether exchange of genes (i.e. breeding or movement of individuals) occurs across the infrastructure.
  - b. Population distribution, abundance and within-population movement data, as well as demographic processes such as dispersal, fecundity, survivorship, and mortality rates, may permit the assessment of species or population-level connectivity.
- vi. **Identify control and treatment areas.** If pre-mitigation data are available, then indicator responses in adjacent “control” areas may be compared with treatment areas – i.e. road sections with wildlife crossings. It will be important to take account of differences in habitat type and population abundance between treatment and control areas. Therefore controls and treatments should comprise similar habitats, and some means of obtaining population abundance indices to check for confounding effects should be used.
- vii. **Set targets.** Develop one or two targets per indicator with the expectation that the indicators will measure progress toward the target. The targets can be based on a series of milestones for implementing the offset, tracking progress towards achieving no net loss or net gain, and verifying that the project interventions and the designed offset deliver the intended conservation outcomes. Before starting a monitoring program, specific benchmarks and thresholds should be agreed upon that trigger management actions. For example, a >50 per cent reduction in road-kill would be acceptable, but a <50 per cent reduction would trigger additional management actions to improve mitigation performance. Normally a power analysis is also performed to determine if these reductions can actually be detected (see below).
- viii. **Design and implement a monitoring plan.** Apply principles of experimental design to select sites for monitoring the identified goals and objectives and management questions. Successful implementation of monitoring plan will require an appropriate design and the necessary human and financial resources.
- ix. **Validate relationships between indicators and benchmarks.** Research carried out over the short and long term will be needed to determine whether the selected indicators are meeting the management goals and objectives. To determine how well avoidance, mitigation, and compensation measures are performing, linear infrastructure design should include ongoing periodic assessments at intervals of not less than once a year by independent ecologists and botanists commissioned for site assessments. Different indicators will be assessed at different time intervals according to what is being measured and assessed.
- x. **Employ adaptive management.** The results from the monitoring plan implementation should be used to make changes to project management as necessary to ensure success of the mitigation measures over time. The monitoring plan should be designed to link the monitoring data collected to management decisions and approaches.

# Annexes

## A. Primary International Agreements

### I. ESPOO CONVENTION

The Convention sets out the obligations of Parties to carry out an environmental impact assessment of certain activities at an early stage of planning. It also lays down the general obligation of States to notify and consult each other on all major projects under consideration that are likely to have a significant adverse environmental impact across boundaries. It defines ‘impact’ as ‘any effect caused by a proposed activity on the environment’ and ‘fauna’ among other things.<sup>26</sup> Transboundary impacts include any impacts within ‘the jurisdiction of a Party,’ but which originates in the jurisdiction of another Party.<sup>27</sup>

Appendix I to the Espoo Convention provides the current list of activities subject to its impact assessment requirements.<sup>28</sup> The ones relevant to linear infrastructure are:

- (7) Construction of motorways, express roads and lines for long-distance railway traffic and of airports with a basic runway length of 2,100 metres or more;
- (8) Large-diameter pipelines for the transport of oil, gas or chemicals.

ESPOO CONVENTION	
<i>Name</i>	Convention on EIA in a Transboundary Context
<i>Place</i>	Espoo, Finland
<i>Adopted in</i>	February 25, 1991
<i>In force by</i>	September 10, 1997
<i>Parties</i>	42 countries
<i>Depositary</i>	UNECE <a href="http://www.unece.org">www.unece.org</a>

<sup>26</sup> Espoo Convention, Art. 1, paragraph vii.

<sup>27</sup> Espoo Convention, Art 1., paragraph viii.

<sup>28</sup> Annex VII Second Amendment to the Espoo Convention sets out an amended list of projects. This amendment has 24 parties, has not yet been signed by any Central Asian UNECE members, and is not yet in force. The proposed amendments would add the following as a separate paragraph to Section 7 – “7(b) Construction of a new road of four or more lanes, or realignment and/or widening of an existing road of two lanes or less so as to provide four or more lanes, where such new road, or realigned and/or widened section of road, would be 10 km or more in a continuous length.”

(9) Trading ports and also inland waterways and ports for inland-waterway traffic which permit the passage of vessels of over 1,350 metric tons.

For each of the activity areas listed in Appendix I, the UNECE also produces a set of review categories and factors to assist with the assessment process. Review categories and factors for linear infrastructure are contained in a section entitled Project 7 - Construction of motorways, express roads and lines for long-distance railway traffic and of airports (UNECE Impact Checklist). One of the categories is ‘fauna’ for which the following factors must be considered:

- migratory changes – for birds and mammals,
- disturbances to wildlife habitat,
- impacts to threatened species,
- changes in species population,
- impacts to threatened areas, and
- changes in mammal food web (UNECE Project 7, Impact Checklist).

The application of Espoo’s requirements in Central Asia remains limited, however, as three eligible countries (Tajikistan, Turkmenistan, and Uzbekistan) have yet to sign, and two other countries (Mongolia and China) are not part of its geographical coverage and therefore not eligible to sign. That the remaining countries have not signed or are not eligible has an impact on those species whose range and distribution fall wholly or partially within these non-signatory states. Excluding species that only occur in China and in countries not included in these guidelines, species affected by this application gap include argali, Bactrian camel, both Asiatic wild asses (khulan and kiang), Mongolian gazelle, goitered gazelle, saiga antelope, and snow leopard.

The transboundary impacts covered by the treaty are those that occur between Kazakhstan, Kyrgyzstan, and the Russian Federation. These three countries share the ranges for only two migratory species of concern: argali and snow leopard.

## II. KIEV PROTOCOL

The Protocol to Strategic Environmental Assessment, informally known as the Kiev Protocol, is another UNECE agreement relevant to linear infrastructure and managing impacts to migratory species. It was adopted in 2003 and entered into force in 2010. It is singularly focused on ensuring the application of assessment standards to ‘plans and programmes’ and is directed at a long list of resource types and development activities. Among them, and relevant to linear infrastructure, are ‘transport’ and ‘telecommunications.’<sup>29</sup> Annex I contains a detailed list of topics for which assessments must be done and uses language identical to Appendix I of the Espoo Convention. Annex II provides an extended list of project

KIEV PROTOCOL	
<i>Name</i>	Protocol on Strategic Environmental Assessment
<i>Place</i>	Kiev, Ukraine
<i>Adopted in</i>	May 21, 2003
<i>In force by</i>	July 11, 2010
<i>Parties</i>	26 countries
<i>Depositary</i>	UNECE <a href="http://www.unece.org">www.unece.org</a>

<sup>29</sup> Kiev Protocol, Art. 4, paragraph (2)

types. Several of these are forms of linear infrastructure, numbered as they appear in the original text for reference:

- 63) Pipelines for transport of gas or oil, as far as not included in annex I.
- 64) Pipelines for transport of chemicals with a diameter of more than 800 mm and a length of more than 40 km.
- 65) Construction of railways and intermodal transshipment facilities, and of intermodal terminals, as far as not included in annex I.
- 66) Construction of tramways, elevated and underground railways, suspended lines or similar lines of a particular type used exclusively or mainly for passenger transport.
- 67) Construction of roads, including realignment and/or widening of any existing road, as far as not included in annex I.
- 69) Construction of inland waterways and ports for inland-waterway traffic, as far not included in annex I.
- 72) Construction of airports\*\*/ and airfields, as far as not included in annex I.
- 78) Works for the transfer of water resources between river basins.
- 82) Installations of long-distance aqueducts.<sup>30</sup>

Any plan or programme that has 'likely significant environmental effects',<sup>31</sup> is subject to the assessment requirements of the Protocol. In addition, any plans or programmes with 'significant transboundary environmental effects' trigger its requirement for consultation with affected States.<sup>32</sup> Annex III sets out the criteria for determining likely significance as follows:

- 1) The relevance of the plan or programme to the integration of environmental, including health, considerations in particular with a view to promoting sustainable development.
- 2) The degree to which the plan or programme sets a framework for projects and other activities, either with regard to location, nature, size and operating conditions or by allocating resources.
- 3) The degree to which the plan or programme influences other plans and programmes including those in a hierarchy.
- 4) Environmental, including health, problems relevant to the plan or programme.
- 5) The nature of the environmental, including health, effects such as probability, duration, frequency, reversibility, magnitude and extent (such as geographical area or size of population likely to be affected).
- 6) The risks to the environment, including health.
- 7) The transboundary nature of effects.

<sup>30</sup> Kiev Protocol, Annex II List of Projects referred to by Art. 4 relevant to linear infrastructure

<sup>31</sup> Kiev Protocol, Art. 6 and 7.

<sup>32</sup> Kiev Protocol, Art. 10.

- 8) The degree to which the plan or programme will affect valuable or vulnerable areas including landscapes with a recognized national or international protection status.<sup>33</sup>

The Kiev Protocol has not been signed by any eligible Central Asian country and so remains unenforceable in the region. Strategic environmental assessments are therefore entirely reliant on national legislation and any bilateral or regional agreement that requires, or at least encourages, the coordinated assessment of transboundary impacts to wildlife, such as the Convention on Biological Diversity.

**d) European Agreement on Important International Combined Transport Lines and Related Installations (AGTC)**

The stated purpose of this agreement is to establish a “legal framework which lays down a coordinated plan for the development of combined transport services and the infrastructure necessary for their operation based on internationally agreed performance parameters and standards”. Combined transport lines are primarily railway lines used for international transport. The term ‘combined’ is used to indicate that this is an integrated system including ship transport as well.

AGTC AGREEMENT	
<i>Name</i>	European Agreement on Important International Combined Transport Lines and Related Installations
<i>Place</i>	Geneva, Switzerland
<i>Adopted in</i>	February 1, 1991
<i>In force by</i>	October 20, 1993
<i>Parties</i>	32 countries
<i>Depositary</i>	UN Secretary General <a href="http://www.treaties.un.org">www.treaties.un.org</a>

Annex I contains a list of all railway lines that have this designation and includes 12 lines located in three Central Asian countries (Kazakhstan, Kyrgyzstan, and Uzbekistan). Annex III provides infrastructure parameters for existing and new lines. The parameters specify standards that must be met, such as the number of tracks, minimum distances between track centres, nominal speed and others. In the explanation to the parameters, and of note for migratory species, is that one of the stated purposes of international transport lines is to provide a high capacity service. To facilitate this, the minimum number of tracks for all new construction is set at two (no standard for existing tracks) and the nominal speed must increase from the current 100 kph to 120 kph. Both volume and track width have been shown to increase barrier effect on large mammals.

The agreement does not regulate the construction of rail lines, nor does it make reference to the need to consider environmental impacts other than a brief statement in the Preamble recognizing that adverse environmental consequences follow from such development. Even though several lines occurring in Kyrgyzstan and Uzbekistan are listed by the agreement, the sole Central Asian signatory is Kazakhstan.<sup>34</sup>

<sup>33</sup> Kiev Protocol, Annex III, Criteria for determining of the likely significant environmental, including health, effects referred to in article 5, paragraph 1

<sup>34</sup> Available at <http://www.unece.org/fileadmin/DAM/trans/conventn/agtce.pdf>

### III. EUROPEAN AGREEMENT ON MAIN INTERNATIONAL TRAFFIC ARTERIES (AGR)

The Agreement on Main International Traffic Arteries is intended to create “a coordinated plan for the construction and development of roads adjusted to the requirements of future

AGR AGREEMENT	
<b>Name</b>	European Agreement on Main International Traffic Arteries
<b>Place</b>	Geneva, Switzerland
<b>Adopted in</b>	November 15, 1975
<b>In force by</b>	March 15, 1983
<b>Parties</b>	37 countries
<b>Depositary</b>	UN Secretary General <a href="http://www.treaties.un.org">www.treaties.un.org</a>

international traffic and the environment”. Parties to the agreement have adopted a scheme called the E-Road Network and through this agreement created a body of standards. Annex I lists the roads that are part of the network and Annex II describes applicable standards. Chapter VI of Annex II is dedicated to practices for integrating roads into the environment and landscape. Paragraph VI.2 expressly states that:

*When a new project is proposed or existing roads are upgraded, consideration should be given to the direct and indirect effects of the roads and traffic on:*

*- people, flora and **fauna**. (emphasis added).*

This is the only mention of wildlife in the text. It goes on to state, however, that the main impacts from roads and road construction are noise and water pollution (Art. VI.3) and provides some guidance on these.

The easternmost part of the network, E 127, reaches Maikapshagai, Kazakhstan at longitude 85°36' E. Although the network crosses five Central Asian countries (Turkmenistan, Uzbekistan, Tajikistan, Kyrgyzstan and Kazakhstan), Kazakhstan is so far the only signatory to this Agreement. Together, these five countries are Range States for argali, goitered gazelle, saiga antelope and snow leopard.

Figure 3: Map of E-Road Network in Central Asia



Source: <http://www.unece.org/fileadmin/DAM/trans/conventn/MapAGR2007.pdf>

## B. Selected UNECE Transport Conventions in Central Asia

	Construction Traffic Arteries, 1950	E Road Network (AGR), 1975	E Rail Network (AGC), 1985	E Comb. Tr. Network (AGTC), 1991	Protocol Int. Nav. to AGTC, 1997	E Int. Water Network (AGN), 1996	Road Traffic, 1949	Road Traffic, 1968	Protocol on Road Signs & Signals, 1949	Road Signs & Signals, 1968	Suppl. 1968 Convention Road Traffic, 1971	Suppl.1968 Conv. Road Signs & Signals, 1971	Weights and Dimensions, 1950	Suppl. 1949 Conv. and Protocol, 1950	Road Markings, 1957	Protocol Road Markings, 1973	Issue and Validity of Driving Permits (APC)
	Infrastructure networks						Road traffic and road safety										
						X <sup>1/</sup>	S <sup>1/</sup>		S <sup>1/</sup>								
China						X <sup>1/</sup>	S <sup>1/</sup>		S <sup>1/</sup>								
Kazakhstan	X			X			X	X	X	X	X	X					X
Kyrgyzstan						X	X	X	X	X							
Mongolia							X		X								
Russian Federation	X	X	X		X	X	X	X	X	X	X	X					X
Tajikistan							X		X								
Turkmenistan							X		X								
Uzbekistan							X		X								

Legend: X = Ratification, accession, definite signature;

S = Signature;

## C. Related International Agreements

### I. CONVENTION ON MIGRATORY SPECIES (CMS)

Also known as the Bonn Convention, the Convention on Migratory Species was established in 1979 with the aim of conserving aquatic, terrestrial and avian migratory species throughout their range. A major impetus for establishing CMS was not just the status of certain migratory species, but the international legal principle of state sovereignty, which gives States effectively complete control over the animals present in their jurisdiction even if they do not remain there. The Convention on Biological Diversity recognizes sovereign rights to biological resources and the Convention on the Law of the Sea extends this principle to marine species that occur within a country's Exclusive Economic Zone (EEZ). Unless there is an agreement in place, there is no limit to the level of exploitation for any particular sovereign state. As a result, species that migrate between countries are subject to successive management regimes and, without coordination, the conservation efforts of one can be easily negated by the actions or inactions of another.

CMS CONVENTION	
<b>Name</b>	Convention on Migratory Species
<b>Place</b>	Bonn, Germany
<b>Adopted in</b>	June 23, 1979
<b>In force by</b>	November 1, 1983
<b>Parties</b>	118 countries
<b>Depositary</b>	CMS <a href="http://www.cms.int">www.cms.int</a>

CMS has several provisions and tools to facilitate coordination. In Article II, the Parties recognize the importance of migratory species and the need for all Range States to “individually or in cooperation [take] appropriate and necessary steps to conserve such species and their habitat”. In addition, the convention sets out two Appendices, the first listing migratory species that are threatened with extinction. In Article II(3)(b), the Parties agree to “provide immediate protection for migratory species” included in this Appendix. The second lists species that need, or would substantially benefit from, international cooperation. Article II(3)(c) commits the Parties to concluding separate Agreements to cover the conservation and management of these species. Article III(4) goes further and asks Parties and Ranges States:

*a) to conserve and, where feasible and appropriate, restore those habitats of the species which are of importance in removing the species from danger of extinction;*

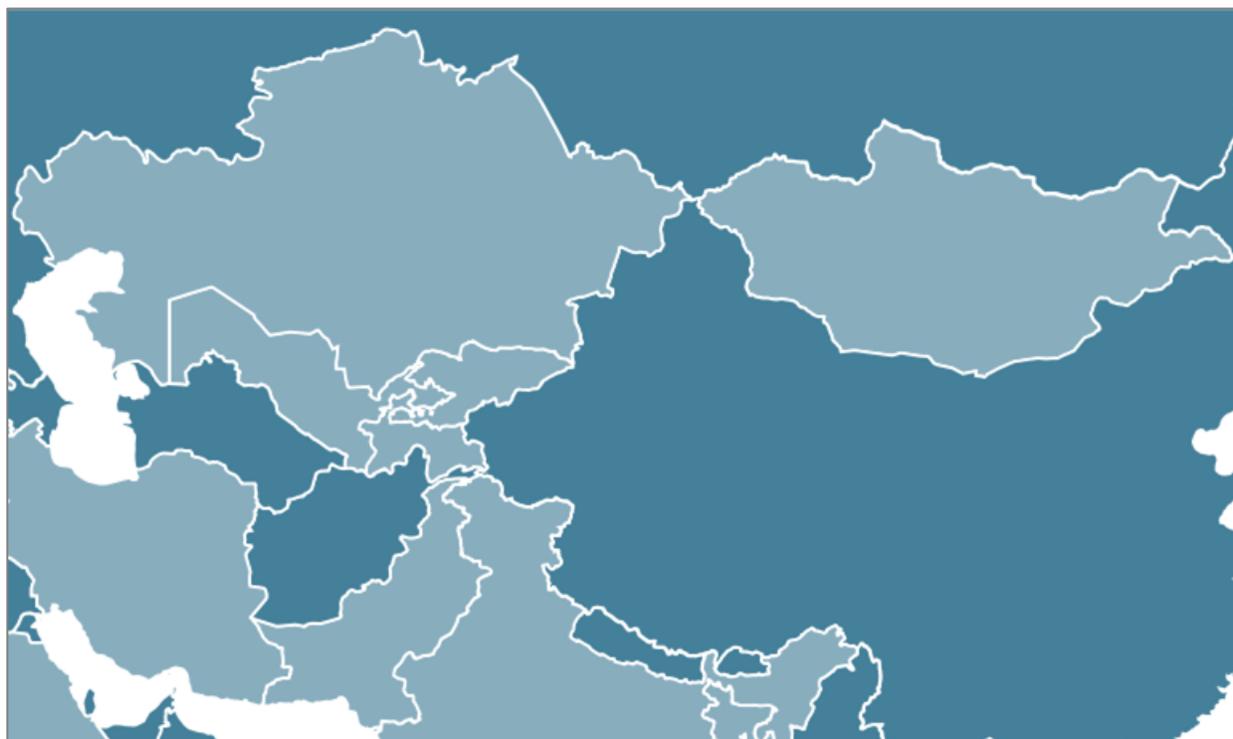
*b) to prevent, remove, compensate for or minimize, as appropriate, the adverse effects of activities or obstacles that seriously impede or prevent the migration of the species;*

As with all international conventions, CMS only applies to those States that have agreed to be bound to its terms through signature, ratification or other accepted process. The following map shows the countries of Central Asia coloured light blue for Parties and dark blue for non-Party Range States. The light blue states have signed the CMS, the dark blue have not signed and

have therefore not agreed to be bound by its terms, although are recognized as being within the range of migratory species that occur on one of the Appendices – hence the name ‘Range States’. Their participation in any of the consultations or cooperative actions is purely voluntary. Central Asian countries and the year they became a Party are as follows:

- Kazakhstan 2006
- Mongolia 1999
- Kyrgyzstan 2014
- Tajikistan 2001
- Uzbekistan 1998

Figure 4: Map of Central Asian Parties and Ranges States



Source: <http://www.cms.int/en/parties-range-states>

Legend: Range States  Parties

China, the Russian Federation and Turkmenistan have not yet signed. Excluding species that only occur in China and in countries not included in these guidelines, species affected by this application gap include argali, Bactrian camel, Asiatic wild asses (khulan and kiang), Mongolian gazelle, goitered gazelle and snow leopard.

## II. CMS RESOLUTION 7.2 - IMPACT ASSESSMENT AND MIGRATORY SPECIES

CMS Resolution 7.2 was adopted at the 7<sup>th</sup> meeting of the Parties in Bonn in 2002. It was drafted in recognition that “avoidable impacts to migratory species often occur through lack of adequate prior assessment of the potential environmental impacts of projects, plans, programmes and policies, carried out in a way that is systematic and formally taken into

account in decision-making”.<sup>35</sup> It also recognizes that, although many countries have SEA and EIA legislation, “most would benefit from international harmonization of guidance on principles, standards, techniques, and procedures and confirmation of their applicability to migratory species interests.”<sup>36</sup>

The Resolution, however, does not set out specific obligations for its members. Instead, it ‘urges’ Parties “to include in EIA and SEA, wherever relevant, as complete a consideration as possible of effects involving impediments to migration, in furtherance of Article III(4)(b) of the Convention, of transboundary effects on migratory species, and of impacts on migratory patterns or on migratory ranges.”<sup>37</sup> It further asks them to make use of the “Guidelines for Incorporating Biodiversity-related Issues into Environmental Impact Assessment Legislation and/or Processes and in Strategic Environmental Assessment” endorsed by Decision VI/7 of CBD COP 6.<sup>38</sup>

### III. CMS MOU CONCERNING BUKHARA DEER

The Memorandum of Understanding (MOU) concerning Conservation and Restoration of the Bukhara Deer was developed under the auspices of the Convention on Migratory Species (CMS) in collaboration with the Central Asia Programme of the World Wide Fund for Nature (WWF) Russia. It became effective on 16 May 2002 and will remain open for signature indefinitely.

The MOU area covers four Range States in Central Asia: Kazakhstan, Tajikistan, Turkmenistan and Uzbekistan. These countries together with three cooperating international organizations (WWF, the International Council for Game and Wildlife Conservation [CIC] and CMS), have signed the MOU. At the Meeting of Signatories in November 2011, Afghanistan was recognized as an additional Range State of Bukhara deer and invited to sign the MOU.

This MOU presents an example of a legal instrument where the signatories are not all Parties to the convention under which it was authored. In this case, Turkmenistan has signed the MOU, but has yet to become a Party to the CMS itself. As a non-Party Range State, its participation is voluntary.

### IV. CMS MOU CONCERNING SAIGA ANTELOPE

The Memorandum of Understanding (MOU) concerning Conservation, Restoration and Sustainable Use of the Saiga Antelope (*Saiga spp.*) was developed under the auspices of the Convention on Migratory Species (CMS) and has been in force since the First Meeting of Signatories in Almaty, Kazakhstan, in September 2006.

All five Range States of the saiga antelope have signed the MOU: Kazakhstan, Mongolia, the Russian Federation, Turkmenistan and Uzbekistan. Cooperating organizations that have signed include the Association for the Conservation of Biodiversity of Kazakhstan (ACBK), Fauna and

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<sup>35</sup> CMS Resolution 7.2, Preamble, 1<sup>st</sup> paragraph.

<sup>36</sup> CMS Resolution 7.2, Preamble 2<sup>nd</sup> paragraph.

<sup>37</sup> CMS Resolution 7.2, Article 2.

<sup>38</sup> Available at <http://www.cbd.int/decision/cop/?id=7181>.

Flora International, the Frankfurt Zoological Society, the International Council for Game and Wildlife Conservation (CIC), the IUCN Species Survival Commission, the Saiga Conservation Alliance (SCA), the Wildlife Conservation Society and WWF International.

The body of this MOU calls for an assessment of species’ distribution, spatial and temporal variation in breeding pastures, and migratory routes. The work carried out as a result provides baseline data for planning and impact assessments.

## V. CONVENTION ON BIOLOGICAL DIVERSITY

The Convention on Biological Diversity is a key international instrument governing the management of the natural environment. A major premise of the CBD is that further loss of biodiversity is unacceptable. This is reflected in the 2010 Aichi Biodiversity Targets in which the CBD Parties have agreed to achieve a significant reduction in rates of biodiversity loss at the global, regional and national level. To ensure no net loss of biodiversity, it sets out the following approach:

- Avoid irreversible losses of biodiversity (especially extinction of a species).
- Seek alternative solutions that minimize biodiversity losses.
- Use mitigation to reduce the severity of impacts.
- Compensate for unavoidable losses by providing substitutes of at least similar biodiversity value.
- Seek opportunities for enhancement as biodiversity is in global decline.

CBD CONVENTION	
<i>Name</i>	Convention on Biological Diversity
<i>Place</i>	Rio de Janeiro, Brazil
<i>Adopted in</i>	June 5, 1992
<i>In force by</i>	December 29, 1993
<i>Parties</i>	194 countries
<i>Depositary</i>	CBD <a href="http://www.cbd.int">www.cbd.int</a>

This mitigation hierarchy of avoid, mitigate and compensate is a standard whereby the first – avoidance – is considered the highest-level good. All planning and development efforts should look to achieve this and the following two pursued only when avoidance is not possible.

As the CBD is the only international agreement in the set presented here that all relevant countries have signed, its provisions specific to environmental impact assessments are especially important.

Article 14 of the CBD sets out several provisions specific to the conduct of environmental impact assessments. In relevant part, it states:

1. Each Contracting Party, as far as possible and as appropriate, shall:
  - (a) Introduce appropriate procedures requiring environmental impact assessment of its proposed projects that are likely to have significant adverse effects on biological diversity with a view to avoiding or minimizing such effects and, where appropriate allow for public participation in such procedures;

(b) Introduce appropriate arrangements to ensure that the environmental consequences of its programmes and policies that are likely to have significant adverse impacts on biological diversity are duly taken into account;

(c) Promote, on the basis of reciprocity, notification, exchange of information and consultation on activities under their jurisdiction or control which are likely to significantly affect adversely the biological diversity of other States or areas beyond the limits of national jurisdiction, by encouraging the conclusion of bilateral, regional or multilateral arrangements, as appropriate;

(d) In the case of imminent or grave danger or damage, originating under its jurisdiction or control, to biological diversity within the area under jurisdiction of other States or in areas beyond the limits of national jurisdiction, notify immediately the potentially affected States of such danger or damage, as well as initiate action to prevent or minimize such danger or damage; and

(e) Promote national arrangements for emergency responses to activities or events, whether caused naturally or otherwise, which present a grave and imminent danger to biological diversity and encourage international cooperation to supplement such national efforts and, where appropriate and agreed by the States or regional economic Integration organizations concerned, to establish joint contingency plans.

2. The Conference of the Parties shall examine, on the basis of studies to be carried out, the issue of liability and redress, including restoration and compensation, for damage to biological diversity, except where such liability is a purely internal matter.

## VI. AMSTERDAM DECLARATION

The Amsterdam Declaration<sup>39</sup> was authored under the auspices of the UNECE and the World Health Organization and adopted in 2009. It was developed primarily to manage environmental and health impacts as they relate to human health and global challenges such as climate change. It does not specifically mention wildlife or migratory species anywhere in its text, but some of its mandates are generally worded and thus potentially applicable to all elements of the environment. One of its major purposes is "to stimulate investment in energy-efficient and low-emission vehicles and transport technologies, environment- and health-friendly modes of transport and infrastructure, such as for public transport, cycling and walking, as well as accessibility and mobility management."<sup>40</sup>

In the Annex containing the PEP work plan for 2009-1014,

AMSTERDAM DECLARATION	
<i>Name</i>	Amsterdam Declaration of the Transport, Health and Environment Pan-European Programme (The PEP)
<i>Place</i>	Amsterdam, the Netherlands
<i>Adopted in</i>	January 23, 2009
<i>In force by</i>	--
<i>Parties</i>	--
<i>Secretariat</i>	UNECE ( <a href="http://www.unece.org">www.unece.org</a> ) WHO ( <a href="http://www.who.org">www.who.org</a> )

<sup>39</sup> Available at [http://www.euro.who.int/\\_\\_data/assets/pdf\\_file/0019/86500/E92356.pdf?ua=1](http://www.euro.who.int/__data/assets/pdf_file/0019/86500/E92356.pdf?ua=1)

<sup>40</sup> Amsterdam Declaration, Priority Goal 1.

paragraph d lists one of the activities as “[f]acilitating the implementation of activities at local, national and regional levels” among other things to “develop, refine and assist in the implementation of tools to support environment and health impact assessments of transport policies.”

Of the seven Central Asian countries eligible to sign, four have done so – Kazakhstan, Tajikistan, Uzbekistan and the Russian Federation.

The next two parts outline the major principles of each of these instruments and discuss the status of corresponding national laws in Central Asia. The goal is to reflect on major components with a view to understanding the need and potential for harmonizing laws so that migratory species can be consistently managed across their range. This review does not assess all possible elements, terminology, implementation practices, and court decisions. All of these of course play a role, but to be adequately addressed should be the subject of a separate intensive exercise to identify gaps and develop regulations that require project planners and developers to identify all impacts and take the steps necessary to avoid and minimize them.

## D. National Legal Framework Assessments

### I. STRATEGIC ENVIRONMENTAL ASSESSMENTS

A widely cited definition of SEAs refers to them as “*a systematic process* for evaluating the environmental consequences of a proposed policy, plan or program... to ensure that they are fully included and appropriately addressed at the earliest appropriate stage of decision making on par with economic and social considerations” (*emphasis added*) (Sadler and Verheem 1996). Other than the focus on plans, programmes and policies, the biggest departure from the standard definition of an EIA is the emphasis on ‘process’. An SEA in this sense is not just a single event, but also a governance approach to ensure the integration of environmental and social considerations along a line of decisions that ultimately connect to the project-based EIA itself.

Lovei (2006) describes two main types of SEAs:

- 1) **impact-centred**, designed to assess and predict likely environmental impacts and establish necessary prevention, mitigation and control measures; and
- 2) **institution-centred**, assessing institutional and governance standards and practices to manage impacts from policies, plans, and programs that cannot be accurately predicted in these early stages.

When part of a single system, the two types fit neatly into a standard project-cycle management model, wherein initial decisions (based on impact-centred assessments) are regularly reviewed and adjusted (through institution-centred practices) to ensure that they continue to be based on sound information. This type of process is important for any resource, but especially so for managing migratory and nomadic species whose movements and

populations can fluctuate over time. In the Central Asian region, the pace of new development further complicates this as well as the fact that, for many species, initial baseline data are scarce or missing.

For these guidelines, we reviewed legislation for each country and documented the provisions that can be considered part of an SEA process, whether or not they are specifically labelled as such. Different languages, interpretations and complex regulatory formats make it difficult to compare content between countries perfectly, but there are nonetheless visible trends and concepts that can be captured regardless of the specific wording. The goal of this review is not to say that the absence of an express reference means that a particular thing is not included; broad references can indeed be sufficient. However, in most cases the greater the need to interpret, the greater the insecurity in the legal framework. Regulatory frameworks that do the bulk of the interpreting are not subject to the same review processes as primary legislation and can be changed with greater frequency. In the absence of additional information concerning interpretations and actual practices, a clear reference adds to the certainty that a given component has in fact been securely anchored in the legal system.

Assessing the institution-centered elements of each country's legislation would require a detailed review of more than just the primary legislation. Typically the regulatory instruments under each law define the institutional processes that govern assessments. Kazakhstan, as a contrary example to this, did include institution-centred SEA provisions requiring assessments at three instances in addition to the initial – finalization of the project, at the introduction of any amendments, and pursuant to court judgments.

For impact-centred assessments, the question is whether the laws require assessments for any of the three major categories of **policies, plans, and programmes**. Based in part on the definitions for these terms given by Wood and Djeddour (1992), we broadly defined 'policy' as reference to any document that provides "guidance for action" and looked for provisions that used the term 'policy' itself, or identified any form of legislation at any level (international agreements, laws, enactments, regulations, standards), as well as guidelines. For plans, again we looked for the term and synonyms such as "scheme(s)" (used in Uzbekistan and other former CIS countries). We expanded this to look for provisions that identify any documents that serve a planning purpose, e.g. feasibility studies, mapping, and zoning exercises. We excluded instances where the term is used solely in reference to the plans for particular projects or types of projects. For programmes, we included any provisions that mentioned the term 'programme' or identified sets of projects for a particular area or resource. Finally, we looked to see whether 'linear infrastructure' or 'migratory species' are specifically referred to in any SEA-related provisions.

For the most part, SEA provisions have general wording, but as just noted they also provide specific examples of what is included. There is nothing legally deficient in the use of general wording, but lists contained directly in the legislation have an impact on understanding, interpretation and application. What is and is not mentioned is therefore worth highlighting as herein lay at least some potential for differing management approaches. For example, most of the countries (five of seven) specifically mention natural resources or the environment in the context of SEA-related provisions. The remaining two (Turkmenistan and Mongolia) are silent in

this regard. Only one country, Kazakhstan, goes further to specifically mention wildlife, using the term ‘animal resources.’<sup>41</sup> And finally, only one country, Tajikistan, uses a term related to linear infrastructure (transportation) when describing the content of certain draft regulations that are subject to review. It appears from the wording, however, that the term is not related to linear infrastructure construction standards, but standards that apply to the transport of goods.<sup>42</sup>

SEAs are still a recent development in the region (e.g., Mongolia expanded its EIA law to include plans, policies, and programs in 2012) and between them all are numerous differences in the exact wording and therefore potentially the actual application. As a starting point, however, national legal structures in Central Asia, with the exception of the Russian Federation, have at least the basic legal foundations to support impact-centered strategic assessments. What is not yet clear is the degree to which institution-centred practices are also in place.

## II. PROJECT BASED EIAs

These guidelines do not review all of the differences and nuances that may matter to EIA practice, focusing only on content related to three major concerns: 1) whether transboundary impacts must be considered; 2) whether and what types of linear infrastructure must be reviewed; and 3) whether wildlife, and more particularly, migratory species are among the resources to be considered.

In this part of the review, it helps to have some background on the history and intent of EIA legislation. These types of laws are fundamentally a form of planning tool, as opposed to a standards-setting mechanism. EIA laws make consideration of the adverse effects on the environment a requirement in government decision-making processes. Unlike many environment and development related laws, it is entirely process-oriented as opposed to outcome-oriented; in other words, it focuses on how information is gathered and used in a decision, not on the standards that apply to the decision itself.

A forest law, by contrast, will define the annual allowable cut for a forest area, usually a specific number of cubic metres (or board feet) in a specific area (a defined forest boundary) for a given year. Exceeding the annual allowable cut is a violation of the law. Similarly, a water quality law may specify turbidity rates (the amount of suspended material in water measured in NTUs) that cannot be exceeded for water to be considered safe for drinking. An air quality law will define the allowable emissions rate (parts per million) for a particular pollutant (e.g. SO<sub>2</sub>) over a given

The law’s job is to ensure that decision-makers are aware of potential harms, have relevant information when evaluating the appropriateness of a project’s approval or denial, and can make the best decisions to avoid, reduce and mitigate possible harms.

<sup>41</sup> Environmental Code of Kazakhstan, Art. 47(6).

<sup>42</sup> Law of Tajikistan on Ecological Expertise, No. 818, Art. 9(1), sub-paragraph 2.

period of time (e.g. 24 hours). All of these are examples of laws that present defined targets that can be measured, compliance with which is mandatory.

EIA laws might reference the standards in these laws; but the legislation itself does not set environmental compliance targets. If there are no hard and fast rules in a nation's other laws to prevent a project from going forward, the EIA process typically does not step in to create substitute standards. The law's job is to ensure that decision-makers are aware of potential harms, have relevant information when evaluating the appropriateness of a project's approval or denial and can make the best decisions to avoid, reduce or mitigate possible harms. The EIA can thus be boiled down to three fundamental requirements for decision makers:

- To examine potential impacts for projects;
- To justify their decisions based on studies conducted and public input received; and
- To make decisions to avoid, reduce, or mitigate possible harms.

As a result, EIA legislation does not typically result in stopping a project simply because harm to the environment or a resource may result. If a court or a governing body issues an injunction against a project, the alleged EIA violation is related in some way to the procedure, public process, or the adequacy of the information gathering or analysis, and not a substantive violation of an environmental standard.

In this review, we are therefore asking whether certain types of infrastructure are clearly identified in the legislation and whether impacts to wildlife, in particular migratory species, are also expressly required, and not which standards or levels of harm apply. As with the SEA provisions, there are difficulties in making full comparisons, but general patterns are nonetheless discernible and in some instances, clear mandates can be cited. The clearest example comes from Kazakhstan's legal framework. Not only has Kazakhstan signed most of the relevant international agreements highlighted in the previous section, but it has also instituted specific implementing legislation and fully revised its approach to impact assessments in its Environmental Code. The number of project-level references to linear infrastructure, transboundary impacts, wildlife and migratory species are too numerous to repeat here. However, the most succinct expression for purposes of this review is contained in Article 237, which states that:

6. In designing and constructing railways, motor roads, main pipelines, power and communication lines as well as canals, dams and other water engineering facilities, actions that ensure conservation of wildlife migration routes must be developed and implemented.

The only linear infrastructure type not referred to with the same clarity is fencing. The Environmental Code mentions them twice; once as a requirement for the development of plots of land used for the placement, burial and storage of industrial waste;<sup>43</sup> and again in Article 222 in reference to "overhead line accessory centres." This gap does not mean that impact of fences are not already covered when part of the 'design and construction' of other linear infrastructure. However, whether they are reviewable as stand-alone infrastructure is not clear.

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<sup>43</sup> Environmental Code of Kazakhstan, Art. 217, paragraph 4.

None of the other countries have this level of detail and clarity concerning linear infrastructure or migratory species in their primary, project-based EIAs legislation. Wildlife is the most frequently included term (five of the eight countries), but it is used in a variety of contexts that likely have different implications for the type of animals included and why. China, for example, only refers to ‘animal husbandry’ in the context of assessments for plans, but does not use the term wildlife in any form. Mongolia’s recently revised EIA law mentions the term ‘animal’ in its definition of ‘risk assessment’ to indicate that this is one of the resources that must be reviewed in this type of assessment, but without further clarification; while Kyrgyzstan has several references to wildlife in its definitions and assessment requirements that are broadly worded and also specifically identifying endangered species. Turkmenistan’s law does not include any reference to wildlife or animals. The Russian Federation’s laws reference wildlife for both general conservation and for impact assessments. However, its explicit reference to migratory species is limited to fish. Other than Kazakhstan, no legal framework refers to migratory species that would conceivably apply to large ungulates. The need to consider transboundary impacts has been incorporated into the legislation of just four countries: Kazakhstan, Tajikistan, the Russian Federation and Kyrgyzstan. Finally, linear infrastructure is also mostly absent, although potentially covered by general references. Chapter III of China’s EIA law is directed generically at ‘construction projects,’ which could include linear infrastructure. However there is no specific reference to any type of linear infrastructure. Both Kyrgyzstan and Uzbekistan specifically identify roads, rail lines, and pipelines, while Turkmenistan’s law makes no mention of linear infrastructure of any kind. Assessments are “mandatory in the process of investing, business and other activities carried out on the territory of Turkmenistan, associated with the transformation of the human environment”.<sup>44</sup> Arguably this could include linear infrastructure, but the connection is not explicitly made. Fences are not mentioned by any (excluding the references in Kazakhstan’s Environment Code that likely have no application in this context).

From this top-level review, there is a strong indication that there is room to improve the legal and regulatory foundation for migratory species in national EIA legislation. However, the severity of the perceived gap cannot be answered without a more in-depth analysis of regulatory instruments, related practices and interpretations. In other words, does the general reference in Turkmenistan’s law to “other activities” in fact apply to linear infrastructure? In some instances, the lack of an explicit reference seems more likely to result in an actual gap in practice. Only three country references transboundary impacts, for example, and this is consistent with the level of acceptance of the Espoo Convention among the countries reviewed, and therefore a strong indication that transboundary impacts are still not part of assessment practices. The need to address migratory species impacts (and in general both indirect and cumulative impacts) is something that may require modifications in regulations in most countries. Ideally these modifications could be harmonized among countries and even made more consistent with best practices included in lender requirements (see section below).

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<sup>44</sup> Law of Turkmenistan on Environmental Review, Art. 3 (1995).

## E. Sample National Legal Framework

The number of legal instruments at the national level potentially related to environmental impact assessments and migratory species is typically many more than the applicable international agreements. It is also highly variable from country to country. Some countries, for example, have yet to institute legislation for strategic environmental assessments, while others have this, project-based impact assessment requirements, and complementary laws implementing every related international agreement they have signed. Some manage most legislative questions through national laws and supplement with few implementing regulations. Others create multiple regulatory instruments for every law adopted.

Regardless of the volume of legislation, there is always an extensive framework to consider when planning and developing linear infrastructure. This is due to the physical nature of this type of development and how national legal frameworks are typically structured. By its nature, linear infrastructure crosses almost every form of natural resource from forests, to water, soil, wildlife, protected areas, border territories and more. A common practice for all countries is to establish separate laws for each resource, and many separate activities as well, and in the process create a wide array of potential standards, practices, limitations, and permissions that may apply to a single linear infrastructure project.

Outlining all possibly relevant laws is therefore a time consuming task just for one country, let alone all of the countries reviewed in these guidelines. Given the usual pace of legal development, putting them here would have short-lived value as the information would soon become obsolete. It is nonetheless instructive to illustrate what a potential framework may look like. To this end, these guidelines present a table of laws (Table 6) for one of the Central Asian countries (Kazakhstan) to represent what may need to be consulted for a given linear infrastructure project.

As with international legislation, national laws are divided into two sections – primary and related. For each law, the table gives the name of the legislation, the year it was approved, and brief comment to highlight the type of law. This is not a detailed or comprehensive review to show all laws and all possible mandates; only to illustrate the breadth of review required. Even so, the table compiles twelve primary and seven related laws, regulations, and guidelines. The first two primary laws are different types of strategic environmental impact assessments and the third is the guidelines for transboundary EIAs. The next six are all project-based requirements, followed by two rules and guidelines for public participation. The related laws illustrated in the list are the various resource laws (e.g., water, land, forests, wildlife) headed by the country's overarching environment law. This is just a sample list for illustration that does not include other potential primary laws that might, for example, set specific standards for road construction, or related legislation governing other resources.

Table 6: Table of EIA Related National Legislation, Kazakhstan

No.	Document Title	Year	Comments
Primary Legislation			
1	Rules for assessing impact of proposed activities on the environment in the development of national, regional development programmes, industries, layouts of the production forces; No.129-p	2003	Strategic impact assessments
2	Instructions for the assessment of planned economic and other activity on the environment when developing pre-planning, design and project documentation № 204-p	2007	Strategic impact assessments
3	Guidelines for conducting environmental impact assessment in a transboundary context for Central Asian countries	2006	Transboundary EIA requirements
4	Regulations on state environmental review, № 207-p	2007	Project-based EIA Requirements
5	Criteria for allocation of objects of category I that are subject to State ecological expertise, between the authorized body in the field of environmental protection and its territorial subdivisions № 449	2009	Project-based EIA Requirements
6	Allocation of objects of category I that are subject to State ecological expertise, and for the issuing of permits for emissions in the environment between the authorized body in the field of environmental protection and its territorial subdivisions, № 143-p	2009	Project-based EIA Requirements
7	The rules for monitoring the activities of officials of local executive bodies in the environmental review № 160-p	2007	Government administration of EIA processes
8	The rules for public hearings, № 135-o	2007	Public participation for assessments
9	The Rules on access to environmental information relating to the procedure for assessing the impact on the environment and the decision making process on the planned economic and other activities № 238-p	2007	Access to information for EIAs.
10	A guide to the environmental impact assessment for the States-participants of the CIS		Guidelines for EIA practice
11	The rules for state registration of public environmental review conducted by the local executive bodies, in which the activity is scheduled expertise № 149-p	2004	Government administration of EIA processes
12	The information and reference guide for organizing and conducting public hearings on issues related to the environment	2007	Guidelines for public participation

No.	Document Title	Year	Comments
Related			
1	The Environmental Code, № 212-III	2007	General environmental protection
2	The Law of the Republic of Kazakhstan "On protection, reproduction and use of fauna", № 593-II	2004	Resource specific legislation
3	The Land code, № 442-II	2003	Resource specific legislation
4	The Forest Code, № 477-II	2003	Resource specific legislation
5	The Water Code, № 481-II	2003	Resource specific legislation
6	The Law of the Republic of Kazakhstan "On Subsoil and Subsoil Use", № 2828	1996	Resource specific legislation
7	The Law of the Republic of Kazakhstan "Specially Protected Areas", № 175-III	2006	Resource specific legislation

## F. Excerpts of National SEA Legislation

The following section on legislation is comprised of unofficial translations obtained from a variety of electronic sources. The CMS has not verified the quality of these translations; they have been used solely for the limited purposes of reviewing specific references related to linear infrastructure and to facilitate comparisons in a single language. CMS makes no warranty, express or implied, as to the accuracy, completeness or reliability of the translations. All reproductions of such text are intended solely to facilitate further research, assessments, and collaboration. The official text is always in the official language of the country.

### I. KAZAKHSTAN:

Kazakhstan's SEAs provisions are first outlined in its Environmental Code and include both impact-centred and institution-centred elements. Article 47 of the Environmental Code sets out a list of activities subject to an impact centered review. Those that are potentially relevant to linear infrastructure and migratory species include the following:

- 2) all types of pre-planned and pre-project documentation relating to **nature use issues**, forecast projects, **environmental and other programmes**, concepts of principal activities of government agencies and organizations, state investment programmes, agreements, and contracts including those relating to the change of ownership and privatization forms;

5) drafts laws and regulations of the Republic of Kazakhstan, technical regulatory and instructional documents, the implementation of which is likely to result in negative environmental impact;

6) feasibility studies (calculations) and projects of placement, construction, reconstruction, development, upgrade, conversion, and liquidation of plants, facilities and complexes, buildings and structures, and biological substantiation for mining and use of **animal** and plant **resources**;

7) draft area layout maps;

8) urban and area general development plans, including areas of special economic zones and territories which offer special conditions for business activities;

9) data of comprehensive environmental study of the areas to substantiate assigning to such areas of the legal status of specially protected natural areas, areas of environmental disorder or environmental emergency, and rehabilitation programmes for such areas;

2. Objects of state environmental review shall be subjected to a repeated state environmental review in the following cases:

1) finalization of the project under state environmental review subject to comments of the previous State environmental review;

2) introduction of amendments into the project and other documentation after obtaining an affirmative statement of opinion of State environmental review; and

3) on the grounds of a court judgment.

3. Objects of state environmental review shall be subdivided into categories I, II, III, IV in accordance with the classification set out in Article 40 hereof.

Category I shall also include **draft laws and regulations** elaborated by central government agencies and the objects specified in sub-paragraphs 6) – 9) and 11) of paragraph 1 of this Article.

Category II shall also include **draft legal acts of local authorities, draft regional plans and programmes, general area development plans of oblast and district importance**.

## II. KYRGYZSTAN

### CLAUSE 3. OBJECTS OF ECOLOGICAL EXPERTISE

Objects of the ecological expertise are as follows:

Drafts of enactments, standards, guidance and other documents regulating economic and other activities;

Materials preceding detailing development projects and productive forces placement in Kyrgyz Republic including:

- Drafts of investment, integrated and also goal-oriented socioeconomic, research and other state programs associated with the ***nature management***;
- Drafts of territorial development layouts including free economic zones and areas with special regime of ***nature management***;
- Drafts of industrial development plans;
- Drafts of state integrated plans for nature protection and usage of water, forest, land and other ***natural resources*** including drafts of ecological rehabilitation of territories and remediation;
- Feasibility studies and also construction, reconstruction, development, re-equipment, conservation, laying-up, and dissolution projects; other projects regardless of their estimated cost, affiliation and patterns of ownership implementation of which can have an impact on the environment;
- Feasibility studies and economic projects of other neighbouring states which will involve usage of natural objects (resources) in common with neighbouring states;
- Drafts of international agreements, contracts and obligations associated with nature management;
- Technical manuals for new equipment, technology, materials, substances, licensed goods and services including imported ones;
- Materials of an integrated ecological examination of areas, giving reasons for validation these territories as specially protected areas, ecological disaster zones or ecological emergency zones as well as programs for rehabilitation of these territories;
- Materials which support granting certificates, licences and permissions to engage in activities capable of having an impact on the environment including export and import of products and ***natural resources***;
- Materials characterizing environmental conditions of separate regions, areas and objects;
- Agreements, contracts, conventions concerning change in patterns of ownership of enterprises which have negative impact on the environment;
- Other documentation supporting economic and other activities.

### III. TAJIKISTAN

Article 6: Competence of the Government of the Republic of Tajikistan and the powers of other State bodies in the field of environmental impact assessment

- Coordination of the activities of state bodies on joint activities to implement environmental assessment on ***programs*** of national and international importance;

Article 9: What is the state ecological expertise

Objects of the state ecological expertise are the following projects or other documents on economic and other activities that may have an adverse impact on the environment:

- National and local projects, industry concepts, forecasts, **programmes and schemes**, the implementation of which involves the use of **natural resources** and (or) may have an impact on the environment;
- Draft **technical regulations**, which establish the requirements for the protection of the **environment** and (or) **management of natural resources** to production processes of its development, production, operation (use), storage, **transportation**, marketing and utilization or the provision of services.

## IV. TURKMENISTAN

### LAW OF TURKMENISTAN

#### State Environmental Review

##### Article 1 The State Ecological Expertise

State ecological expertise - kind of expert activity, carried out by specially authorized State bodies, expert groups and based on scientific, socio-ecological research, analysis and evaluation of projects, **programmes**, design and estimate documentation, expertized facilities as well as existing enterprises and to ensure compliance their rules and regulations of environmental protection, environmental management and environmental safety requirements of the population.

##### Article 3. Obligation of the State ecological expertise in investing, business and other activities

State ecological expertise is mandatory in the process of investing, business and other activities carried out on the territory of Turkmenistan, associated with the transformation of the human environment.

##### Article 6. Objects of state ecological expertise

State ecological expertise shall be:

- draft **programmes**, the main directions and **plans** for the placement of the productive forces and sectors of the economy;
- pre-project and project documentation for the development of economic and other activities;
- Projects of methodical and **normative technical documents regulating** economic activity;
- documentation to develop new technology, biotechnology developments, the production technology of materials and substances, including purchased abroad;
- ecological situation in Turkmenistan and its regions;
- operating companies and other entities.

## V. UZBEKISTAN:

### Article 11. Objects of State ecological expertise

Objects of the State ecological expertise are:

- projects of State **programmes**, concepts, layouts and development of the productive forces of the economy and the social sphere;
- Materials selection of land plots for all types of construction;
- and project documentation;
- draft technical regulatory and methodological documents regulating economic and other activities related to the use of **natural resources**;

- documentation on the creation of new types of equipment, technologies, materials, substances and products;
- existing enterprises and other objects that have a negative impact on the environment and public health;
- Materials comprehensive survey areas for subsequent giving them the status of protected natural areas, zones of ecological emergency and environmental disasters;

(Eighth paragraph of Article 11 as amended by the Law of the Republic of Uzbekistan dated January 4, 2011 number LRU-278 - NW RU, 2011, â,,– 1-2, Art. 1)

- all kinds of **planning documentation**;
- objects with a special legal regime.

## VI. CHINA

### Chapter II. Environmental Impact Assessment on Plans

Article 7. The relevant departments under the State Council, the local people’s governments above city level with districts under their jurisdiction and their departments concerned should organize and conduct environmental impact assessment in the process of drawing up plans, and compile sections and chapters or explanations regarding the environmental impact of the plans when organizing the drawing-up of relevant land utilization plans, and drawing up construction, development and utilization plans of regions, drainage areas and sea areas.

The environmental impact sections and chapters or explanations of the plans should include analysis, forecasts and evaluation of possible environmental impacts after the implementation of the plans, put forward a strategy and measures to prevent or reduce the adverse impact on environment, and be submitted to the department examining and approving the plans as a component part of a plan.

Those plans without environmental impact sections and chapters or explanations will not be approved by the examining and approving organization.

Chapter 8. The relevant departments under the State Council, the local people’s governments above city level with districts under their jurisdiction and their departments concerned should organize and conduct environmental impact assessment for their organized compiling of special plans (hereafter called “special plans” for short) for the development of industry, agriculture, animal husbandry, forestry, energy resources, water conservancy, communications, urban construction, tourism and **natural resources** before the draft of the special plans are submitted for examination and approval, and provide the examining and approval department responsible for examining and approving the special plans with the environmental impact assessment report.

The guiding plan of the special plans listed in the previous section should have environmental impact assessment conducted in accordance with the stipulation of Article 7 of This Law.

## G. Excerpts from National EIA Legislation

The following section on legislation is comprised of unofficial translations obtained from a variety of electronic sources. The CMS has not verified the quality of these translations; they have been used solely for the limited purposes of reviewing specific references related to linear infrastructure and to facilitate comparisons in a single language. CMS makes no warranty, express or implied, as to the accuracy, completeness or reliability of the translations. All reproductions of such text are intended solely to facilitate further research, assessments, and collaboration. The official text is always in the official language of the country.

All terms in italics and bold have been added by the authors to facilitate review. This is a review of major legislation. Where available, regulations and other guidance documents were also reviewed.

### I. KAZAKHSTAN

#### a) Environmental Code

Article 43. Specifics of Environmental Impact Assessment with regard to facilities which are likely to have transboundary impact

Specifics of the environmental impact assessment with regard to facilities which are likely to have transboundary impact shall be defined by international treaties ratified by the Republic of Kazakhstan.

Article 47

10) projects of business and other activities which are likely to cause an environmental impact **on adjacent states**, or the performance of which will require the use of natural objects which are shared with certain States, or which affect the interests of adjacent States as defined in the international treaties;

Article 237:

3. During placement, design and construction of inhabited localities, plants and factories, structures and other facilities, during production processes and operation of transport vehicles, improvement of existing technology processes and introduction of new technology, introduction into commerce of unused, near-shore, waterlogged and bushy areas, land development, use of forest resources and water bodies, exploration operations, mineral resource extraction, delineation of areas for pasture and driving of cattle, **development of travel routes** and organization of areas for mass recreation of the public, **measures to protect wildlife habitat and reproduction conditions as well as migration routes and areas of wildlife concentration** shall be stipulated and implemented, and inviolability of areas that present special value as wildlife habitats shall be ensured.

4. During environmental assessment of projects for construction and upgrade of plants and factories, structures and other facilities, introduction of new equipment, technology, materials and substances, there shall be imperative that their **impact on wildlife, habitat, migration** route and wildlife reproduction be considered.

5. During any activity that impacts, or may impact, **wildlife**, individuals and legal entities must ensure **protection of wildlife habitat, reproduction environment and migration routes** and carry out actions to prevent loss of wildlife during production processes, including storage, transportation, utilization of preparations, chemicals and chemical compounds, stocking, waste disposal, agricultural operations, forest husbandry, timber felling and other operations, as well as during operation of power grids and transport vehicles.

6. **In designing and constructing railways, motor roads, main pipelines, power and communication lines as well as canals, dams and other water engineering facilities**, actions that ensure conservation of wildlife migration routes must be developed and implemented.

Article 239:

8. There shall be prohibited to:

2) apply pesticides (toxic chemicals), mineral fertilizers and other preparations:

in reserve areas located on specially protected natural areas;

in designated rest areas at the places of mass concentrations of animals during their migration and mating as well as at the spots which are of special value as the habitat of wild animals;

at designated places of the habitat and artificial breeding of rare and endangered species;

Article 250:

8. In the design and conduct of business and other activities, actions shall be developed to preserve the habitat and the conditions for reproduction, migration routes and places of concentration of rare and endangered animal species, and integrity of designated areas that are of special value as a habitat of these animals shall be ensured.

## b) Law on the Accession of the Republic of Kazakhstan to the Convention on Environmental Impact Assessment in a Transboundary Context

### Appendix 1 List of activities:

7. Construction of motorways, express roads and lines for long-distance railway traffic and airports with long main runway bands of 2,100 metres or more.

"Motorway" means a road specially designed and built for motor traffic, which does not serve properties bordering on it, and which:

a) has, except at special points or temporarily, with separate carriageways for traffic in both directions, separated from each other dividing strip not intended for traffic or, exceptionally, by other means;

- b) does not cross at level with any road, w / d or tramway track, or footpath; and
- c) is specifically designated as a motorway.

"Express road" means a road reserved for motor vehicles Is accessible only from interchanges or controlled junctions and on which, in particular, stopping and parking are prohibited on the roadway (carriageways).

8. Oil and gas pipelines with large diameter pipes.

### c) Guidance on the Practical Application of the Espoo Convention: Convention on Environmental Impact Assessment in a Transboundary Context

On the other hand, an activity that causes impacts on **migrating animals**, have transboundary long-range implications. Agreements may list specific activities to be screened for long-range impacts.

(vii) "impact" means any effect caused by a proposed activity on the environment including human health and safety, flora, fauna, soil, air, water, climate, landscape and historical monument or other physical structures or the interaction among these factors; it also includes effects on cultural heritage or socio-economic conditions resulting from alterations to those factors

Appendix 1 for this 'guidance document' contains the same reference to linear infrastructure types as listed in Appendix 1 for Kazakhstan's Espoo Convention implementation law.

## II. KYRGYZSTAN

### a) The Law of Kyrgyz Republic on Ecological Expertise

Clause 10:

Ecological assessment is organized and performed while preparing studies for the following activities:

- Concepts, programs and plans of sectoral and territorial socioeconomic development;
- Plans of integrated usage and protection of natural resources;
- Master plans of cities and settlements as well as other town-building documentation;
- New construction, reconstruction, expansion and re-equipment of operative economic and other entities able to have impacts on the environment.

Availability of the ecological assessment in all types and stages of design plans and specifications is a requirement being a basis for decision-making by the authorized State organization on ecological expertise.

## b) Guidelines for the State ecological examination of pre-, design and other materials and documents in the Kyrgyz Republic

**wildlife (migratory):** terms fauna and animal are mentioned

**linear infrastructure:** not mentioned

**railways:** not mentioned

**pipelines:** not mentioned

**fences:** not mentioned

9.2:

In reviewing the materials that characterize the State environment before the planned activity, attention is drawn to detailed reporting:

- natural features of the area;
- state components of the environment (air basin, in surface and groundwater, soil and soil, subsoil, plant and animals peace, social environment)

Appendix 2:

"Evaluation of the proposed activity on the environment impact assessment (EIA) ": A complete characterization of the facility's impact on air, surface and ground water, land, soil cover, flora and fauna, the analysis of component-wise change of the environment (degradation, stabilization), the characteristic activities to mitigate (neutralize) the impact on the environment and the conditions of life of the population.

**roads:**

5.1:

Territorial control environmental implementation- following expert activity:

- participate in committees siting under construction

The number of objects that have little adverse impact on the environment (welfare facilities, gas stations, service stations, farms, Maersk farms, roads, drainage structures, nationwide power lines and intraregional values, etc.);

- the State ecological examination of technical and economic studies (calculations), construction projects and reconstruction, projects MPE and MPD above mentioned facilities.

## c) Instructions "on the procedure for Assessing the Impact of the Proposed Activity on the Environment (EIA) in the Kyrgyz Republic"

### 8. Documentation and Information:

Documentation in general should contain the standard elements of EIA:

d) analysis of environmental information, including consideration of cumulative and synergistic effects, and any kind of **transboundary** impacts;

#### Annex 7: Terms and Definitions

Transboundary impacts - impact that objects of economic and other activities of one country (region, area) on the territory of another state (region, area).

Species that are endangered - species of plants and animals that are under threat of extinction throughout their range of distribution or a substantial part thereof.

Wildlife management - collection of all forms of exploitation of natural resources potential and measures for its conservation.

Environmental components - components of ecosystems. These include air, surface and underground water, minerals, soil, flora and fauna.

#### Step 2 - Determination of the effects on the environment:

Completeness and adequacy of information on the nature of the natural conditions of a territory considered from the standpoint of its study, the sensitivity to impact. Sufficiency of the study is on the site selection stage (platform) and assumes the availability of information on the types and nature of the expected impact.

The information should include the following components:

g) biological factors (flora and fauna);

- A description of the impact on the species to man, flora, fauna, soil, water, air, climate, landscape, material assets and cultural heritage, the relationship among these factors;

**linear infrastructure:** not used, but infrastructure is

#### Step 2 - Determination of the effects on the environment:

Completeness and adequacy of information on the nature of the natural conditions of a territory considered from the standpoint of its study, the sensitivity to impact. Sufficiency of the study is at the site selection stage (platform) and assumes the availability of information on the types and nature of the expected impact.

The information should include the following components:

e) infrastructure;

- Profitability of the company is calculated within the boundaries of the self-supporting independence for the current tariffs, prices.

In the calculation should be included the cost of production and distribution, operation and maintenance of production facilities and social infrastructure. Consumption of natural resources and the use of external services for the processing and disposal are estimated to set tariff rates subject to the existing order of payment;

Appendix 2:

The list of activities subject to EIA

17. Construction of roads and railways.

Annex 7:

TERMS AND DEFINITIONS

Types of planning documentation

7) projects detailed planning community center, residential areas, highways cities;

**railways:**

Appendix 2:

The list of activities subject to EIA

7. Metal industry:

c) aviation and rail transport repair enterprises;

17. Construction of roads and railways.

**pipelines:**

Appendix 2:

The list of activities subject to EIA

1. Energy facilities:

c) pipelines, asking for the supply of gas, oil and oil products, heat;

d) high-voltage power lines;

d) storage of oil and oil products, gas, solid fuels;

3. Enterprises by extraction and processing of oil, petroleum products and gas.

4. Production of building materials (cement, asphalt, slate, asbestos-cement pipes, etc.).

#### d) Regulation on state control over environmental protection, natural resource management and environmental security of the Kyrgyz Republic

8. Departmental control by ministries and departments within their industry, the activity of enterprises, institutions and organizations that are associated with the exploitation of natural resources.

- Hunting grounds and fishing-hunting society - in terms of the protection of game animals and birds on their assigned territories.

### III. TAJIKISTAN

#### a) Law the Republic of Tajikistan on Environmental Expertise, April 16, 2012 number 818

##### CHAPTER 1: GENERAL PROVISIONS Article I. Basic Concepts:

In this Law the following basic concepts:

- Transboundary impacts - impacts on the environment of a foreign country, which can be caused by a proposed on the territory of the Republic of Tajikistan and other economic activities;

##### Article 11 The term of the state ecological expertise:

1 The term of the state ecological expertise is up to 30 days. For complex projects, upon the decision of a public authority duration of the state ecological expertise is extended to sixty days.

2 The term of the state ecological expertise for project or other documentation for the planned economic and other activities which are likely to cause transboundary impact, established by the Government of the Republic of Tajikistan.

### IV. UZBEKISTAN

#### 3. Glavgoosekoekspertiza carries out state ecological expertise on the following sites:

pre-project and project documentation, operating companies and other objects that have a negative impact on the environment and health of citizens, objects with a special legal regime (for activities relating to the categories I and II);

projects of normative-technical and methodical documents (technical regulations or standards, environmental standards, rules, regulations) regulating economic and other activities related to the use of natural resources.

ANNEX number 2 to the Resolution of the Cabinet of Ministers of 31 December 2001 A– 491

##### LIST

Activities Related to Category I of the environmental impact (high risk)

1. Highways, metro, railways, highways and freight terminals of national importance.

18. Oil and gas pipelines of national importance.

Activities related to the Category II Environmental Impact (medium risk)

1. Highways regional importance.
6. Waterlines national and inter-provincial values.
24. Oil and gas pipelines of regional importance.

Activities Related to Category III environmental impact (low risk)

6. Waterlines regional and district level.
7. Pipelines settlement values.

## V. MONGOLIA

### Article 3 Definitions

3.1.10. "Risk assessment" of people, animals, plants and the environment, chemical, biological and physical factors, potential impacts and activities to identify the effects of natural disasters;

## VI. RUSSIAN FEDERATION

### a) Law on Environmental Protection

#### Chapter 2 article 5

establish procedures for state control in the field of environmental protection, including objects of economic and other activities, regardless of ownership, under the jurisdiction of the Russian Federation, the facilities that contribute to transboundary pollution in the environment and have a negative impact on the environment within the territories of two or more subjects of the Russian Federation (Federal State environmental control);

#### Article 26

2 Norms of permissible extraction of environmental components and the order of their establishment are determined by the law on mineral resources, land, water, forest legislation, legislation on wildlife and other legislation in the field of environmental protection, nature and in accordance with the requirements of environmental protection and reproduction of certain types of natural resources, established by the present Federal Law, other federal laws and other normative legal acts of the Russian Federation in the field of environmental protection.

#### Article 52

2 In order to protect the conditions of human life, the environment of plants, animals and other organisms around industrial facilities and areas of economic and other activities that have a negative impact on the environment, created for security and protection zones, including sanitary protection zones, in quarters,

neighborhoods urban and rural - areas, green areas, including forest-park zone and other zones with limited mode of wildlife.

#### Article 3

prohibition of economic and other activities, the consequences of which are unpredictable impact on the environment, as well as projects that may lead to the degradation of the natural ecological systems, change and (or) destruction of the gene pool of plants, animals and other organisms, depletion of natural resources and other negative changes environment;

#### Article 4

The objects of the environment from pollution, depletion, degradation, damage, destruction and other negative impacts of economic and other activities are: forests and other vegetation, animals and other organisms and their gene pool;

#### Article 44

1 In the siting, design, construction, renovation, urban and rural settlements, conform with the protection of the environment, providing a favorable environment for human life, as well as habitat for plants, animals and other organisms, stable functioning of natural ecosystems.

components of the environment - land, subsoil, soil, surface and ground water, air, flora, fauna and other organisms, as well as the ozone layer of the atmosphere and near-Earth space, providing a set of favourable conditions for the existence of life on Earth;

#### Article 46

1 Location, design, construction, reconstruction, commissioning and operation of oil and gas production, processing facilities, transportation, storage and sale of oil, gas and products shall be in accordance with the requirements established by the legislation in the field of environmental protection.

2 In the location, design, construction, reconstruction, commissioning and operation of oil and gas production, processing facilities, transportation, storage and sale of oil, gas and refined products should provide for effective cleaning and disposal of industrial waste and the collection of oil (passing) gas and brine, and reclamation of contaminated land, reducing the negative impact on the environment, as well as to compensate for damage to the environment caused during the construction and operation of these facilities.

3 Construction and operation of oil and gas production, processing facilities, transportation, storage and sale of oil, gas and refined products are allowed in

the presence of contaminated land rehabilitation projects in the areas of temporal and (or) permanent land acquisition, the positive conclusions of the state ecological expertise and other established laws of the state examinations, financial guarantees such projects.

4 Construction and operation of oil and gas production, processing facilities, transportation and storage of oil and gas fields located in water areas on the continental shelf and the exclusive economic zone of the Russian Federation shall be allowed if a positive conclusion of the state ecological examination and other requirements established by the legislation of public examinations after remediation of contaminated land.

## b) Russian Federation Federal Law on Ecological Expertise

### Chapter III Article 10

State ecological expertise is organized and conducted by the federal executive authority in the field of environmental impact assessment and public authorities of subjects of the Russian Federation in accordance with the procedure established by the present Federal Law, other normative legal acts of the Russian Federation, laws and other normative legal acts of the Russian Federation (Article amended, entered into force on 1 January 2007 by the Federal Law of December 31, 2005 N 199-FZ. \* 10.1 )

### Article 11: What's the state environmental expertise at the federal level

Objects of the state environmental expertise at the federal level are:

- 1) draft regulatory technical and methodical documents in the field of environmental protection, approved by the authorities of the Russian Federation;
- 2) projects of federal targeted programs involving construction and operation of economic activities that have an impact on the environment, in the location of such facilities with the regime for the protection of natural objects;
- 3) projects of production sharing agreements;
- 4) the substantiation of licenses for certain activities that have a negative impact on the environment and the licensing of which is carried out in accordance with the Federal Law of August 8, 2001 N 128-FZ "On Licensing Certain Types of Activities" (hereinafter - the Federal Law "On Licensing of Certain Types of Activities") (except for substantiation of a license to carry out the collection, use, disposal, transportation, waste disposal) and legislation in the field of nuclear energy use by federal executive bodies (subparagraph as

amended, entered into force on 11 January 2009, the Federal Law of 30 December 2008 N 309-FZ ;

5) projects of technical documentation for new equipment, technology, the use of which may have an impact on the environment, as well as technical documentation for new substances that may be released into the environment;

6) material integrated environmental survey sites territories justify giving these territories the legal status of specially protected natural territories of federal significance, ecological disaster zone or zones of an ecological emergency situation;

6\_1) materials supporting the transformation of the state natural reserves in national parks; (Subparagraph additionally included with December 30, 2013 Federal Law of December 28, 2013 N 406-FZ )

### c) On approval of the Regulation on the assessment of planned economic and other activities on the environment in the Russian Federation

2.9:

In that case, if the planned economic and other activities which may have transboundary effects, the research and preparation of materials for the assessment of the impact on the environment shall be based on the provisions of the Convention, the UNECE on the assessment of the environmental impact in a transboundary context.

3.1.1:

During the first phase of the customer:

A preliminary assessment of the impact on the environment the customer shall collect and document information:

- Of the planned economic and other activities, including the purpose of its implementation, possible alternatives, timing and expected mestorazmeschenie affected by administrative territory, the possibility of transboundary impact, compliance with the territorial and sectoral plans and programmes;

3.1.1:

During the first phase of the customer:

A preliminary assessment of the impact on the environment the customer shall collect and document information:

- The possible significant impacts on the environment (land requirements, waste load on transport and other infrastructure, the sources of emissions and discharges) and measures to reduce or prevent these impacts.

## d) Land Code

### Article 55.1:

1) prevention of harm to the life or health of individuals, property, natural or legal persons, state or municipal property, the environment, life and health of animals and plants, cultural heritage (monuments of history and culture) of the Russian Federation (hereinafter - the damage) due to defects in the work, which affect the security of capital construction and executed members of the self-regulatory organizations;

## e) On approval of rules for submitting project documentation for the construction, reconstruction, major repairs that are expected to carry on the lands of protected areas.

### Article 1:

11) red lines - lines that denote existing planned (mutable, newly formed) boundaries of common areas, the boundaries of land, on which there are power lines, communication lines (including outside plant), pipelines, roads, railway lines and other similar structures (the linear objects); (In the red. Federal law from 31.12.2005 N 210-FZ )

21) Parking (parking space) - a specially designed and, if necessary, marked and equipped place, including being part of the road, and (or) adjacent to the roadway and (or) the sidewalk, curb, viaduct or bridge, or forming part of, or under-bridge podestakadnyh spaces, squares and other objects of the road network, buildings or structures designed and organized for the parking of vehicles for a fee or free of charge by the owner or other owner of the road, the land owner or the owner of the relevant part of the building, structure or facilities. (In the red. Federal Law from 21.04.2011 N 69-FZ )

### Article 14:

3. schemes of territorial planning of the Russian Federation contain provisions on territorial planning and maps of the planned siting of regional significance, relating to the following areas: (In the red. Federal law from 20.03.2011 N 41-FZ )

1) transportation (rail, water and air transport), roads of regional or inter-municipal significance; (in the red. Federal law from 20.03.2011 N 41-FZ )

### Article 10:

1. territorial planning documents of the Russian Federation are the schemes of territorial planning of the Russian Federation in the following areas:

1) Federal transportation (rail, air, sea, inland waterway, pipeline), federal highways;

### Article 14:

3. schemes of territorial planning of the Russian Federation contain provisions on territorial planning and maps of the planned siting of regional significance, relating to the following areas: (In the red. Federal law from 20.03.2011 N 41-FZ )

1) transportation (rail, water and air transport), roads of regional or inter-municipal significance; (in the red. Federal law from 20.03.2011 N 41-FZ )

Article 35:

3. in residential areas can be accommodated freestanding, built-in or adjoined of social and communal purpose, health care facilities, facilities for pre-school, primary and general secondary education, houses of worship, parks road transport, garages, objects related to the residence of citizens and do not adversely impact on the environment. The composition of residential areas may also include areas designated for gardening and country economy. (In the red. Federal law from 02.07.2013 N 185-FZ )

8. production zone, the zone of engineering and transport infrastructures are designed for industrial, municipal and warehouse facilities, utilities and transport infrastructure, including facilities and communications of railway, road, river, sea, air and pipeline transport, communications, as well as for establishment of buffer zones such facilities in accordance with the requirements of technical regulations.

Article 43:

5.1. Draft land survey, designed to accommodate the linear transport infrastructure federal, regional or local significance, includes drawings of land survey, which displays the boundaries of existing and (or) be the formation of land, including those intended for the withdrawal for state or municipal needs, to accommodate such facilities. (as amended. Federal law from 23.07.2013 N 247-FZ )

Article 45:

10.1. Preparation of planning documents designed to accommodate the linear transport infrastructure federal, regional or local significance, shall be based on the requirements laid down in paragraph 10 of this Article, and in accordance with the results of engineering studies. (as amended. Federal Law on 23.07.2013 N 247-FZ )

The provisions of Paragraph 10.1 of Article 45 (as amended by this Federal Law) shall apply in the event that a decision on the preparation of planning documents, designed to accommodate the linear transport infrastructure federal, regional or local importance, was made after the date of entry into force of this Federal law (Article 3 of the Federal Law of 23.07.2013 N 247-FZ)

Article 48.1:

1. particularly dangerous and technically complex objects include:  
7) infrastructure railway transport;

Article 49:

2.1. If construction, reconstruction mentioned in Part 2 of this article of the capital construction is planned to be within the boundaries of protected zones of pipeline transport, examination of project documentation for construction, reconstruction of these objects of capital construction is mandatory. (In the red. Federal laws from 21.07.2011 N 257-FZ , of 28.11.2011 N 337-FZ )

Article 51:

4) hydraulic structures of the first and second classes, established in accordance with the legislation on the safety of hydraulic structures, airports and other aviation infrastructure facilities, infrastructure, railway transport, embassies, consulates and missions of the Russian Federation abroad, facilities of defense and security, space objects infrastructure, facilities, providing status and protection of the State Border of the Russian Federation, facilities, information about which constitutes a State secret, communication lines crossing the State Border of the Russian Federation, on the border of the Russian Federation, facilities, construction, reconstruction, which is planned to carry on the continental shelf of the Russian Federation , in the internal sea waters, territorial sea of the Russian Federation, the exclusive economic zone of the Russian Federation - the authorized federal executive bodies; (In the red. Federal law from 18.07.2011 N 224-FZ )

Article 55.24:

5. Operation of buildings, including road maintenance must be carried out in accordance with the requirements of technical regulations, project documentation, normative legal acts of the Russian Federation, normative legal acts of the Russian Federation and municipal regulations. If for construction and renovation of buildings and structures in accordance with this Code does not require the preparation of project documentation, and (or) the issuance of permits for the construction and operation of buildings and structures shall be in accordance with the requirements of technical regulations, regulations of the Russian Federation, normative legal acts of the Russian Federation and municipal regulations.

## f) On Amendments to Certain Legislative Acts of the Russian Federation in connection with the improvement of the division of powers

Article 6:

The powers of the organs of state power of subjects of the Russian Federation carried out by subventions from the federal budget, include the following powers in the protection and use of wildlife, and aquatic biological resources:

organization and regulation of industrial, recreational and sport fishing, with the exception of resources of the internal waters, territorial sea, continental shelf and exclusive economic zone of the Russian Federation, specially protected natural territories of federal significance, and aquatic biological resources of inland waters, listed in the Red Book of the Russian Federation , anadromous and catadromous fish

species, transboundary species of fish and other aquatic animals, lists of which are approved by the federal executive branch responsible for public policy and legal regulation in the sphere of agriculture and fisheries;

protection of marine biological resources in inland sites, with the exception of specially protected natural territories of federal significance and border areas, and aquatic biological resources of inland waters, listed in the Red Book of the Russian Federation, anadromous and catadromous fish species, transboundary species of fish and other aquatic animals, lists are approved by the federal executive branch responsible for public policy and legal regulation in the sphere of agriculture and fisheries";

protection of wildlife, except for the objects on specially protected natural territories of federal significance, as well as objects of fauna listed in the Red Book of the Russian Federation;

regulation of the use of wildlife, except for objects:

reproduction of wildlife, except for the objects on specially protected natural territories of federal significance;

restrictions on the use of wildlife for the purpose of protection and reproduction in the territory of the Russian Federation, with the exception of objects on specially protected natural territories of federal significance, and objects of fauna listed in the third paragraph - the seventh of this article;

State control and supervision, maintenance of the state census of wildlife and use of state monitoring and public inventory of wildlife, except for the objects on specially protected natural territories of federal significance, and objects of fauna listed in the third paragraph - the seventh of this article;

Article 6.1:

The powers of the organs of state power of subjects of the Russian Federation in the field of protection and use of wildlife include:

development and implementation of regional programs for the protection and restoration of wildlife and their habitats;

participation in the implementation of international treaties of the Russian Federation in the field of protection and use of wildlife in the manner agreed to by the federal body of executive power. ";

Article 17:

"7) The establishment of the print media for publication of municipal legal acts, discuss projects of municipal legal acts on local issues, communicating to the residents of the municipal education official information on the socio-economic and cultural

development of the municipality, on the development of its public infrastructure and other official information; "

Article 8:

"Services for the use of inland waterway infrastructure."

**g) On Amending the Federal Law on Environmental Protection and Certain Legislative Acts of the Russian Federation**

Article 63.1:

3 A single system of state environmental monitoring (state environmental monitoring) includes subsystems:

State monitoring of wildlife

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