PROPOSED SUPPLEMENTAL GUIDANCE TO THE IFC'S INTRODUCTION TO HEALTH IMPACT ASSESSMENTS

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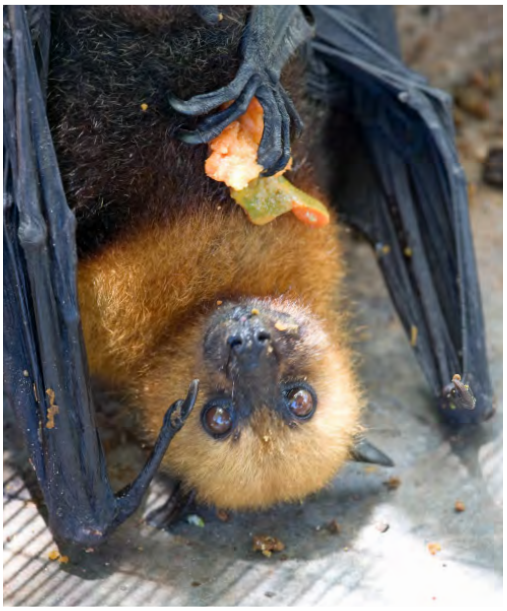

Emerging Pandemic Threats Program

PREDICT • RESPOND • PREVENT • IDENTIFY

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PROPOSED SUPPLEMENTAL GUIDANCE TO THE IFC'S INTRODUCTION TO HEALTH IMPACT ASSESSMENTS[1]

Emerging Infectious Diseases and HIAs

1. **Development Projects and Emerging Infectious Diseases**

Nearly three-quarters of emerging infectious diseases originate from wildlife. Three wild animal groups, which comprise approximately 70 percent of mammal species, are considered most likely to spread new infections to people: bats (Corona virus responsible for SARS and Marburg, Nipah and Rabies viruses), rodents (Lassa, hanta, and monkeypox viruses) and non-human primates (Ebola and yellow fever viruses). People contract these diseases by inhalation of aerosolized contaminated feces and urine, through direct contact via scratches, bites, and bodily fluids—such as blood and saliva—that can occur during hunting and food preparation, and by ingesting contaminated food, water, or undercooked meat. Disease emergence is dynamic, and is influenced by ecological, biological, and social factors. Factors that influence disease dynamics and increase the likelihood of disease emergence include:

- High population density (human or animal)
- Movement of human and animal populations
- Changes in land use (e.g. from forest to agriculture)
- Pathogen adaptation and evolution
- Presence and mobility of vectors
- Behavior changes leading to increased potential for human-animal interaction/exposure
- Climate change.

Industry activities can contribute to disease emergence. These activities include, but are not limited to:

- Deforestation
- Road and corridor development
- Temporary labor camps and other facilities
- Expansion of surrounding local communities and agriculture
- Project-induced migration.

These activities bring people to previously wild areas and can fragment wildlife habitat and reduce biodiversity, which can alter the distribution and abundance of wildlife and their associated pathogens, and amplify the risk of pathogen "spillover" into new populations. Increasing contact between people, domestic animal (e.g. livestock), and

[1] **(http://ifcext.ifc.org/ifcext/sustainability.nsf/Content/Publications_Handbook_HealthImpactAssessment)**

wildlife populations increases the likelihood of spillover and disease transmission between species.

All animal species can carry zoonotic diseases. As habitats fragment and people enter previously undeveloped areas, wildlife species will seek alternate food and shelter that will bring them into closer contact with people.

Wildlife may become a nuisance or pest and take advantage of the new food sources and habitats created at construction camps, canteens, and villages. As a result, animals come in closer contact with people, potentially increasing human exposure to disease. Other animals raid crops in fields that border their habitat, invade labor camps and homes, become violent, or eat infected animals.

As more people populate a previously undeveloped area, hunting pressure often increases. Agriculture may be introduced or intensified. These factors lead to increased potential for interaction between wildlife and people. These interactions may also be exacerbated by growing human populations that can stress local health care, water, food, and waste management infrastructures. In turn, stressed systems are more likely to break down, creating ideal conditions for increased disease transmission and emergence. Table 1 summarizes some health impact issues that can increase the potential of zoonotic disease transmission.

Table 1-1: Typical Health Impact Issues associated with Zoonotic Disease Transmission

Impact Issues	Effect	Emerging Infectious Disease Issues
Influx (job seekers, family, service workers, camp followers)	• Increases population • Stresses community infrastructure. • Introduces an immunologically susceptible immigrant population.	• Increases person-to-person contact • Increases potential for evolution and/or amplification of disease
Resettlement; Relocation	• Existing social/community structures altered • Mix populations with different endemic disease • Shift subsistence to peri-urban	• Increased in person-person contact • Immunological susceptibility altered
Water Management (Including creation of new water bodies, altering existing water bodies, and changes in drainage patterns)	• Insect-breeding habitat created or modified. • Animal watering areas created or modified. • Increases stress on or competition for water resources.	• Food and water storage containers contaminated by nuisance wildlife. • Increases potential for shared use of and competition for water between humans and wildlife.

Table 1-1: Typical Health Impact Issues associated with Zoonotic Disease Transmission		
Impact Issues	**Effect**	**Emerging Infectious Disease Issues**
Linear Features (roadways; transportation routes; transmission lines)	• Increased access to remote undeveloped areas • Increased bushmeat hunting • Modifies existing wildlife habitat.	• Increases human-wildlife contact. • Potential consumption of nuisance wildlife meat and their fluids.
Infrastructure Facilities (including on-site housing catering facilities, housing & laundry, sewage treatment plants (STP), surface-water runoff control, dams, and containment facilities)	• Attracts nuisance wildlife due to sewage, water and food containers. • Increases habitat for rodents and bats.	• Increases potential human-wildlife or vector contact if buildings are not sufficiently wildlife/vector proofed.
Habitat Fragmentation, Edge Effect, Biodiversity loss (due to human population influx, construction of linear features, and construction of facilities and labor camps)	• Modifies existing wildlife habitat. • Wildlife may search for food and shelter in nearby human settlements and labor camps.	• Increase human-wildlife contact
Agricultural Production (including nuisance wildlife, land clearing for agriculture, and food and waste storage)	• Modifies existing wildlife habitat. • Provides food source for wildlife.	• Increases human-wildlife contact. • Increases wildlife-domestic animal contact. • Increases potential for wildlife-livestock disease transmission.
Adapted from IFC's Introduction to Health Impact Assessment		

2. Emerging Infectious Diseases and Impact Assessments

The International Finance Corporation (IFC), International Council of Mining and Minerals (ICMM), and IPIECA, the global oil and gas industry association for environmental and social issues, have procedures to conduct a Health Impact Assessment. Although these guidelines include veterinary and zoonotic diseases, they emphasize vector-borne diseases and diseases of livestock and domestic animals. This document provides the steps to incorporate emerging infectious diseases of zoonotic origin into a health impact assessment.

3. Screening

Impact assessment procedures involve two initial phases: *Screening* and *Scoping*. *Screening* determines what policies and projects are selected for ESHIAs, and are usually rapid in-house evaluations by trained assessors investigating local contexts using set criteria (e.g. location, climate, endemic disease, etc.). Because Screening determines the range and extent of all subsequent impact assessment activities, understanding the local endemic diseases with zoonotic potential is essential. The following screening checklist

seeks to identify whether the proposed/existing project is in an area with potential for zoonotic disease transmission and to identify if there will be/are activities that might exacerbate the risk of transmission.

Screening Questions	Yes/No	Notes
1. Will the project be located in an area where there are wildlife species that host zoonotic diseases? (See Appendix A)		Hot spots with a high concentration of emerging infectious diseases are located throughout the world.
2. Will the project be located in a previously undeveloped area? (Will existing land use change significantly from undeveloped to developed?)		The likelihood of contact with wildlife, their fluid, or excreta increases in areas being converted from natural habitats to developed areas.
3. Will the project require constructing roads or corridors?		Roads and corridors increase the interaction of human and wildlife by opening up new areas for hunting. Roads are used to transport bush meat.
4. Will an onsite temporary or permanent camp be established?		Camps, canteens, and waste management facilities can attract pest/wildlife, increasing potential contact between people and wildlife and their excreta and increasing transmission risk.
5. Will a new transportation network be developed to move the resource (e.g., timber, ore, oil) and/or staff to and from the facility? (roads, rail, airstrips, and helipads)		Exposed people could leave the facility without knowing that they are sick and expose others along transportation routes.
6. Will a relatively large labor influx occur compared to the existing population? Will populations be displaced or resettled?		New immigrants to an area may not have immunity to endemic diseases or may bring new diseases to an area. Project-induced labor and other in-migration can strain the local health and other infrastructure system. Poorly functioning water and waste management as well as health care systems can result in the amplification of infectious disease transmission.
7. Will livestock be on-site or near the site? Will staff be allowed to have pets on-site?		Pathogens can be transmitted between wildlife and domestic animals. People can then acquire pathogens from domestic animals.
8. Will there be on-site agricultural production? Will additional in-migration lead to agriculture expansion in adjacent areas?		Grain and fruit production attracts wildlife. Food products can be contaminated from animal byproducts and/or direct contact with wildlife.

Screening Questions	Yes/No	Notes
9. Will the infrastructure in surrounding communities be insufficient to accommodate any anticipated population expansion? Is this already a problem?		Insufficient potable water, sanitation, health care, and vector control can amplify any infectious disease that occurs locally.

If you have answered yes to question 1 and two other questions, then it is worthwhile to further examine the potential of emerging infectious diseases for your project area.

4. Scoping

Scoping, the second phase of an assessment, sets the scale for the assessment, determines how key issues identified in the screening process are addressed, and what resources will be available and allocated for further investigation. During the Scoping process, the range and types of hazards, geographic setting, timescale, and population boundaries are determined to assess impacts. The activities to be evaluated and the populations to be considered for each phase of the project are identified. In addition, the potential for cumulative and/or residual impacts is determined.

Populations potentially at risk will have to be determined on a site-specific basis. Activities that should be evaluated with respect to emerging zoonotic disease transmission include:

- The scale of vegetation/habitat removal
- Biodiversity reduction
- Linear infrastructure development (e.g., road, transmission line corridors)
- Camp/facility management
    - Waste management
    - Food management/storage/disposal
- Water management/sanitation – surface water runoff, dams, containment facilities, sewage treatment plants
- Project-induced migration
- Agricultural expansion
- Strains on the community infrastructure

Cumulative impacts to consider include:

- The current and planned habitat removal and fragmentation in the region, including the types of habitat to be removed or fragmented.
- The number of existing and planned roads and other linear infrastructure in the region.
- The number of existing and planned resource development projects and the number of workers and others likely to migrate to the area.

5. Baseline Data

To assess the risks and potential impacts of emerging infectious diseases, it is necessary to identify wildlife species endemic to a project area. By linking these species to their associated known zoonotic pathogens it is possible to obtain a crude assessment of the potential zoonotic disease risk. By analyzing the types of activities that are or will be undertaken, it is possible to identify those factors which increase potential exposure and/or wildlife-human interaction.

Recommended baseline data collection activities should include:

1. Complete an inventory of biodiversity in the area.[2]
2. Obtain or generate a species list of wildlife endemic to the area. Determine whether these species are carriers of zoonotic diseases, what their behaviors are and what they eat.
3. Determine sources of protein for existing and increased population; whether bushmeat is used as a source of protein, what species are hunted
4. Determine the methods that bushmeat is harvested, butchered, transported, and prepared.
5. Determine how local communities interact with rodents, bats, and primates, and what potential exposure pathways exist between these animals and humans in the area.
6. Determine the capacity of the local community's infrastructure with respect to potable water supply, sanitation, vector control, and health care.
7. Assess potential sources of food for rapidly increasing population; including the extent and location of potentially arable land.
8. If possible, collect data from local governmental and non-governmental organizations regarding existing local wildlife diseases.

Project data that will be necessary to consider and evaluate:

1. If temporary or permanent living quarters will be constructed at the facility
    a. Quality of on-site housing with respect to ventilation, space, and sanitation
    b. Measures to protect facilities against primate, rodents, and bats infestation
2. If the facility will have a canteen
    a. Food handling procedures
    b. Quality and type of food storage
    c. Food disposal methods
3. If on-site healthcare facility will be available
    a. Capacity (for treatment; for preventive services)
    b. Disease outbreak preparedness plan

[2] This information should be collected as part of the Environmental Social Impact Assessment process

4. Waste management
    a. Pest control measures
5. Water management
    a. Vector control measures
    b. Water purification
6. Biodiversity monitoring and management strategy
7. Bushmeat policy
8. Agricultural development on-site (biosecurity of animal production; markets)

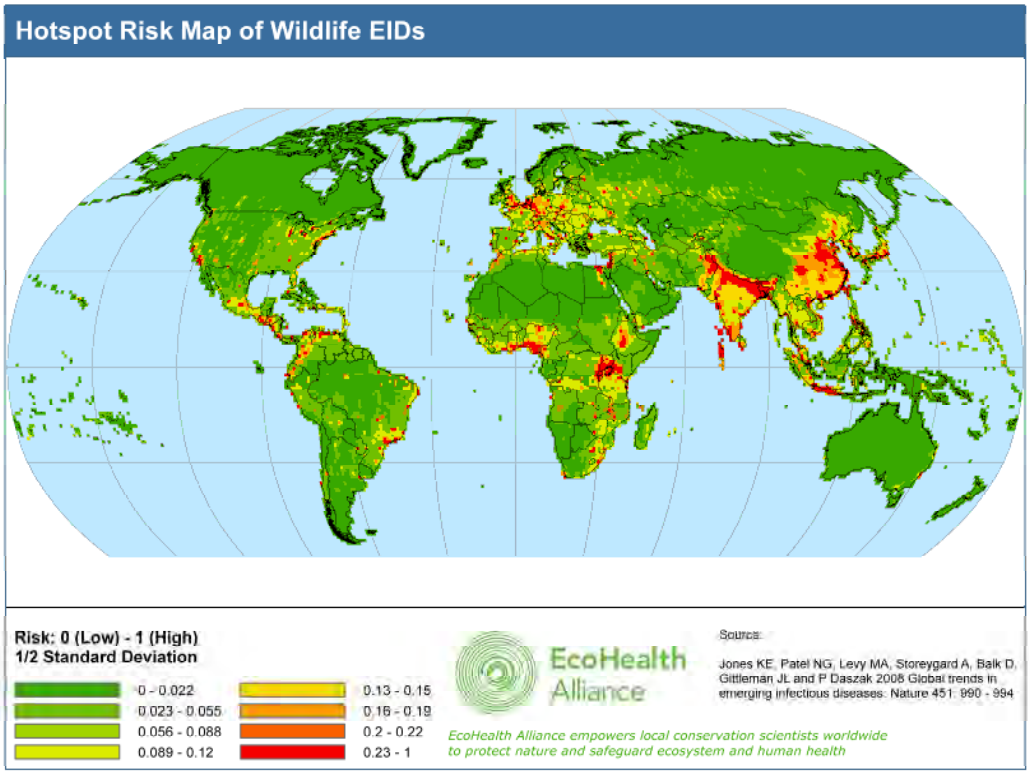
6. Stakeholder Engagement

Stakeholder engagement is a fundamental element of a health impact assessment. Discussions with stakeholders should supplement the evaluation of potential transmission routes and zoonotic disease risks. Topics to discuss could include:

- Disease outbreaks among people, domestic livestock, wildlife
- Bushmeat hunting – species hunted, butchering and cooking techniques
- Contact with rodents, bats, and primates
- Nuisance wildlife and methods of control
- Infrastructure capacity – potable water, sanitation, health care, and vector control

7. Assessing the Risk of a Zoonotic Disease Outbreak

Most HIAs evaluate risks of occurrence of potential health impacts either quantitatively or to help prioritize management actions. To date, no methodologies have been developed to quantify the risk of new infectious disease emergence or the potential for a zoonotic disease outbreak. However, certain areas of the world have been identified as "hot spots." These are illustrated in the following figure.



The significance of potential health impacts are assessed by considering the magnitude, duration, frequency, and geographical limits of these potential impacts.

Magnitude and Frequency

Depending on the project's location, the frequency of a zoonotic disease outbreak will likely be very low or low, but the magnitude is likely to be very high to high. The frequency of zoonotic disease outbreaks should be considered in the context of the frequency of disease outbreaks in the area in general. The frequency of infectious disease outbreaks reflects the effectiveness of public health, health care, and other infrastructure systems and can indicate whether there are vulnerabilities in the systems.

Duration
The duration of an outbreak is not predictable but, in general, would be several days to several months.

Geographic Limits
The geographic limits of a zoonotic disease outbreak are not predictable because of incubation times and global travel. The geographic extent of SARs illustrates this. However, it should be assumed that a disease outbreak affecting a facility would likely spread to the nearby communities at a minimum.

8. Health Action Plan

Preventing emerging infectious disease of zoonotic origin should be addressed at multiple levels.

At an individual level, mitigation measures should focus on preventing direct or indirect contact with wildlife or their excreta by 1) not creating habitat or food sources for wildlife where people live and work, 2) limiting or preventing contact with wildlife or their excreta, and 3) educating individuals to safeguard against transmission where it could occur.

At a community/regional level, mitigation measures should focus on 1) maintaining intact habitats and preserving biodiversity, 2) general public measures to prevent infectious disease transmission and outbreaks, and 3) preparedness for disease outbreaks. While preventing an outbreak is preferable, all health action plans should also have a preparedness plan for disease outbreaks

9. Monitoring and Verification

As discussed in the IFC's Introduction to Health Impact Assessment, the mitigation strategy, and the health action plan established by a company should include 1) long-term monitoring and evaluation (M&E), and 2) verification programs. These programs should be built on key performance indicators.

Key performance indicators fall into three categories: structural, process, and outcome indicators. The following are potential key performance indicators for successful emerging infectious disease mitigation:

Structural

- Staff housing characteristics (adequate and appropriate space per individual, sanitation, food storage)
- Landfill characteristics (adequate size; appropriate cover to discourage pests; appropriate and adequate runoff control; appropriate distance from housing, village, and other human-used facilities)

- Waste bins (covered and secure to prevent raiding by wildlife)
- Facility structure characteristics (measures to discourage bat roosting and rodents invasion)

Process

- Implementation of Biodiversity Monitoring Plan
- Implementation of appropriate waste management procedures
- Implementation of food – procurement, safety/security, handling, disposal – procedures to eliminate potential contamination by pests
- Operational disease monitoring, surveillance and reporting plan
- Operational disease outbreak plan

Outcome

- Maintenance of biodiversity in and around the facility
- Number of infectious disease events or outbreaks
- Number of pests trapped
- Number of adverse wildlife encounters
- Amount of on-site hunting
- Number of occurrences of bushmeat procurement
- Amount of bushmeat found in company vehicles

APPENDIX A

The following are examples of the types of tables that should be generated to identify wildlife pathogens that have been identified in and around the project area, potential pathogens associated with wildlife endemic to the project area, and the corresponding transmission pathways of infection associated with these pathogens.

These types of country level tables can be generated from WHO Global Health Observatory, FAO EMPRES, OIE WAHID databases, and may be supplemented by a tool on HealthMap (http://www.healthmap.org/en/). Otherwise, a literature search will have to be conducted by country and pathogen.

Table A-1. Known Zoonotic Pathogens of Concern – Gabon. *This table is designed as a first level "Hazard Identification" element for supporting HIA screening tools*.

Pathogen	***Type of Pathogen***	***Transmission pathway***	***Location Previously Detected*** *(if known)*	***Known species (taxonomic group) affected***
Hendra Virus	**Virus**	Direct contact with infected animals		*Eidolon helvum (bats)*
Nipah Virus	**Virus**	Direct contact with infected animals	Coastal zones, southern savannah zones, and forested zones of interior	*Eidolon helvum (bats)*
Yellow Fever Viurs	**Virus**	Vector-borne	Coastal zones, southern savannah zones, and forested zones of interior	*Eidolon helvum (bats)*
St. Louis Encephalitis Virus	**Virus**	Vector-borne	Coastal zones, southern savannah zones, and forested zones of interior	*Eidolon helvum (bats)*
Lake Victoria Marburg Virus	**Virus**	Direct contact with infected animal	Coastal zones, southern savannah zones, and forested zones of interior	*Epomops franqueti*, *Hypsignathus monstrosus*, *Micropteropus pusillus*, *Rousettus aegyptiacus, Miniopterus inflatus (bats)*
Rift Valley Fever Virus	**Virus**	Vector-borne	Coastal zones, southern savannah zones, and forested zones of interior	*Micropteropus pusillus*, *Epomops franqueti*, *Hipposideros caffer*
West Nile Virus	**Virus**	Vector-borne	Coastal zones, southern savannah zones, and forested zones of interior	*Eidolon helvum* (bats), humans
Ebola Virus	**Virus**	Direct contact with infected animals	Forested areas throughout country (Mayibout, Booue region, Libreville, Mekambo, Ogooue Ivindo province, Hau-Ogooue province, Moyen Ogooue province)	*Eidolon helvum*, *Epomops franqueti*, *Hypsignathus monstrosus*, *Micropteropus pusillus*, *Myonycteris torquata, Rousettus aegyptiacus (bats), Gorilla gorilla*, *Pan troglodytes (non-human primates),* humans
Chickungunya Virus	**Virus**	Vector-borne	Northwest Gabon	*Rousettus aegyptiacus, Hipposideros caffer,* (bats) *Mastomys natalensis (rodents),* humans

Table A-1. Known Zoonotic Pathogens of Concern – Gabon. *This table is designed as a first level "Hazard Identification" element for supporting HIA screening tools*.

Pathogen	***Type of Pathogen***	***Transmission pathway***	***Location Previously Detected*** *(if known)*	***Known species (taxonomic group) affected***
Hepatitis B Virus	**Virus**	Direct contact with infected animals	Forested areas throughout country: Lope Reserve, south and north of Ougoue River (forested zones)	*Gorilla gorilla*, *Pan troglodytes (non-human primates)*
Simian immunodeficiency virus (SIV)	**Virus**	Direct contact with infected animals	Forested areas throughout country: Lope Reserve, south and north of Ougoue River (forested zones)	*Cercopithecus cephus, Cercopithecus neglectus*, *Cercopithecus nictitans, Lophocebus albigena, Mandrillus leucophaeus*, *Mandrillus sphinx*, *Colobus guereza (non-human primates)*
Malaria	**Protozoa**	Vector-borne	Coastal zones, southern savannah zones, and forested zones of interior	*Pan troglodytes (non-human primates)*
Monkeypox Virus	**Virus**	Direct contact with infected animals		*Cercopithecus nictitans, , Cercopithecus pogonias*, *Pan troglodytes* (non-human primates), Cricetomys gambianus (rodents)
Lassa Fever Virus	**Virus**	Direct contact with infected animals		Cricetomys gambianus, *Mastomys natalensis* (rodents)

Table includes known zoonotic pathogens in mammals and birds as documented in the scientific literature (2000-2011).

Table A-2. Zoonotic Pathogens and Animal Hosts – Gabon. *This table enables a crude projection of potential zoonotic pathogens in wildlife taxonomic groups by country. This table is designed as a first level "Hazard Identification" element for supporting HIA screening tools*.

	Animal Hosts (taxonomic group)				
Country	**Arthropods**	**Birds**	**Bats**	**Rodents**	**Non-human Primates**
Gabon	Chickungunya Dengue Malaria Rift Valley Fever	West Nile Virus	Ebola virus Marburg virus	Lassa Leptospira Hanta	SIV STLV HBV Ebola virus

Appendix B
EXAMPLE MITIGATION MEASURES

This table is meant to supplement the examples in the IFC's Introduction to Health Impact Assessment document. It presents examples of mitigation measures that can be implemented for a large project within a community in a rural setting. It is not meant to serve as a template, but rather to illustrate some of the actions that can be taken.

■ = Specific Health Mitigation Target
C&C = Company and Contractor Health Plan
RR = Resettled or Relocated Health Plan
Timing: C = Construction, O = Operations, DC = Decommissioning,
PD = Predesign; D = Design phase

PE = Pre-Employment
Co. = Company
EHA = Environmental Health Area
CDC = Centers for Disease Control

WHO = World Health Organization
PACs = Potentially Affected Communities
WATSAN = Water Sanitation Agency

Table B-1 Illustrative Mitigation Measures

	Timing	Action Plan		Responsibility	Collaborating Agency or Organization	Indicators	Surveillance Method
		C & C	PACs				
Emerging Zoonotic Disease Transmission							
Risk: Direct contact with infected animals (Direct contact with infected animals can occur while working outdoors, in agricultural settings, in locations where food or waste is stored)							
Institute a no-bushmeat-hunting policy within the concession	C→DC	x		Company	Local environ-ment department	Presence/ absence of on-site poaching, # of con-fiscations	Company security

Table B-1 Illustrative Mitigation Measures							
	Timing	**Action Plan**		**Responsibility**	**Collaborating Agency or Organization**	**Indicators**	**Surveillance Method**
		C & C	**PACs**				
Train workers about issues associated with bushmeat hunting	C→DC	x		Company education department	Local environment department	Presence/ absence of on-site poaching, # of confiscations	Company security
Educate project workers about zoonotic disease risks, how to avoid encounters with wildlife, and what to do if bitten, scratched, etc.	C→DC	x		Company education department	Local environment department/health department	Number of workers trained/ Number of adverse encounters	Incidence recorded at company clinic
Minimize habitat fragmentation/creation of edge	D→O	x		Company	Local Environmental Department.	Length of linear corridor	Annual mapping
Maintain biodiversity	D→DC	x		Company	Local Environmental Department.	Species counts	Semi-annual inventories
Monitor on-site agriculture for pest invasion.	C→O	x		Company	Local environment department/health department	Presence/ absence of pests; crop destruction	Company environmental audit
Train locals about issues associated with bushmeat hunting and proper methods to butcher	C→DC		x	Company education department	Local environment department	Number of people trained	

Table B-1 Illustrative Mitigation Measures							
	Timing	**Action Plan**		**Responsibility**	**Collaborating Agency or Organization**	**Indicators**	**Surveillance Method**
		C & C	**PACs**				
Educate locals about zoonotic disease risks, how to avoid encounters with wildlife, and what to do if bitten, scratched, etc.	C→DC		x	Company education department	Local environment department/health department	Number of locals trained/ Number of adverse encounters at local clinic	Incidence recorded at local clinic
Train locals about wildlife conflict mitigation & domestic animal biosecurity	C→DC		x	Company education department	Local natural resource department	Number of people trained	
Risk: Indirect contact with infected animals (Indirect contact can occur through consumption of food or liquids that have been contaminated with animal excreta or from insect vectors)							
Review food safety and security procedures	D→O	x		Company	Local health department	Food safety procedure implemented	Food safety audit
Review food storage methods and protections	D→O	x		Company	Local environment department/health department	Presence/ absences of pest prevention measures	Food safety audit
Review waste disposal and management	D→O	x		Company	Local environment department/health department	Daily cover, pest control	Environmental Management Review/Audit
Review housing design to ensure adequate measures exist not to promote or facilitate infectious disease transmission	D->DC	x		Company, Engineering Design	Local health department	Occupants per room, Food storage, Sanitation	Housing audit

Table B-1 Illustrative Mitigation Measures							
	Timing	**Action Plan**		**Responsibility**	**Collaborating Agency or Organization**	**Indicators**	**Surveillance Method**
		C & C	**PACs**				
Conduct health education programs for project workers regarding infectious diseases transmission	C→DC	x		Company Health or Education Department	District Environ-mental Health Officer	Number of workers trained	Worker testing; audit practices, incidence of infectious diseases
Conduct health education programs for project workers regarding food safety.	C→DC	x		Company Health or Education Department	District Environ-mental Health Officer	Number of workers trained	Worker testing; audit practices, incidence of food-borne illnesses
Assist with food sanitation awareness materials to local district environmental sanitation officers for educational sessions with food handlers and slaughterhouses, particularly vendors who sell food to project workers.	C→O		x	Company Health or Education Department	Local Environ-mental Health Department.	Food Handler practices	Audit of food handler practices
Implement an entomological survey program for insect vectors at the facility and in the PACs	C→DC	x	x	Company	Country health services: vector-control division	Ento-mological infection rate/ parasite prevalence rates in children	Review survey reports
Risk: Changes to the surrounding communities due to the presence of a facility could increase contact with wildlife (direct contact) and/or result in increased transmission of infectious diseases that occur locally (amplification)							
Assist local community with spatial planning (location of agricultural, waste disposal, potable water)	D→DC	x	x	Company Engineer/ Planner	Local Environ-mental Health and Planning Departments.	Local spatial plan in place	Periodic reviews of the spatial layout

Table B-1 Illustrative Mitigation Measures							
	Timing	**Action Plan**		**Responsibility**	**Collaborating Agency or Organization**	**Indicators**	**Surveillance Method**
		C & C	**PACs**				
Assist the local community to plan infrastructure and utilities (waste disposal, potable water, health care facilities)	D→DC	x	x	Company Engineer/ Planner	Local Environmental Health, Infrastructure, and Utilities Departments.	Number of plans developed and implemented	
Educate community representatives about vector breeding sites control and maintaining drainage during rainy seasons.	D→DC	x	x	Company Engineer/ Planner	Local Environmental Health Department.	Number of meetings/ workshops	Site audit
Provide support to district health vector control programs	D→DC	x	x	Company Environmental Health Officer	Local Environmental Health Department.	Number of meetings and level of support	
Provide assistance with retrofitting or designing boreholes so that they comply with local regulations, are protected against potential contamination, and do not create vector breeding habitat	D→DC		x	Company Environmental Health Officer	Local Environmental Health Department.	Number of boreholes that are compliant	

Table B-1 Illustrative Mitigation Measures							
	Timing	**Action Plan**		**Responsibility**	**Collaborating Agency or Organization**	**Indicators**	**Surveillance Method**
		C & C	**PACs**				
Collaborate with local waste management services to develop non-hazardous waste management plans for local communities that can include: • Sufficient garbage cans and dumpsters • Garbage stored in rodent-proof containers • Sanitary and solid waste is collected daily and covered daily with a solid layer of soil (15 to 30 cm) • Appropriate container program to avoid waterborne insect breeding • Prohibit moving large quantities of foodstuffs to animal farmers to avoid generating rodent or reptile habitat	D→DC		x	Company Environmental Health Officer	Local Environ-mental Health Department.	Number of plans in place and imple-mented	Site assessment
Support the training of local community health personnel in infectious disease surveillance and outbreak response	D→DC		x	Company Health Officer	Local Health Department	Number of people trained Presence/ absence of plan	Presence of a functioning disease surveillance program
Support improvement of local market biosecurity measures	D→DC		x	Company Health Officer	Local Health Department	Improved bio-security measures (see list)	