

ZESCO

# ZAMBIA-TANZANIA INTERCONNECTOR PROJECT

## ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN UPDATE

### ZAMBIA

WSP REF.: CA0027197.7329

DATE: AUGUST 30, 2024

VOLUME 2 – APPENDICES  
PRELIMINARY VERSION 2





# APPENDIX

## **1-1** *DECISION LETTER FOR THE ZAMBIA-TANZANIA INTERCONNECTOR TRANSMISSION LINE PROJECT*





# ZAMBIA ENVIRONMENTAL MANAGEMENT AGENCY

## Head Office

Corner of Church & Suez Roads  
P.O Box 35131  
Lusaka, Zambia  
Tel: +260-211-254023/254059

All Correspondence to be addressed to  
The Director General

 [info@zema.org.zm](mailto:info@zema.org.zm)  [www.zema.org.zm](http://www.zema.org.zm)

*In reply please quote*

No:

**ZEMA/EIA/EIS/EAC17/924**

March 19, 2024

The Managing Director  
ZESCO Limited  
Great East Road, Stand No.6949  
P.O. Box 33304  
**LUSAKA**

Dear Sir,

**RE: DECISION LETTER IN RESPECT OF THE ENVIRONMENTAL IMPACT STATEMENT FOR THE PROPOSED CONSTRUCTION AND OPERATION OF ZAMBIA – TANZANIA INTERCONNECTOR TRANSMISSION LINE PROJECT BY ZESCO LIMITED**

Reference is made to the above captioned Environmental Impact Statement ("EIS") submitted to the Zambia Environmental Management Agency ("ZEMA") on **October 25, 2023**, for consideration in accordance with the requirements of the Environmental Management Act No. 12 of 2011 as read together with the Environmental Protection and Pollution Control (Environmental Impact Assessment) Regulations, Statutory Instrument No. 28 of 1997.

ZEMA has since reviewed the EIS and based on the information provided by yourselves and taking into account written and verbal comments from interested and affected parties as well as our site verification inspection findings; the said EIS has been **approved** with conditions.

You are advised to fully acquaint yourselves with the conditions herein and to ensure compliance thereof.

Yours faithfully,

Godfrey Mwiinga  
**Director General**  
**ZAMBIA ENVIRONMENTAL MANAGEMENT AGENCY**

Cc. The Town Clerk – Kasama Municipal Council, **KASAMA**  
The Council Secretary – Serenje Town Council, **SERENJE**  
The Council Secretary – Mpika Town Council, **MPIKA**  
The Council Secretary – Nakonde Town Council, **NAKONDE**  
The Director – Forestry Department, **LUSAKA**  
The Director General – Energy Regulation Board, **LUSAKA**  
The Director of Legal Services, ZEMA, **LUSAKA**

**Northern Regional Office**  
P.O Box 71302  
Tel: +260-212-621048/610407

**Solwezi**  
P.O Box 110134  
Tel: +260-218-821297

**Livingstone**  
P.O Box 60195  
Tel: +260-213-321279

**Chipata**  
P.O Box 510527  
Tel: +260-216-221254

**Chirundu**  
P.O Box CRU 31 Chirundu  
Tel: +260-211-515261



# Zambia Environmental Management Agency

## DECISION LETTER

### 1.0 PROJECT BACKGROUND

#### 1.1 PROJECT TITLE:

Proposed Construction and Operation of Zambia – Tanzania Interconnector Transmission Line Project by ZESCO Limited

#### 1.2 PROJECT PROPONENT:

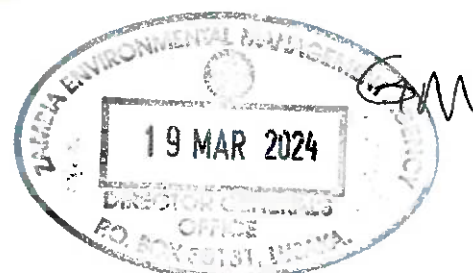
The Managing Director  
ZESCO Limited  
Great East Road, Stand No.6949  
P.O. Box 33304  
**LUSAKA**

#### Contact Person's Details:

**Name:** Mr. Victor B. Mapani  
**Designation:** Managing Director  
**Tel:** +260 211 361111  
**Email:** [vmapani@zesco.co.zm](mailto:vmapani@zesco.co.zm)

#### 1.3 PROJECT LOCATION:

The transmission line will stretch between the Tanzanian border to Pensulo. It will go through Nakonde Mpika, Lavushimanda (Muchinga Province), Kasama, Kanchibiya, Mungwi (Northern Province) and Serenje (Central Province).





# Zambia Environmental Management Agency

## DECISION LETTER

### Coordinates:

Major Points	Latitudes	Longitudes
Starting Point (Pensulo Substation)	13° 2'0.18"S	30°26'26.41"E
Mpika Substation	11°52'21.42"S	31°24'27.12"E
Kasama Substation	10°13'41.94"S	31° 9'31.28"E
Termination Point (Nakonde Substation)	9°22'27.5"S	32°36'12.4"E

### 1.4 DATE OF SUBMISSION BY PROPONENT:

October 25, 2023

### 1.5 DATE OF CONSIDERATION BY THE AGENCY:

March 15, 2024

### 2.0 TOTAL INVESTMENT COST/INVESTMENT: USD 161,436,000

### 3.0 DETAILS OF THE PROJECT:

The Zambia-Tanzania Interconnection Project (ZTIP) Project involves the construction and operation of a single-circuit 330-kV electricity transmission line mounted on steel lattice pylons linking the Nakonde substation with substations in Kasama, Mpika, and Pensulo. The ZTIP Project is planned to add to another ongoing transmission project promoted by the Industrial and Commercial Bank of China (ICBC), which will link the Nakonde and Kasama substations. The 330-kV line from the Tanzanian border to Nakonde and the 330/66-kV substation at Nakonde components of the ICBC Project are considered associated facilities of the present World Bank-funded ZTIP Project.

The Project involves construction and operation of:





## Zambia Environmental Management Agency

### DECISION LETTER

- A transmission line from Nakonde – Kasama – Mpika – Pensulo: one 330-kV circuit of alternating current, mounted on one row of single-circuit pylons over 596 km, with a 50 m ROW.
- additional equipment (including three 330-kV feeder bays and one 30 MVAR line reactor) into the planned 400/330/66-kV substation in the Nakonde area (construction of the substation is included in the Kasama-Nakonde 330-kV transmission Project built with the ICBC);
- additional equipment (including two 330-kV feeder bays and two-line reactors) into the existing 330/66-kV substation in Kasama (substation already existing, with sufficient space to accommodate additional equipment);
- additional equipment (including two 330-kV feeder bays and two-line reactors) into the planned 330/66-132-kV substation in Mpika (substation already existing, with sufficient space to accommodate additional equipment);
- 10,500 m<sup>2</sup> extension of existing 330/66-kV substation in Pensulo for additional equipment (including two 330-kV feeder bays and two-line reactors and space for a 330-kV bay);
- access and maintenance roads along wayleave, where necessary.
- Tower heights will range from:31.1 m to 37 m. The width of the wayleave is 50 m over the entire length of the Project area. However, portions of the Project that parallel existing transmission lines will require less new ROW (i.e., 35 m width of new ROW between Pensulo and Kasama, and 10 m width of new ROW between Kasama and Nakonde) because the ROW will be shared between projects.

#### 4.0 DECISION BY THE AGENCY

4.1 The project is **approved** subject to the following conditions:

4.1.1 ZESCO Limited shall **notify** the Zambia Environmental Management Agency (ZEMA) before the commencement of the project activities.





## Zambia Environmental Management Agency DECISION LETTER

- 4.1.2 ZESCO Limited shall implement the project and all environmental management commitments as stated in the Environmental Impact Statement (EIS) with changes as made by Zambia Environmental Management Agency (ZEMA) and any other conditions that may be issued thereafter.
- 4.1.3 The approval is for construction and Operation of Zambia – Tanzania Interconnector Transmission Line Project by ZESCO Limited only. Therefore, ZESCO Limited shall not conduct or carry out activities that are not part of the approved project and can impact negatively on the environment.
- 4.1.4 ZESCO Limited shall consult and comply in full with the specifications and requirements of the Kasama Municipal Council, Serenje Town Council, Nakonde Town Council, Energy Regulation Board, Forestry Department, Road Development Agency, Resettlement Department and any other relevant authorities **prior** to the commencement of the project.
- 4.1.5 ZESCO Limited shall consult with the Resettlement Department prior project implementation.
- 4.1.6 The project and ancillary activities shall be conducted in such a way that public and private property, the health of people and sources of livelihood shall not be endangered, harmed, affected negatively, damaged or lost. Where it is determined that the health of people, property or source of livelihood is endangered, harmed, damaged, affected negatively, or lost as a result of project activities, ZESCO Limited shall be liable for payment or settlement of appropriate compensation and/or other forms of relief or replacement.
- 4.1.7 ZESCO Limited shall ensure that all individuals affected by the project, including those whose structures or means of livelihood will be affected, are fully compensated prior to construction of the 330kv transmission line. This includes compensation for structures, fruit trees, and any other affected assets;



GM



## Zambia Environmental Management Agency DECISION LETTER

- 4.1.8 ZESCO Limited shall implement measures to minimize environmental impacts during construction and operation, such as erosion control, re-vegetation of cleared areas, and proper waste management;
- 4.1.9 ZESCO Limited shall establish a grievance mechanism with affected communities to ensure that grievances are addressed in a transparent and timely manner;
- 4.1.10 ZESCO Limited shall implement the Resettlement Action Plan (RAP) prepared for the project, ensuring that affected households are resettled or compensated according to agreed-upon terms and timelines;
- 4.1.11 ZESCO Limited shall develop and implement an emergency response plan to address any unforeseen environmental or social incidents during the construction and operation of the transmission line;
- 4.1.12 ZESCO Limited shall put in place safeguards in the compensation distribution process involving elderly or vulnerable beneficiaries.
- 4.1.13 ZESCO should strictly adhere to the Electrical Safety Code of Practice (ZS 418) during construction, commissioning and operation of the proposed electrical network.
- 4.1.14 ZESCO Limited shall ensure to install bird diverters on the transmission line to prevent bird collision.
- 4.1.15 ZESCO Limited shall collect, decontaminate and dispose of in an environmentally sound and appropriate manner all contaminated waste throughout the project life cycle.
- 4.1.16 Hazardous waste to be generated from the project shall be managed by persons authorized by ZEMA.





## Zambia Environmental Management Agency DECISION LETTER

- 4.1.17 ZESCO Limited shall install and operate effective and efficient facilities for preventing and controlling pollution of the underground regime and surface water resources throughout the project life cycle.
- 4.1.18 ZESCO Limited shall ensure that any major spillages and leakages of hydrocarbons shall be immediately reported to the Zambia Environmental Management Agency and Energy Regulation Board.
- 4.1.19 ZESCO Limited shall install and operate effective and efficient dust suppression techniques and/or air pollution abatement equipment in all areas with potential to generate air pollutants.
- 4.1.20 The levels of noise from project activities shall be monitored frequently; appropriate measures shall be put in place where noise levels approach harmful state.
- 4.1.21 ZESCO Limited shall prepare and implement an appropriate and effective emergency preparedness and response plan.
- 4.1.22 ZESCO Limited shall put in place necessary and sufficient measures, procedures or equipment to mitigate the effects that might arise from such emergencies as fire outbreak and occupational injuries during construction and operation of the project.
- 4.1.23 ZESCO Limited shall ensure that disposal of hazardous waste generated from the project site during construction and operation stage is in line with the provisions of the Environmental Management Act No. 12 of 2011.
- 4.1.24 ZESCO Limited shall obtain applicable licenses or permits from ZEMA and comply in full with the conditions of the licenses or permits issued under the Environmental Management (Licensing) Regulations, Statutory Instrument No. 112 of 2013 and the Environmental Management (Extended Producer Responsibility) Regulation Statutory Instrument No.65 of 2018.





## Zambia Environmental Management Agency DECISION LETTER

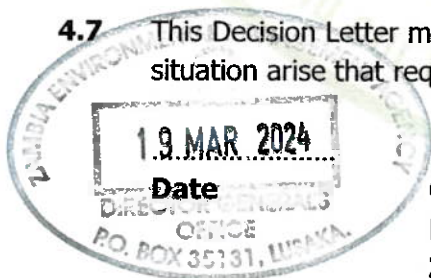
- 4.1.25 ZESCO Limited shall undertake an environmental audit of the project within a period of not less than twelve months and not more than **thirty-six months** after completion of the project or commencement of operations, whichever comes first.
- 4.1.26 ZESCO Limited shall prepare and submit a decommissioning and closure report outlining implementation of all the environmental management commitments presented in the Environmental Impact Statement (EIS) at the end of the project for consideration by ZEMA.
- 4.2 ZESCO Limited shall:**
- 4.2.1 As appropriate obtain and comply in full with other relevant authorizations such as those stipulated in the following Acts of parliament:
- i. The Energy Regulation Act No. 12 of 2019;
  - ii. The Electricity Act No. 11 of 2019;
  - iii. The Urban and Regional Planning Act, No. 3 of 2015;
  - iv. The Local Government Act No. 2 of 2019;
  - v. The Water Resources Management Act, No. 21 of 2011;
  - vi. The Public Health Act, Cap 295 of the Laws of Zambia;
  - vii. The Workers' Compensation Act No. 10 of 1999;
  - viii. The National Council for Construction Act No. 10 of 2020;
  - ix. The Metrology Act No. 6 of 2017;
  - x. The Standards Act No. 4 of 2017;
  - xi. The Occupational Health and Safety Act No. 36 of 2010;
  - xii. The Employment Code Act No. 3 of 2019; and
  - xiii. The Solid Waste Regulations and Management Act No. 20 of 2018.
- 4.2.2 Make available information on hygiene, malaria, HIV/AIDS and other communicable and infectious diseases to employees.
- 4.2.3 Put in place environmental, occupational health and safety policies and procedures.





## Zambia Environmental Management Agency DECISION LETTER

- 4.2.4 Provide workers with appropriate fire-fighting equipment and train workers in fire-fighting and emergency response.
- 4.2.5 Provide employees with Personal Protective Equipment (PPE) and employees shall undergo appropriate medical check-ups.
- 4.3 ZESCO Limited shall comply with environmental standards and/or specific limits of particular pollutants as its responsibility. Thus, compliance with Zambia Environmental Management Agency recommended measures **does not absolve** ZESCO Limited its responsibility if such measures do not achieve compliance with environmental control standards.
- 4.4 ZESCO Limited shall in accordance with section 15 of the Environmental Management Act No. 12 of 2011, allow inspectors from ZEMA **unrestricted entry** to the project site at any reasonable time with or without making prior notice throughout the project life cycle.
- 4.5 The implementation of the project shall commence **within three years** from the date of approval. Failure to commence implementation of the project within the stated period shall render the Decision Letter invalid and ZESCO Limited shall be required to re-submit the EIS for consideration.
- 4.6 The Agency may suspend or cancel the Decision Letter **without notice** should ZESCO Limited fail to comply with any condition of approval.
- 4.7 This Decision Letter may be amended on the volition of the Agency or otherwise should a situation arise that requires that an amendment be effected.



  
.....  
Godfrey Mwiinga  
**Director General**  
**ZAMBIA ENVIRONMENTAL MANAGEMENT AGENCY**



# APPENDIX

## **1-2** *DECISION LETTER FOR THE KASAMA- NAKONDE 330/132KV TRANSMISSION LINE PROJECT*





# ZAMBIA ENVIRONMENTAL MANAGEMENT AGENCY

## Head Office

Corner of Church & Suez Roads  
P.O. Box 35131  
Lusaka, Zambia  
Tel: +260-211-254130/254023/254059  
Fax: +260-211-254164/256658

## Northern Regional Office

Jacaranda Road  
P.O. Box 71302  
Ndola, Zambia  
Tel: +260-212-621048/610407  
Fax: +260-212-610246

## Livingstone Office

Plot No. 555  
Junction Obote / Neru Roads  
P.O. Box 60195  
Livingstone, Zambia  
Tel / Fax: +260-213-321297

## Chirundu Border Office

Lusaka Road  
P.O. Box CRU31  
Chirundu, Zambia  
Tel/Fax: +260-211-515261

*In reply please quote*

No:

**ZEMA/EIA/EIS/540**

August 1, 2017

The Managing Director  
ZESCO Limited  
Great East Road, Stand No.6949

**LUSAKA.**

Dear Sir,

**RE: ENVIRONMENTAL IMPACT STATEMENT FOR THE PROPOSED CONSTRUCTION OF KASAMA – NAKONDE 330/132KV TRANSMISSION LINE PROJECT BY ZESCO LIMITED.**

Reference is made to the above captioned Environmental Impact Statement ("EIS") submitted to the Zambia Environmental Management Agency ("ZEMA") on **June 1, 2017** for consideration in accordance with the requirements of the Environmental Management Act No. 12 of 2011 as read together with the Environmental Impact Assessment Regulations, Statutory Instrument No. 28 of 1997.

ZEMA has since reviewed the EIS and based on the information provided by yourselves and from written and verbal comments received from interested and affected parties and our site verification inspection findings; the said EIS has been **approved**.

Find attached to this Decision Letter, conditions governing the **approval**.

Yours faithfully,

John Msimuko

**Director General**

**ZAMBIA ENVIRONMENTAL MANAGEMENT AGENCY**

- Cc. Town Clerk – Kasama Municipal Council, **KASAMA**.  
Town Clerk- Mbala Municipal Council, **MBALA**.  
Council Secretary-Mporokoso Town Council, **MPOROKOSO**.  
Council Secretary-Nakonde Town Council, **NAKONDE**.  
Council Secretary-Mungwi Town Council, **MUNGWI**.  
Chief Executive Officer- Energy Regulations Board, **LUSAKA**.  
Director- Forestry Department, **LUSAKA**.



# Zambia Environmental Management Agency

## DECISION LETTER

### 1.0 PROJECT BACKGROUND

#### 1.1 PROJECT TITLE:

Proposed Construction of Kasama – Nakonde 330/132KV Transmission Line project by ZESCO Limited.

#### 1.2 PROJECT PROPONENT:

ZESCO Limited  
Great East Road, Stand No.6949  
P.O. Box 33304  
**Lusaka**

#### Contact Person's Details:

Name: Mr. Victor Mundende  
Position: Managing Director  
Cell: +260 211 362710

#### 1.3 PROJECT LOCATION:

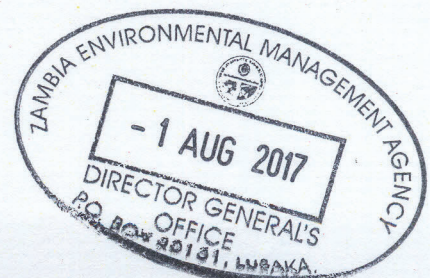
The proposed project is located in the Northern and Muchinga Provinces of Zambia. Specifically, the project traverses five districts namely Nakonde, Mungwi, Kasama, Mpulungu and Mporokoso. The Chiefdoms affected by the project include Chitimukulu (sub chiefs Nseluka and Chimba), Mumporokoso, Chinakila, Shibwalyakapila, Munkonge, Mwamba, Nkolemfumu, Makasa and Nawaitwika.

#### 1.4 DATE OF SUBMISSION BY PROPONENT:

June 1, 2017

#### 1.5 DATE OF CONSIDERATION BY THE AGENCY:

July 27, 2017





## 2.0 DETAILS OF THE PROJECT:

The project involves the construction of three strategic transmission lines that include the extension of the 330kV transmission line from Kasama to Nakonde District (**230km**), a 400kV line (**15km**) to the Tunduma Border and a **12km** 66kV to the existing Nakonde 66/33kV substation. Another 330kV line from Kasama to Mporokoso District (**180km**), with a 132kV (**11km**) extension to the existing 66/33kV Mporokoso Substation. The third line will be a 132kV transmission line from Kasama to Mungwi District (**170km**). In Mungwi District, the project will also have 33kV distribution lines in Mungwi, Malole, Chimba, Makasa (Chandamali) and Kayambi areas. The proposed project area is located in Kasama, Nakonde, Mungwi and Mporokoso Districts.

The proposed project shall consist of the following scope of works:

### 1. 330/ 132 kV Transmission lines

- Construct 230km of 330kV overhead transmission line with single circuit conductor from Kasama – Nakonde. In addition, construction of 15km of 400kV line from the new Nakonde 400/330/66kV substation to the Tanzania border and a 12km double circuit 66kV line to link the new Nakonde 400/330/66kV with the existing 66kV Isoka-Nakonde line;
- Construct about 170km of 132kV single circuit overhead transmission line from Kasama to Kayambi - through Mungwi, Malole, Chimba and Makasa areas; and
- Construct about 180km of 330kV single circuit overhead transmission line from Kasama to Mporokoso and linking it to the existing 66/33kV Mporokoso substation with an 11km 132kV line.

### 2. Substations (9)

- Nakonde 400/330/66kV
- Kayambi 132/33/11kV
- Chandamali 123/33/11kV
- Chimba 132/33/11kV
- Malole 132/33/11kV,
- Mungwi 132/33/11kV,
- Kasama 330/66kV extension
- Chishimba 132kV





consult and comply in full with the specifications of the Energy Regulation Board, Forestry Department, Water Resources Management Authority, National Heritage and Conservation Commission, Kasama Municipal Council, Mungwi District Council, Nakonde District Council and Mporokoso District Council prior to the implementation of the project.

ensure there is no acts of major contamination or disturbances to the groundwater or surface water regimes located along the project site.

Should ZESCO Limited encounter or exhume artefacts that of any heritage nature, they shall fully consult with the National Heritage Conservation Commission for appropriate management or disposal of them.

ZESCO Limited ensure that all its suppliers of construction aggregate, sand and any material whose extraction is likely to result in environmental damage are guided on the scope of the project and the potential environmental impacts.

Where ZESCO Limited employs or contract a firm or individual to do works that requires additional notifications to or approvals from the Agency, it shall be ZESCO's responsibility to ensure that such is done with the ZEMA.

ZESCO Limited shall avoid indiscriminate clearing of vegetation. The vegetation clearing shall only be limited to areas where the line will be constructed and the temporal camp sites. In order to avert soil erosion, where possible, stumping as opposed to uprooting shall be used to clear vegetation in temporal camp sites.

ZESCO Limited shall engage the forestry Department to identify an appropriate area where to carry out tree planting and revegetation as a way of offsetting the cleared vegetation in the affected forests.

The use of banned chemicals shall not be allowed throughout the project cycle. All the chemicals that will be used in the project cycle shall be purchased from the Zambia Environmental Management Agency licensed facilities.

ZESCO shall ensure that they store used oil in well banded areas with clearly labeled and colour coded containers.





- 3.1.15 The personnel involved in the management of used oil ensure that they seal the containers when they are not more than three-quarters full
- 3.1.16 In the event that general and hazardous waste are accidentally mixed, on site, ZESCO shall ensure that they notify the Agency and treat the mixture as hazardous waste. Hazardous and municipal solid waste shall be kept separate throughout the project cycle.
- 3.1.17 ZESCO Limited shall consistently suppress dust in areas with potential to generate dust during the construction phase and throughout the project cycle.
- 3.1.18 ZESCO Limited shall ensure that noise levels are maintained to acceptable limits during construction phase and throughout the project cycle.
- 3.1.19 ZESCO Limited shall only use PCB free capacitors and transformers throughout the project cycle.
- 3.1.20 ZESCO Limited shall erect in English and local languages, signage around the project areas and shall use other means necessary to warn any nearby community and the general public on the general risks surrounding the project throughout the project cycle.
- 3.1.21 ZESCO Limited shall prepare and Environmental Response Plan (ERP) and the ERP to include measures to be taken in the event that an emergency occurs.
- 3.1.22 ZESCO Limited shall ensure that all incidences with potential to pollute the environment and harm humans are reported to ZEMA and Energy Regulation Board, respectively **immediately**.
- 3.1.23 Environmentally sound practices shall be put in place to manage the waste. The waste shall not be buried at the project site but shall be disposed of at the Local Authority designated waste disposal sites.
- 3.1.24 Firefighting equipment shall be placed where it can be easily accessed and it shall always be kept in good working condition. Reflective material shall be used to facilitate visibility at night.





3.1.25 ZESCO Limited shall undertake an environmental audit of the project within a period of not less than **twelve months** and not more than **thirty six months** after completion of the project or commencement of operations, whichever shall come first.

3.1.26 ZESCO Limited shall obtain applicable licenses or permits from ZEMA and comply in full with the conditions of the licenses or permits issued under the Environmental Management (Licensing) Regulations, Statutory Instrument No.112 of 2013.

3.2 The Agency advises ZESCO Limited to:

3.2.1 Obtain any other relevant authorizations such as those stipulated in the following Acts of Parliament:

- a) The National Heritage and Conservation Commission Act;
- b) The Forestry Act;
- c) The Labour Act;
- d) The Worker's Compensation Act;
- e) The Lands Act;
- f) The Land Acquisition Act;
- g) The Water Resources Management Act;
- h) The Mines and Minerals Act;
- i) The Town and Country Planning Act;
- j) The Public Health Act;
- k) The Local Government Act;
- l) The Petroleum Act;
- m) The Electricity Act; and,
- n) The Energy Regulation Act.

3.2.2 Make available information on hygiene, malaria control and HIV/AIDS to employees.

3.2.3 Provide all workers with appropriate firefighting equipment and train all workers in firefighting and emergency response.

3.2.4 Provide all workers with personal protective equipment and all workers shall undergo **annual** medical checkups.





3.3 ZESCO Limited shall comply with environmental standards and/or specific limits of particular pollutants as its responsibility. Thus, compliance with Zambia Environmental Management Agency recommended measures **does not** absolve ZESCO Limited from its responsibility if such measures do not achieve compliance with environmental control standards.

3.3 ZESCO Limited shall comply with environmental standards and/or specific limits of particular pollutants as its responsibility. Thus, compliance with Zambia Environmental Management Agency recommended measures **does not** absolve ZESCO Limited from its responsibility if such measures do not achieve compliance with environmental control standards.

3.4 ZESCO Limited shall in accordance with Section 15 of the Environmental Management Act, 2011 allow ZEMA inspectors **unrestricted entry** into the project site at any reasonable time with or without making prior notice throughout the project cycle.

3.4 ZESCO Limited shall in accordance with Section 15 of the Environmental Management Act, 2011 allow ZEMA inspectors **unrestricted entry** into the project site at any reasonable time with or without making prior notice throughout the project cycle.

3.5 The implementation of the project shall commence within **three years** from the date of approval. Failure to commence the project within the stated period shall render this decision letter invalid and ZESCO Limited shall be required to re-submit the EIS for consideration.

3.5 The implementation of the project shall commence within **three years** from the date of approval. Failure to commence the project within the stated period shall render this decision letter invalid and ZESCO Limited shall be required to re-submit the EIS for consideration.

3.6 The Zambia Environmental Management Agency may suspend or cancel this Decision Letter **without notice** should ZESCO Limited fail to comply with any of these conditions.

3.6 The Zambia Environmental Management Agency may suspend or cancel this Decision Letter **without notice** should ZESCO Limited fail to comply with any of these conditions.

John Msimuko  
 Director General  
 ZAMBIA ENVIRONMENTAL MANAGEMENT AGENCY

John Msimuko  
 Director General  
 ZAMBIA ENVIRONMENTAL MANAGEMENT AGENCY

1. AUG 2017  
 Date  
 DIRECTOR GENERAL'S OFFICE

1. AUG 2017  
 Date  
 DIRECTOR GENERAL'S OFFICE

ZAMBIA ENVIRONMENTAL MANAGEMENT AGENCY  
 Managing our environment securing our future

ZAMBIA ENVIRONMENTAL MANAGEMENT AGENCY  
 Managing our environment securing our future

# APPENDIX

**1-3**

*EXTENDED DECISION  
LETTER FOR THE  
KASAMA-NAKONDE  
330/132KV  
TRANSMISSION LINE  
PROJECT*





# ZAMBIA ENVIRONMENTAL MANAGEMENT AGENCY

## Head Office

Corner of Church & Suez Roads  
P.O Box 35131  
Lusaka, Zambia  
Tel: +260-211-254023/254059

All Correspondence to be addressed to  
The Director General



[info@zema.org.zm](mailto:info@zema.org.zm)



[www.zema.org.zm](http://www.zema.org.zm)

*In reply please quote*

August 8, 2023

The Managing Director  
ZESCO Limited  
Stand No. 6949 Great East Road  
**LUSAKA**

No: **ZEMA/INS/101/04/1**



Dear Sir,

**RE: INTENSION TO PROCEED WITH IMPLEMENTATION OF THE KASAMA - NAKONDE TRANSMISSION PROJECT BY ZESCO LIMITED**

Reference is made to the letter received from the Energy Regulation Board on 6<sup>th</sup> July, 2023 with respect to your request to re-register the Kasama -Nakonde transmission line project and consequently extend the validity of the decision letter for the said project.

ZEMA has since reviewed the submitted document in line with the provisions of the Environmental Management Act No. 12 of 2011 as read together with the Environmental Protection and Pollution Control (Environmental Impact Assessment) Regulations, Statutory Instrument No. 28 of 1997.

Based on the information provided by the authorizing Agency, ZEMA has granted ZESCO Limited a **No Objection** to the extension of the validity of the Decision Letters and subsequently the implementation of the project on condition that you abide by the conditions of the Decision Letter No. ZEMA/EIA/EIS/540 dated 1<sup>st</sup> August, 2017.

Should there be any issues herein that you may wish to clarify or have clarified, please contact the undersigned.

Yours faithfully,

Maxwell Nkoya

**Acting Director General**

**ZAMBIA ENVIRONMENTAL MANAGEMENT AGENCY**

Cc The Director General – Energy Regulation Board, **LUSAKA**  
The Director - Legal Services- ZEMA, **LUSAKA**

**Northern Regional Office**  
P.O Box 71302  
Tel: +260-212-621048/610407

**Solwezi**  
P.O Box 110134  
Tel: +260-218-821297

**Livingstone**  
P.O Box 60195  
Tel: +260-213-321279

**Chipata**  
P.O Box 510527  
Tel: +260-216-221254

**Chirundu**  
P.O Box CRU 31 Chirundu  
Tel: +260-211-515261



# APPENDIX

## **2-1** *ZTIP PENSULO - NAKONDE CORNER POINTS COORDINATES*





## SC 330kV Pensulo - Mpika WGS 1984 ZONE 36

Structure Number	X Easting (m)	Y Northing (m)	Centerline Z Elevation (m)	Line Angle (deg)
PM-001	222321.22	8558075.99	1563.59	7.71
PM-003	222529.37	8558325.47	1564.96	39.22
PM-004	222895.21	8558396.22	1565.30	37.90
PM-018	228004.02	8555798.43	1599.44	-56.54
PM-020	228516.94	8556089.66	1608.60	65.57
PM-027	230842.63	8554400.88	1587.64	-35.70
PM-053	241018.79	8554349.65	1639.83	-76.93
PM-082	243645.07	8565405.94	1563.16	31.13
PM-132	257656.68	8579666.52	1560.48	-2.03
PM-142	260372.53	8582633.54	1538.04	3.39
PM-157	264663.64	8586797.76	1500.78	-1.37
PM-210	279600.53	8602001.56	1520.91	15.23
PM-211	279887.98	8602169.37	1529.08	-41.57
PM-217	280528.29	8604122.01	1530.56	-0.05
PM-226	281613.78	8607441.77	1498.50	-0.05
PM-234	282589.62	8610435.33	1462.06	-0.07
PM-238	283072.66	8611922.90	1466.70	-0.02
PM-241	283400.16	8612932.55	1488.63	-0.08
PM-255	285144.68	8618335.88	1495.95	0.01
PM-266	286493.13	8622510.67	1464.73	0.01
PM-274	287442.77	8625449.13	1443.08	-0.02
PM-285	288779.47	8629589.18	1458.21	-0.04
PM-291	289509.54	8631855.80	1430.20	-0.03
PM-295	290025.51	8633460.10	1437.15	-0.01
PM-305	291153.90	8636970.14	1491.48	27.34
PM-315	293917.00	8639718.00	1469.17	-46.60
PM-324	293824.96	8643376.02	1442.08	27.39
PM-338	296396.02	8648659.20	1418.67	-0.08
PM-353	298971.94	8653971.11	1379.50	-0.02
PM-366	301045.67	8658250.86	1360.66	-0.09
PM-377	302729.53	8661740.63	1351.84	54.77
PM-399	311441.71	8663193.92	1397.96	-40.07
PM-405	312961.41	8664976.05	1395.06	0.18
PM-415	315602.37	8668053.28	1375.20	-0.87
PM-424	317721.18	8670599.52	1393.47	0.22
PM-435	320391.87	8673784.30	1379.18	-13.95
PM-443	321828.72	8676726.58	1397.79	-0.01
PM-457	324179.12	8681540.89	1339.58	0.09
PM-461	324782.57	8682772.00	1368.15	0.04
PM-470	326388.71	8686043.01	1343.74	-28.96
PM-472	326357.26	8686684.65	1366.07	-22.30
PM-473	326291.63	8686824.74	1365.93	54.27
PM-474	326425.24	8687064.13	1369.31	83.23

## SC 330kV Mpika - Kasama WGS 1984 ZONE 36

Structure Number	X Easting (m)	Y Northing (m)	Centerline Z Elevation (m)	Line Angle (deg)
MK-001	326464.46	8687118.68	1370.36	-29.74
MK-008	323987.97	8687030.01	1332.90	44.57
MK-012	322822.63	8688098.62	1329.87	27.69
MK-093	311809.96	8718710.40	1336.24	1.03
MK-106	310140.70	8723626.75	1314.92	5.01
MK-197	301447.15	8759160.17	1330.31	-18.24
MK-267	287153.59	8782043.24	1228.47	67.35
MK-296	293548.00	8791053.00	1204.73	-55.76
MK-304	292520.99	8793815.09	1242.98	34.11
MK-335	295344.58	8805387.20	1240.45	-13.85
MK-347	295333.32	8810124.91	1215.69	19.61
MK-354	296296.06	8812847.38	1221.31	21.86
MK-367	299493.68	8816482.61	1224.60	-25.53
MK-383	301224.00	8822595.00	1236.27	-5.26
MK-399	302379.00	8828799.00	1235.73	-0.02
MK-405	302808.98	8831112.54	1235.93	-59.43
MK-408	302024.95	8831796.35	1231.98	50.29
MK-421	302146.39	8836817.02	1239.09	-6.95
MK-448	301158.25	8846966.58	1239.60	10.13
MK-450	301207.34	8847580.33	1246.88	-58.17
MK-451	301019.27	8847718.98	1244.67	44.83
MK-475	299559.00	8857178.00	1266.27	65.68
MK-483	301945.87	8858733.87	1264.87	-52.62
MK-497	302354.45	8864189.95	1288.73	-49.58
MK-509	298434.17	8868069.42	1324.40	26.69
MK-510	298322.95	8868399.66	1326.76	6.36

## SC 330kV Kasama - Nakonde Arc 1950 Zambia

Corner Number	X	Y	H	Corner
XKN2/ZTKN1	8869046.29	298122.59	1325.35	-55.54
XKN3/ZTKN2	8869148.46	298208.01	1327.36	-33.53
XKN4/ZTKN3	8869197.99	298378.39	1328.93	-89.60
XKN5/ZTKN1	8868458.08	298593.54	1320.54	28.60
KN6/TKN17	8864069.05	303014.80	1293.82	62.40
KN7/TKN22	8864643.70	304795.35	1308.67	57.51
KN8/TKN37	8870654.42	306322.80	1378.73	-40.05
KN9/TKN53	8874184.38	311244.31	1378.89	5.58
KN9+1/TKN172	8907212.15	348422.13	1266.09	-13.07
KN9+2/TKN177	8908186.28	350216.47	1271.43	33.24
KN9+3/TKN181	8909365.28	350845.80	1261.66	-20.17
KN9+4/TKN196	8913446.14	355439.44	1255.34	44.12
KN9+5/TKN202	8915836.06	355614.03	1229.19	-65.03
KN10/TKN214	8917499.48	360002.10	1257.02	17.05
KN11/TKN259	8928890.94	374658.92	1284.54	63.38
KN12/TKN264	8930985.39	374232.93	1286.17	-75.11
KN13/TKN295	8936447.26	385282.50	1330.62	45.28
KN14/TKN336	8952616.84	390609.36	1323.67	-55.17
KN14+1/TKN339	8952932.77	391677.60	1302.14	43.18
KN14+2/TKN343	8954160.13	392392.51	1286.13	-62.50
KN14+3/TKN351	8954001.18	395365.21	1282.34	19.14
KN15/TKN394	8958928.10	412345.86	1272.03	-0.12
KN15+1/TKN411	8960799.82	418881.11	1241.59	37.17
KN15+2/TKN430	8966865.69	423407.49	1262.58	-24.38
KN15+3/TKN452	8971195.24	431339.22	1271.54	-25.18
KN15+4/TKN474	8971710.45	440201.60	1315.26	-41.21
KN15+5/TKN506	8963650.38	450505.15	1331.10	42.17
KN15+6/TKN514	8963884.99	453664.45	1393.08	0.32
KN15+7/TKN521	8964116.67	456432.66	1468.88	-4.47

## DC 330kV Nakonde - Border Arc 1950 Zambia

Structure Number	X Easting (m)	Y Northing (m)	Centerline Z Elevation (m)	Line Angle (deg)
ZT2/NT3	456432.658	8964190.235	1465.6916	-61.124
ZT3/NT4	456225.892	8964566.532	1466.858	-27.2839
ZT4/NT7	456204.132	8965520.307	1473.565	17.4518
ZT5/NT17	454985.759	8969046.521	1465.46	-12.422
ZT6/NT23	454708.515	8971535.73	1458.79	-36.2102
ZT7/NT33	456849.527	8975244.528	1544.515	-8.4137
ZT8/NT36	8976129.135	457558.413	1553.547	14.2929
CB1/NT38	457869.058	8976819.484	1594.045	

### 132 (66)kV Nakonde - Isoka Arc 1950 Zambia

NO.	X	Y	H	Line Angle (deg)
KN15/KIN2	8964094.39	456783.24	1485.44	20.4651
KN16/ KIN8	8964266.68	458781.79	1500.33	-0.37
KN17/KIN35	8964898.07	467168.58	1621.78	61.48
NI2/KIN37	8964375.20	467501.72	1608.78	37.43
NI3/KIN41	8963958.53	468660.71	1585.10	30.46
NI4/KIN42	8963981.65	468779.68	1588.30	

**PROPOSED NEW NAKONDE SUBSTATION COORDINATES: Arc 1950**

<b>ID</b>	<b>Northings</b>	<b>Eastings</b>	<b>Elevation</b>
A	8964263.9	456428.671	1461.727
B	8964277.768	456928.973	1488.998
C	8963280.874	456849.28	1451.237
D	8963266.984	456349.001	1434.222

**KASAMA SUBSTATION BOUNDARY COORDINATES Arc 1950 Zambia**

<b>ID</b>	<b>Northings</b>	<b>Eastings</b>
A	8869099.296	297932.644
B	8869297.917	298266.043
C	8868682.105	298004.282
D	8868818.008	298403.921

**MPIKA SUBSTATION BOUNDARY COORDINATES ARC 1950**

<b>ID</b>	<b>Northings</b>	<b>Eastings</b>
A	8687548.02	326639.007
B	8687377.082	327000.591
C	8686917.459	326783.232
D	8687088.28	326421.638

**PENSULO SUBSTATION BOUNDARY COORDINATES WGS 1984 ZONE 36L**

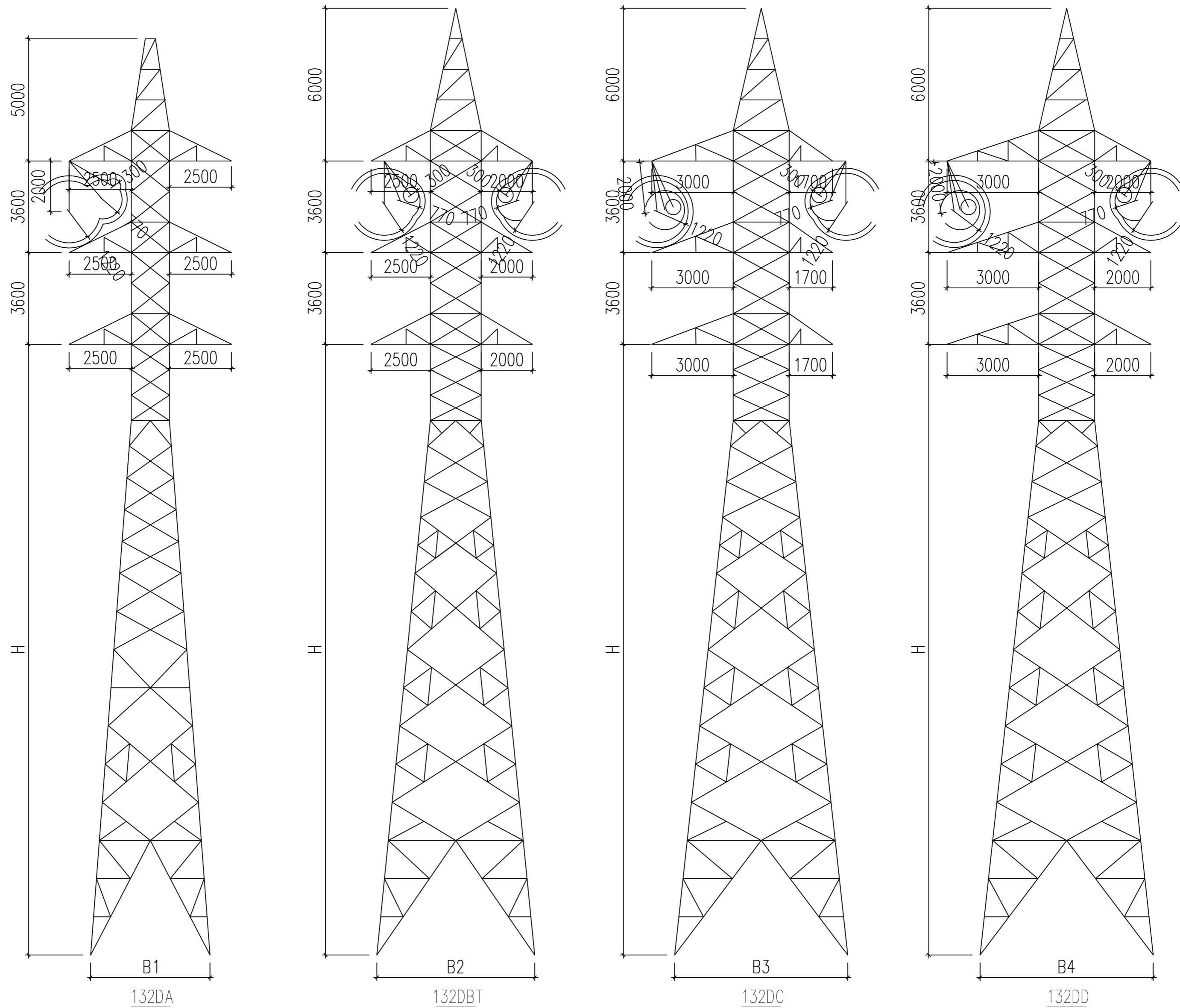
<b>ID</b>	<b>Northings</b>	<b>Eastings</b>
A	8558122	222251
B	8557945	222120
C	8557743	222396
D	8557916	222524

# APPENDIX

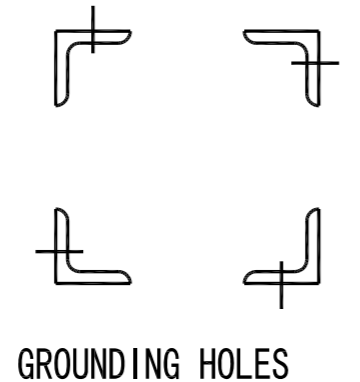
## **2-2** *CONCEPTUAL DESIGN DRAWINGS*







Note: The controlled dimensions are determined according to the bidding documents, shield angle and electric clearance; the dimensions in the brackets and member arrangement will be optimized in the period of working drawing design.



Designation & Uses of Towers					
Tower Type	Tower Name	Height Rang (m)	Wind Span (m)	Weight Span (m)	Deviation Angle (°)
Suspension Tower	132DA	18~27	360	450	0°
	132DBT	18~24	350	450	0°~30°
Tension Tower	132DC	18~24	350	450	30°~60°
	132DD	18~30	350	450	60°~90°/ 0°~90°DE

EMPLOYER: ZESCO LIMITED		PROJECT NAME: KASAMA-NAKONDE, KASAMA-MPOROKOSO AND KASAMA-KAYAMBI TRANSMISSION LINES AND SUBSTATIONS NAKONDE STEP DOWN / ISOKA-NAKONDE 132-66KV LINE PROJECT			
CONTRACTOR: TBEA CO., LTD		DOC STATUS: FILE FOR APPROVAL DESIGNED: [Signature] CHECKED: [Signature] REVIEWED: [Signature] APPROVED: [Signature]		INTERMEDIATE FILE PRELIMINARY DESIGN <input checked="" type="checkbox"/> WORKING DRAWING AS BUILT	
DATE: _____ SIGNATURE: _____		TITLE: <b>TOWER GENERAL DRAWINGS</b>		DATE: 14/05/2019 SCALE: _____ ORIGINAL: S0544C-A01-09	

1 2 3 4 5 6 7 8 9 10

A

B

C

D

E

F

A

B

C

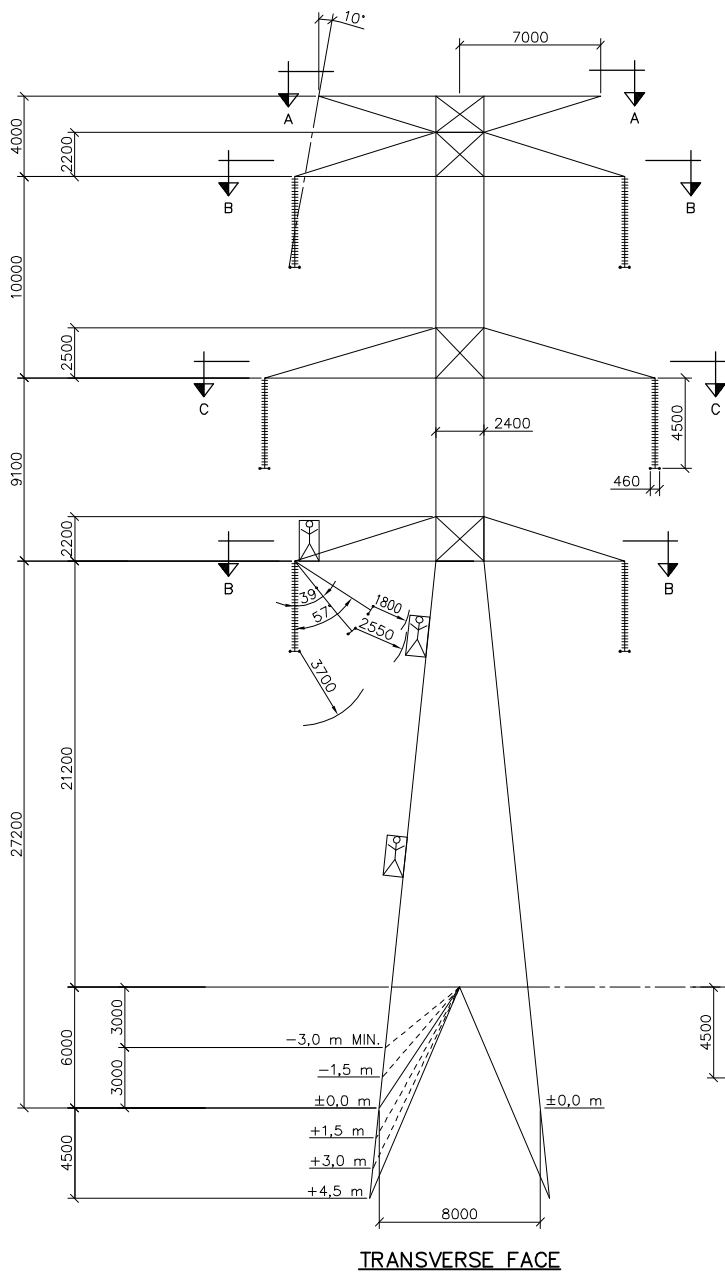
D

E

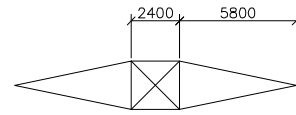
F

1 2 3 4 5 6 7 8 9 10

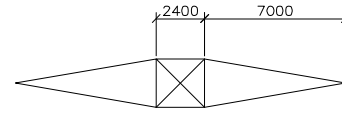
FILENAME: K:\GAMESA\T\m\1000\2017\03\28\2846...Tanzania-Zambia...Tower-2-Zambia...hsk\07\_Plan\A...hsk\03\28\2846-LINE-200...Rev.dwg



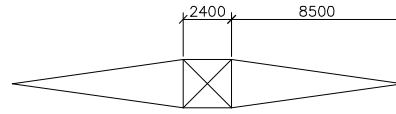
**TRANSVERSE FACE**



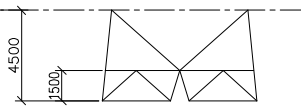
**SECTION A-A**



**SECTION B-B**



**SECTION C-C**

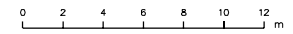


**+4.5 m BODY EXTENSION**

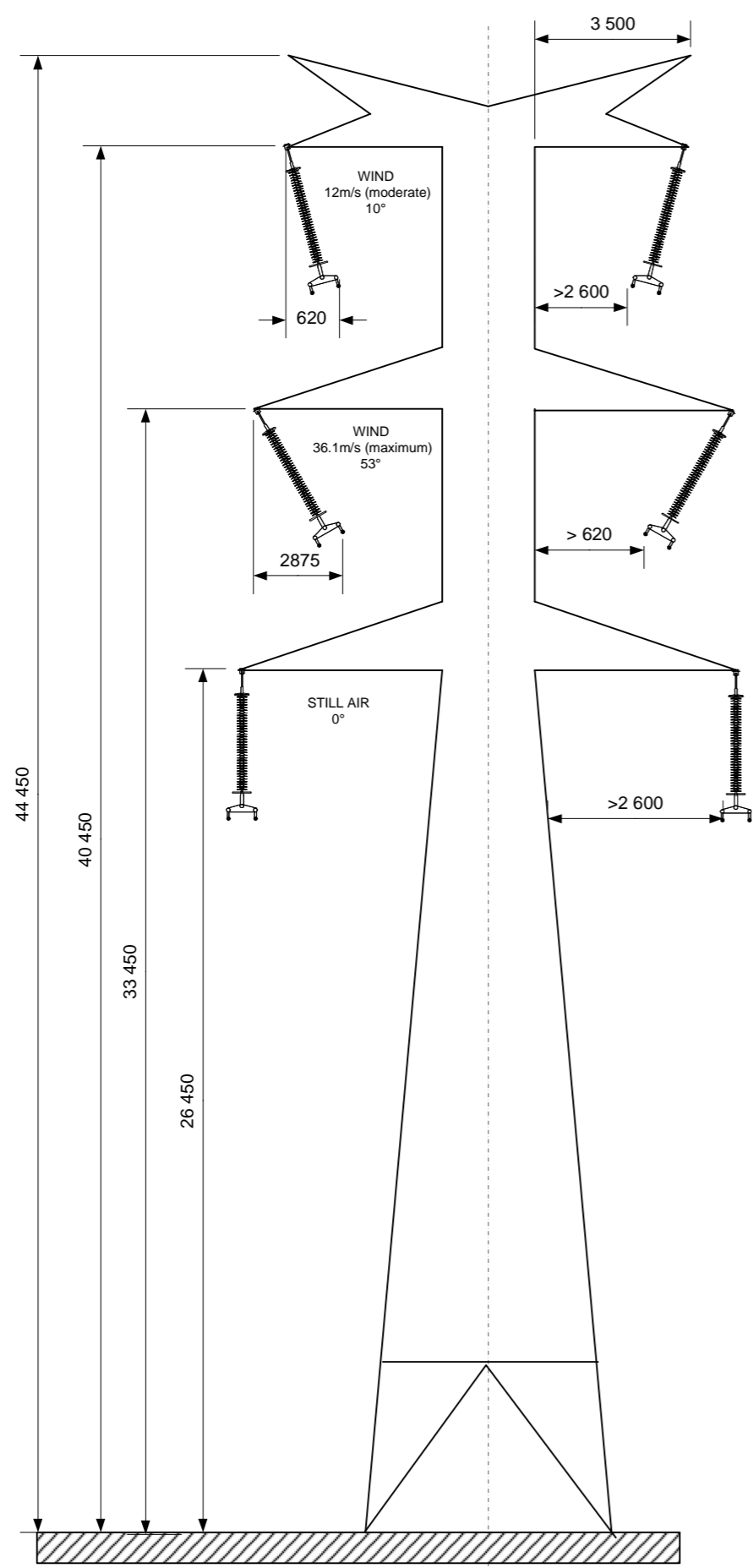
- NOTES:**
- 1: ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
  - 2: ALL DIMENSIONS ARE TYPICAL. FINAL DIMENSIONS SHALL BE DETERMINED BY TENDERERS FOLLOWING THE REQUIREMENTS OF THE TECHNICAL SPECIFICATION.
  - 3: MINIMUM APPROACH DISTANCE UNDER LIVE WORKING = 2.9 m

THIS DRAWING SHOULD NOT BE USED FOR CONSTRUCTION PURPOSES. IT IS FOR GUIDANCE ONLY AS TO THE SCOPE OF WORK INVOLVED.

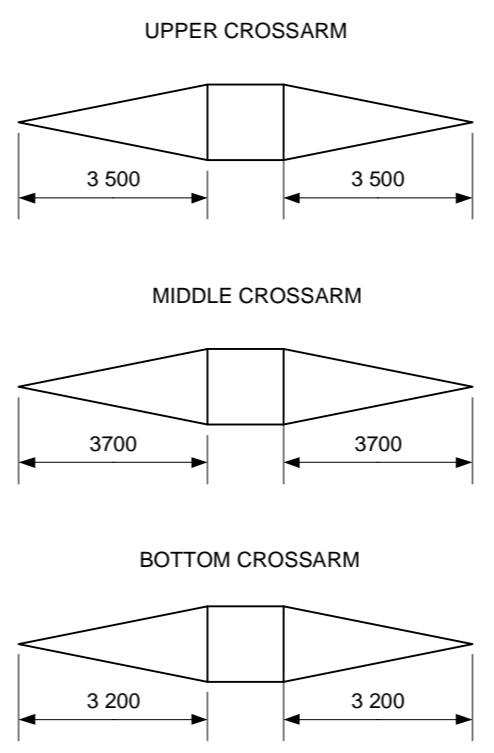
SCALE  
1:250



		FEASIBILITY STUDY, CONCEPTUAL DESIGN AND TENDER DOCUMENTS OF TANZANIA-ZAMBIA POWER INTERCONNECTION STUDY
<b>FEASIBILITY DESIGN REPORT TANZANIA-ZAMBIA INTERCONNECTION PROJECT</b>		
<b>400 kV - DOUBLE CIRCUIT SUSPENSION TYPE (0° - 2°) TOWER OUTLINE</b>		
<b>AECOM</b>		Date : Juin 2017
Drawing No: <b>60309286-LINE-200</b>		Rev. <b>A</b>



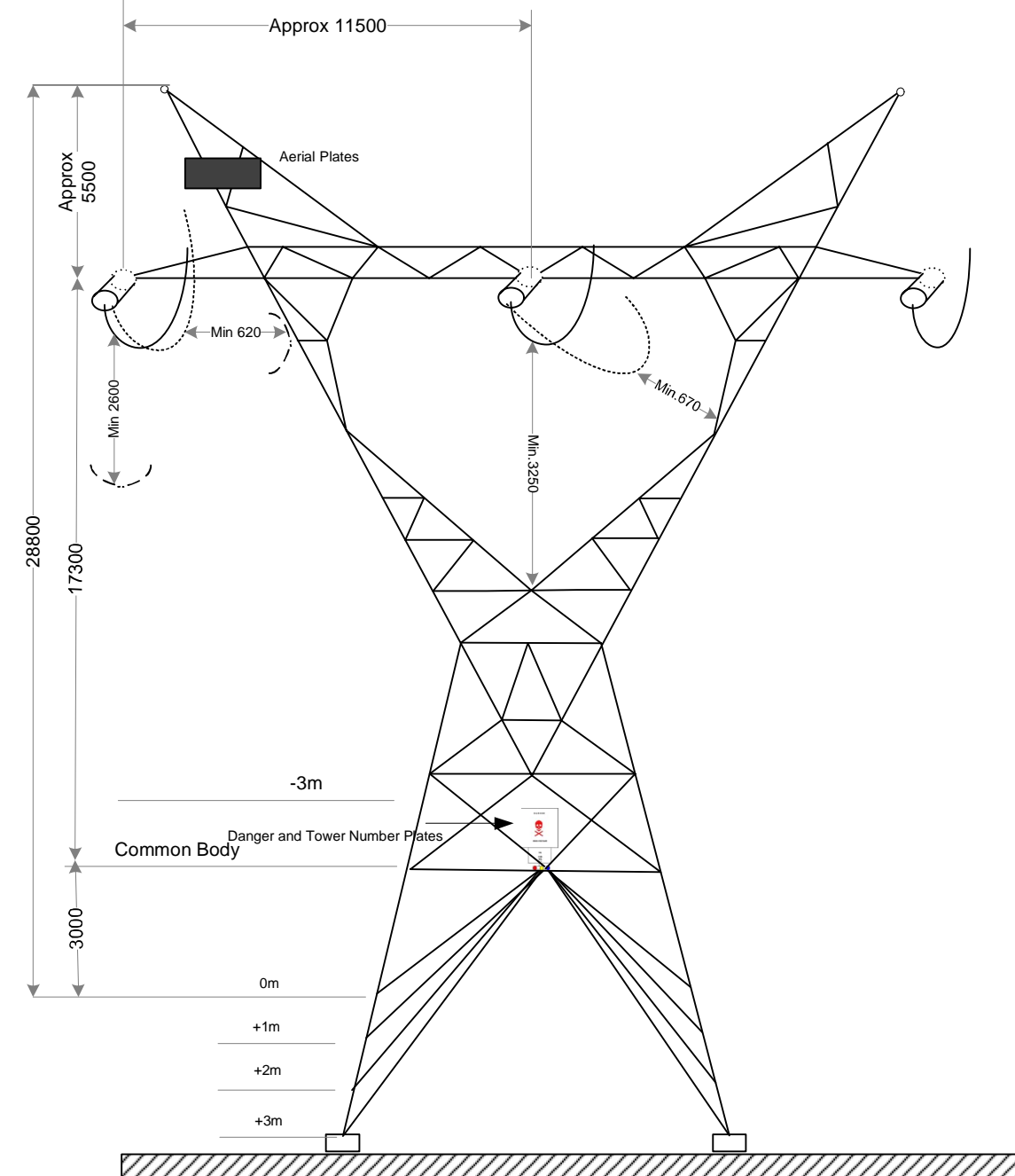
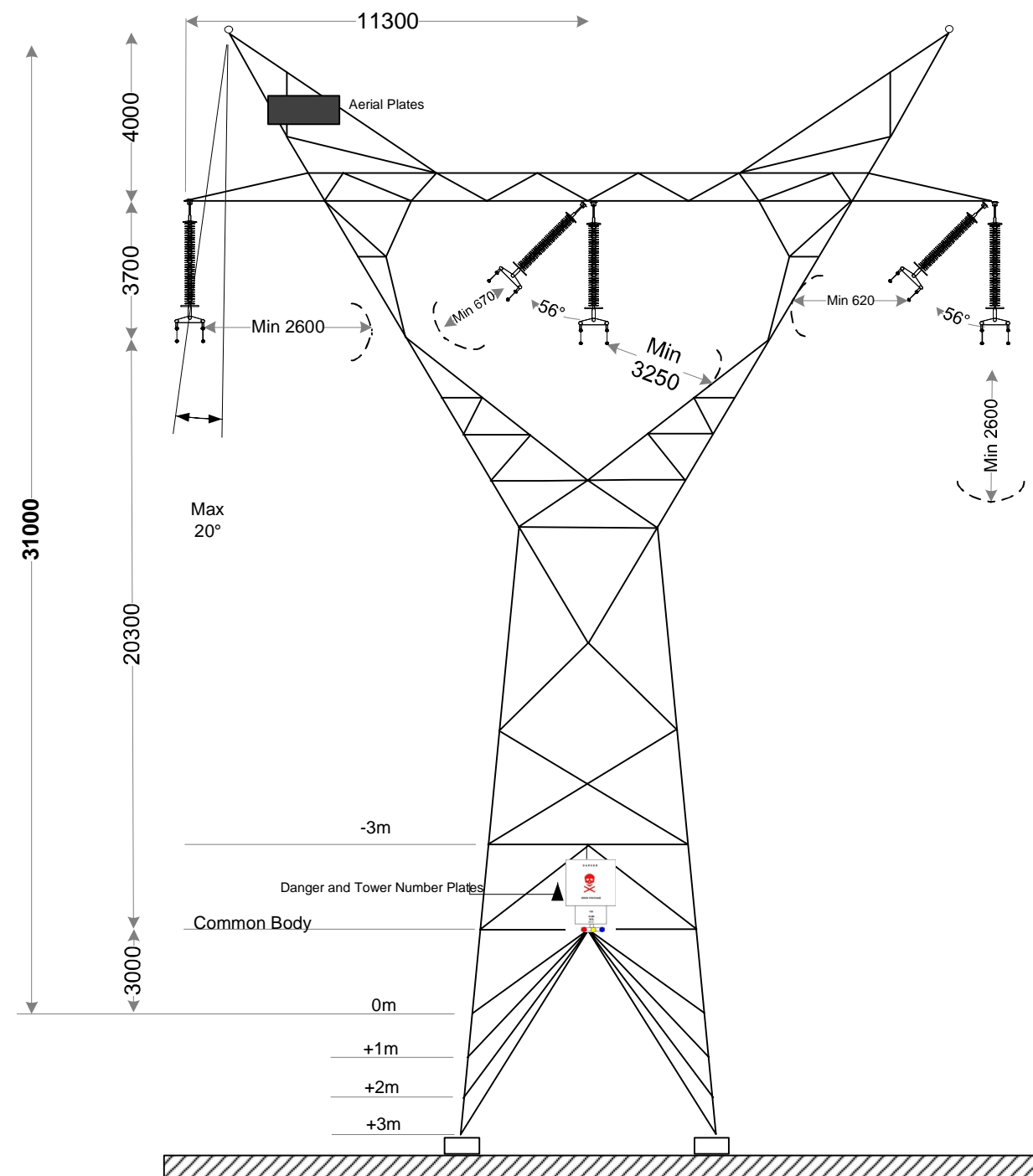
Conductor	ACSR Bluejay
Voltage	330 kV
Clearance to Ground	8.1 m
Basic Span	375 m
Max Sag	14.75 m
String length	3.60 m



**330kV D/C Suspension  
Tower 0° - 2°(A3)**

### 330kV S/C Suspension Tower 0° - 2°(A3)

### 330kV S/C Tension Tower 10° - 30° - 60°

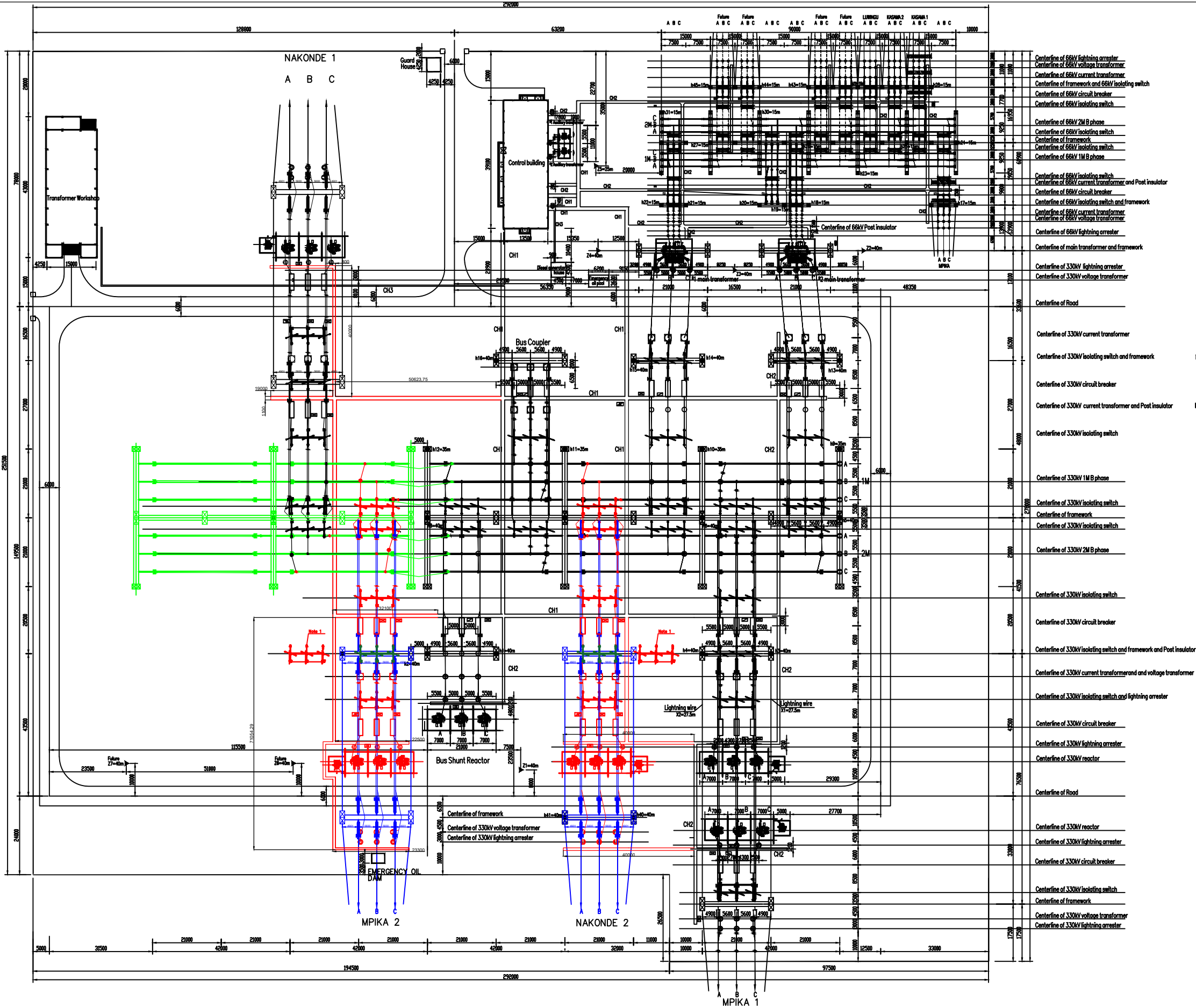


# APPENDIX

## **2-3** *SUBSTATION CONFIGURATION DRAWINGS*







- Centerline of 66kV lightning arrester
- Centerline of 66kV voltage transformer
- Centerline of 66kV current transformer
- Centerline of framework and 66kV isolating switch
- Centerline of 66kV circuit breaker
- Centerline of 66kV isolating switch
- Centerline of 66kV 2M B phase
- Centerline of 66kV isolating switch
- Centerline of framework
- Centerline of 66kV isolating switch
- Centerline of 66kV 1M B phase
- Centerline of 66kV isolating switch and Post insulator
- Centerline of 66kV circuit breaker
- Centerline of 66kV isolating switch and framework
- Centerline of 66kV current transformer and 66kV voltage transformer
- Centerline of 66kV lightning arrester
- Centerline of main transformer and framework
- Centerline of 330kV lightning arrester
- Centerline of 330kV voltage transformer
- Centerline of Road
- Centerline of 330kV current transformer
- Centerline of 330kV isolating switch and framework
- Centerline of 330kV circuit breaker
- Centerline of 330kV current transformer and Post insulator
- Centerline of 330kV isolating switch
- Centerline of 330kV 1M B phase
- Centerline of 330kV isolating switch
- Centerline of framework
- Centerline of 330kV isolating switch
- Centerline of 330kV 2M B phase
- Centerline of 330kV isolating switch
- Centerline of 330kV circuit breaker
- Centerline of 330kV isolating switch and framework and Post insulator
- Centerline of 330kV current transformer and voltage transformer
- Centerline of 330kV isolating switch and lightning arrester
- Centerline of 330kV circuit breaker
- Centerline of 330kV lightning arrester
- Centerline of 330kV reactor
- Centerline of Road
- Centerline of 330kV reactor
- Centerline of 330kV lightning arrester
- Centerline of 330kV circuit breaker
- Centerline of 330kV isolating switch
- Centerline of framework
- Centerline of 330kV voltage transformer
- Centerline of 330kV lightning arrester

Notes:

1. The unit of dimension is mm.
2. The continuous line is for the current project while the dashed line is for the future.
3. The size of cable trench: CH1: 1100X1000; CH2: 800X800; CH3: 400X400.

- Legend:
- 330kV Circuit breaker
  - 330kV three-phase isolating switch (Un-Grounding), to the ground setting
  - 330kV three-phase isolating switch (Un-Grounding), high setting
  - 330kV three-phase isolating switch (Single-Grounding)
  - 66kV three-phase isolating switch
  - 66kV Circuit breaker
  - 66kV Current transformer
  - Capacitor voltage transformer
  - 330kV Current transformer
  - Lightning arrester
  - Post insulator
  - Independent lightning rod (Z1-Z5 is for the current project; Z6-Z7 is for the future)
  - Gantry lightning rod (h1-h31 are for the current project, among them: h1-h16 are in 330kV switchgear area, h17-h31 are in 66kV switchgear area, h32-h45 are for the future.

NOTE:

1. THIS DRAWING IS A HIGH LEVEL CONCEPTUAL GA ONLY.
2. THIS DRAWING IS NOT FOR CONSTRUCTION PURPOSES
3. WSP INDEMNIFIES ITSELF AGAINST ANY CLAIM, DAMAGES OR MISREPRESENTATION BY ANY PARTIES, FROM CURRENT OR FUTURE USE OF THIS SKETCH ILLUSTRATION, OTHER THAN WHAT IT IS INTEND FOR: ILLUSTRATION AND CONCEPT PURPOSES ONLY.

REV	DATE	BY	DESCRIPTION	CHK	APD
2	02/09/2020	AG	CHANGES AS PER ZESCO COMMENTS	MH	DB
1	22/07/2020	AG	ZESCO COMMENTS	MH	DB
0	23/06/2020	AG	FIRST DRAFT	MH	DB

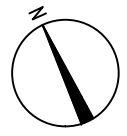
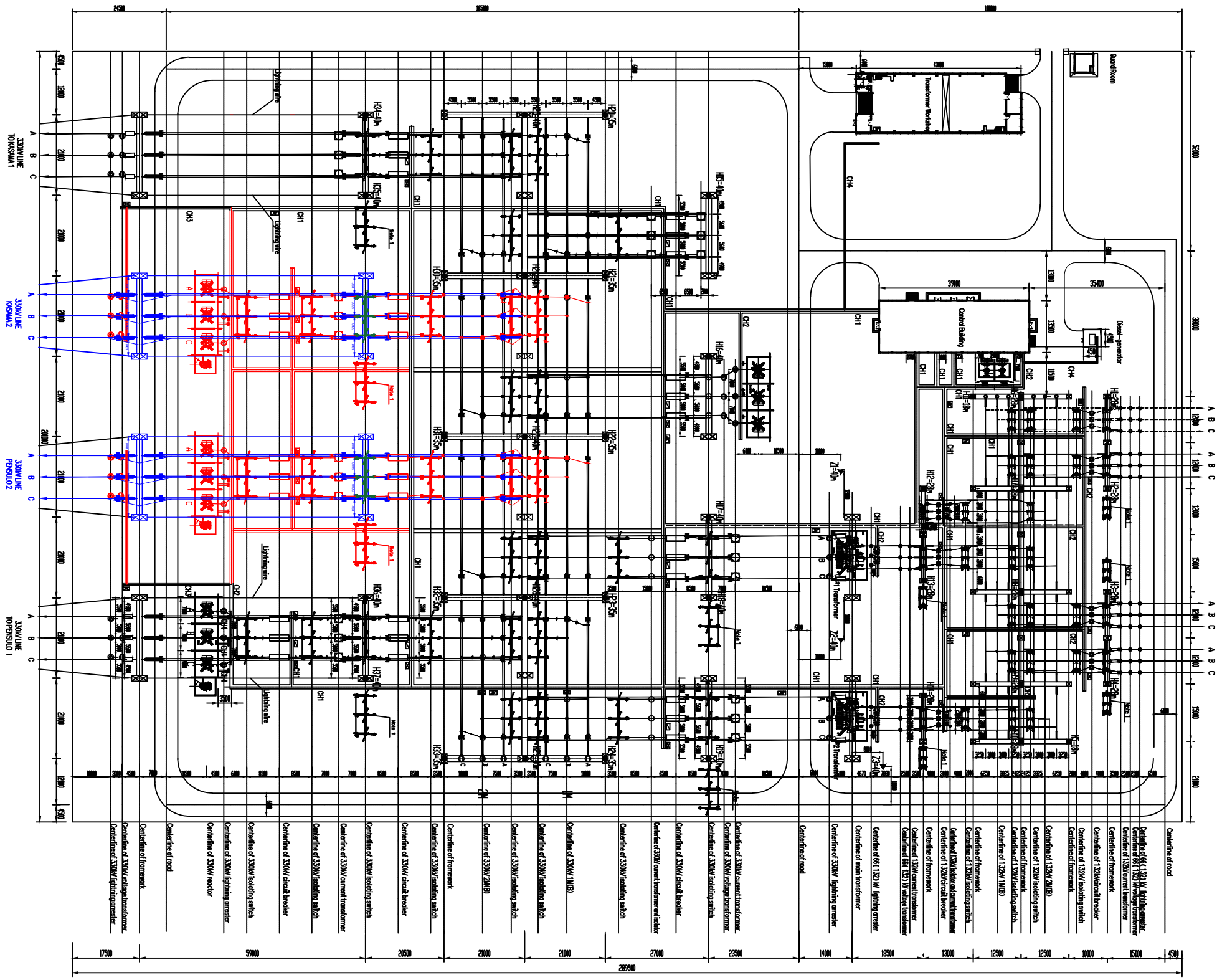
CLIENT:  
**SAPP (ZESCO)**

**WSP Group Africa (Pty) Ltd**  
Power  
Building C, Knightbridge, 33 Sloane Street, Bryanston, 2191  
PO Box 98867 Sloane Park 2152  
Tel: +27(0)11-361-1300 Fax: +27(0)11-361-1301 www.wsp.com

PROJECT:  
**SAPP - ZTIP Phase 2**

TITLE:  
**KASAMA GA - PROPOSED LAYOUT**

SCALE: <b>1:1250</b>	CHECKED: <b>MH</b>	APPROVED: <b>DB</b>
DESIGN: <b>AG</b>	DRAWN: <b>AG</b>	DATE: <b>02/09/2020</b>
PROJECT No: <b>48100008</b>	DRAWING No: <b>48100008-KASAMA-GA</b>	REV: <b>2</b>



Note 1:  
This isolating switch (Single-Grounding) is under the 330kV framework. Please see each section drawing for its position.

Introduction:  
1. The continuous line is for the current project while the dotted line is for the future.

2. Dimensions in mm.

3. The size of cable trench:  
CH1: 1100x1000  
CH2: 800x880  
CH3: 600x600  
CH4: 400x400

Illustration:

- 330kV Circuit breaker
- 330kV three-phase isolating switch (Un-Grounding), to the ground setting
- 330kV three-phase isolating switch (Un-Grounding), high setting
- 330kV three-phase isolating switch (Single-Grounding)
- 132kV Circuit breaker
- 132kV three-phase isolating switch (Un-Grounding), to the ground setting
- 132kV three-phase isolating switch (Un-Grounding), high setting
- 132kV three-phase isolating switch (Single-Grounding)
- Capacitor voltage transformer
- 330kV Current voltage transformer
- 132kV Current voltage transformer
- Lighting arrester
- Post insulator
- Independent lighting rod, a total of 3, 40 metres high.
- Gantry lighting rod, a total of 35, 2 of them 18 metres high, 12 of them 28 metres high, 9 of them 35 metres high, 16 of them 40 metres high
- XW1 Terminal box, 15 pcs.
- Maintenance power box, 9 pcs.
- Bus CVT Terminal box, 4 pcs.
- Control box of circuit breaker, 7 pcs.
- Control cabinet for main transformer, a total of 2
- Terminal box for shunt reactor, a total of 8

NOTE:

1. THIS DRAWING IS A HIGH LEVEL CONCEPTUAL GA ONLY.
2. THIS DRAWING IS NOT FOR CONSTRUCTION PURPOSES
3. WSP INDEMNIFIES ITSELF AGAINST ANY CLAIM, DAMAGES OR MISREPRESENTATION BY ANY PARTIES, FROM CURRENT OR FUTURE USE OF THIS SKETCH ILLUSTRATION, OTHER THAN WHAT IT IS INTEND FOR: ILLUSTRATION AND CONCEPT PURPOSES ONLY.

REV	DATE	BY	DESCRIPTION	CHK	APD
2	02/09/2020	AG	FINAL CHANGES AS PER ZESCO COMMENTS	MH	DB
1	13/07/2020	AG	ZESCO COMMENTS	MH	DB
0	12/06/2020	AG	FIRST DRAFT	MH	DB

CLIENT:  
**SAPP (ZESCO)**

**wsp**

**WSP Group Africa (Pty) Ltd**  
Power

Building C, Knightbridge, 33 Sloane Street, Bryanston, 2191  
PO Box 98867 Sloane Park 2152  
Tel: +27(0)11-361-1300 Fax: +27(0)11-361-1301 www.wsp.com

PROJECT:  
**SAPP - ZTIP Phase 2**

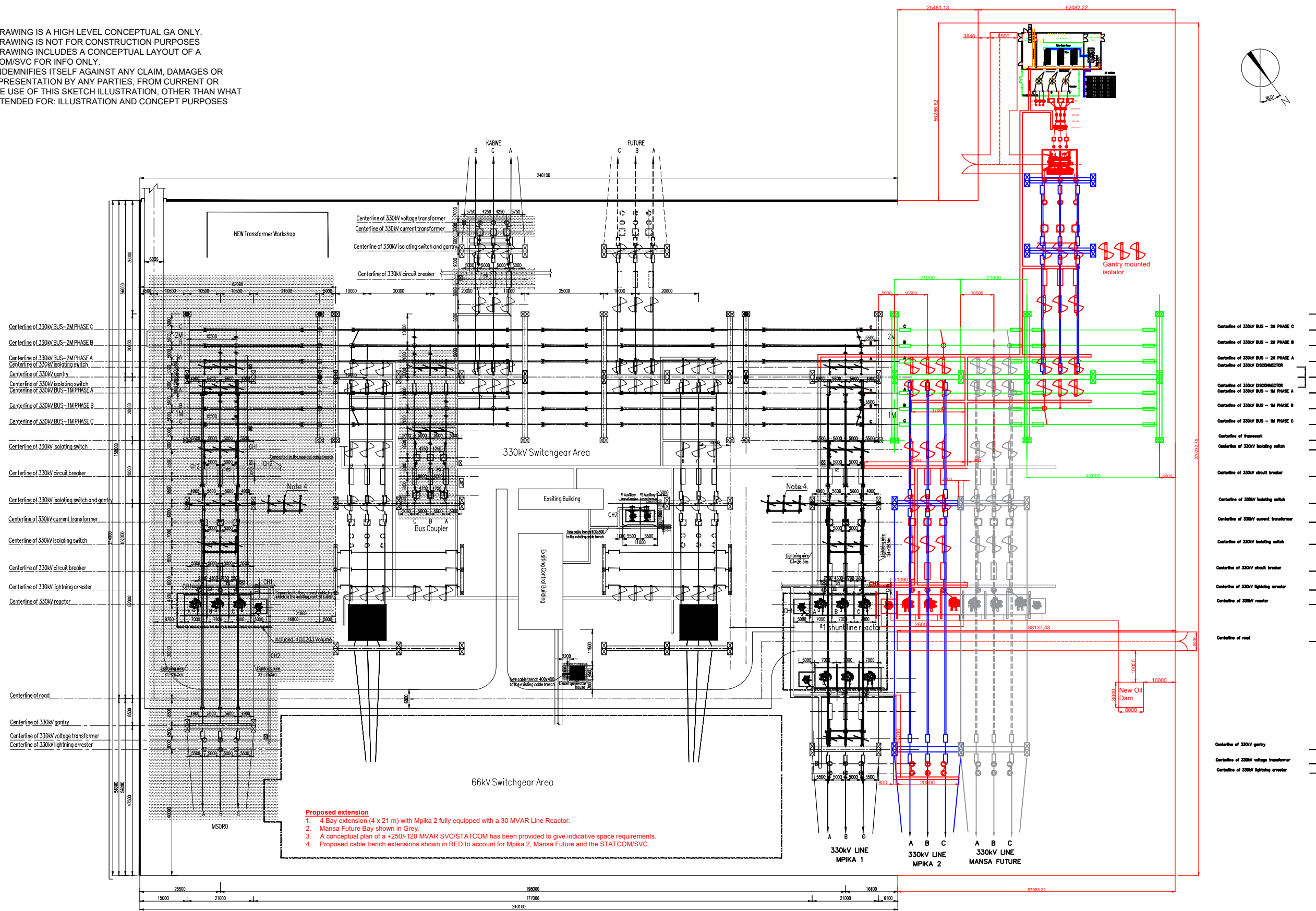
TITLE:  
**MPIKA GA - PROPOSED LAYOUT**

SCALE: <b>1:1250</b>	CHECKED: <b>MH</b>	APPROVED: <b>DB</b>
DESIGN: <b>AG</b>	DRAWN: <b>AG</b>	DATE: <b>02/09/2020</b>
PROJECT No: <b>48100008</b>	DRAWING No: <b>48100008-MPIKA-GA</b>	REV: <b>2</b>



**NOTE:**

1. THIS DRAWING IS A HIGH LEVEL CONCEPTUAL GA ONLY.
2. THIS DRAWING IS NOT FOR CONSTRUCTION PURPOSES
3. THIS DRAWING INCLUDES A CONCEPTUAL LAYOUT OF A STATCOM/SVC FOR INFO ONLY.
4. WSP INDEMNIFIES ITSELF AGAINST ANY CLAIM, DAMAGES OR MISREPRESENTATION BY ANY PARTIES, FROM CURRENT OR FUTURE USE OF THIS SKETCH ILLUSTRATION, OTHER THAN WHAT IT IS INTENDED FOR: ILLUSTRATION AND CONCEPT PURPOSES ONLY.



**Proposed extension**

1. 4 Bay extension (4 x 21 m) with Mpika 2 fully equipped with a 30 MVAR Line Reactor.
2. Mansa Future Bay shown in Grey.
3. A conceptual plan of a +250/-120 MVAR SVC/STATCOM has been provided to give indicative space requirements.
4. Proposed cable trench extensions shown in RED to account for Mpika 2, Mansa Future and the STATCOM/SVC.

Centerline of 330kV BUS - 2M PHASE C
Centerline of 330kV BUS - 2M PHASE B
Centerline of 330kV BUS - 2M PHASE A
Centerline of 330kV DISCONNECTOR
Centerline of 330kV BUS - 1M PHASE A
Centerline of 330kV BUS - 1M PHASE B
Centerline of 330kV BUS - 1M PHASE C
Centerline of framework
Centerline of 330kV isolating switch
Centerline of 330kV circuit breaker
Centerline of 330kV isolating switch
Centerline of 330kV current transformer
Centerline of 330kV isolating switch
Centerline of 330kV circuit breaker
Centerline of 330kV lightning arrester
Centerline of 330kV reactor
Centerline of road
Centerline of 330kV gantry
Centerline of 330kV voltage transformer
Centerline of 330kV lightning arrester

REV	DATE	BY	DESCRIPTION	CHK	APD
1	02/09/2020	AG	FINAL CHANGES AS PER ZESCO COMMENTS	MH	AG
0	31/07/2020	AG	FIRST DRAFT	MH	AG

CLIENT:  
**SAPP (ZESCO)**

**wsp**

**WSP Group Africa (Pty) Ltd**  
Power  
Building C, Knightbridge, 33 Sloane Street, Bryanston, 2191  
PO Box 98867 Sloane Park 2152  
Tel: +27(0)11-361-1300 Fax: +27(0)11-361-1301 www.wsp.com

PROJECT:  
**SAPP - ZTIP Phase 2**

TITLE:  
**PENSULO GA - PROPOSED LAYOUT**

SCALE: <b>1:1250</b>	CHECKED: MH	APPROVED: DB
DESIGN: AG	DRAWN: AG	DATE: 02/09/2020
PROJECT No: <b>48100008</b>	DRAWING No: <b>48100008-PEN-GA</b>	REV: <b>1</b>

# APPENDIX

## **2-4** *DETAILS OF THE CONSTRUCTION SCHEDULE*










# APPENDIX

## **3-1** *WBG EHS GUIDELINES - ELECTRIC TRANSMISSION AND DISTRIBUTION*





# Environmental, Health, and Safety Guidelines for Electric Power Transmission and Distribution

## Introduction

The Environmental, Health, and Safety (EHS) Guidelines are technical reference documents with general and industry-specific examples of Good International Industry Practice (GIIP)<sup>1</sup>. When one or more members of the World Bank Group are involved in a project, these EHS Guidelines are applied as required by their respective policies and standards. These industry sector EHS guidelines are designed to be used together with the **General EHS Guidelines** document, which provides guidance to users on common EHS issues potentially applicable to all industry sectors. For complex projects, use of multiple industry-sector guidelines may be necessary. A complete list of industry-sector guidelines can be found at: [www.ifc.org/ifcext/enviro.nsf/Content/EnvironmentalGuidelines](http://www.ifc.org/ifcext/enviro.nsf/Content/EnvironmentalGuidelines)

The EHS Guidelines contain the performance levels and measures that are generally considered to be achievable in new facilities by existing technology at reasonable costs. Application of the EHS Guidelines to existing facilities may involve the establishment of site-specific targets, with an appropriate timetable for achieving them.

The applicability of the EHS Guidelines should be tailored to the hazards and risks established for each project on the basis

<sup>1</sup> Defined as the exercise of professional skill, diligence, prudence and foresight that would be reasonably expected from skilled and experienced professionals engaged in the same type of undertaking under the same or similar circumstances globally. The circumstances that skilled and experienced professionals may find when evaluating the range of pollution prevention and control techniques available to a project may include, but are not limited to, varying levels of environmental degradation and environmental assimilative capacity as well as varying levels of financial and technical feasibility.

of the results of an environmental assessment in which site-specific variables, such as host country context, assimilative capacity of the environment, and other project factors, are taken into account. The applicability of specific technical recommendations should be based on the professional opinion of qualified and experienced persons.

When host country regulations differ from the levels and measures presented in the EHS Guidelines, projects are expected to achieve whichever is more stringent. If less stringent levels or measures than those provided in these EHS Guidelines are appropriate, in view of specific project circumstances, a full and detailed justification for any proposed alternatives is needed as part of the site-specific environmental assessment. This justification should demonstrate that the choice for any alternate performance levels is protective of human health and the environment.

## Applicability

The EHS Guidelines for Electric Power Transmission and Distribution include information relevant to power transmission between a generation facility and a substation located within an electricity grid, in addition to power distribution from a substation to consumers located in residential, commercial, and industrial areas. Annex A provides a summary of industry sector activities. This document is organized according to the following sections:

Section 1.0 — Industry-Specific Impacts and Management  
Section 2.0 — Performance Indicators and Monitoring  
Section 3.0 — References and Additional Sources  
Annex A — General Description of Industry Activities

## 1.0 Industry-Specific Impacts and Management

The following section provides a summary of EHS issues associated with electric power transmission and distribution that occur during the construction and operation phases of a facility, along with recommendations for their management. Additional recommendations for the management of environmental issues during the construction and decommissioning phases of power transmission and distribution systems are provided in the **General EHS Guidelines**. Examples of the impacts addressed in the General EHS Guidelines include:

- Construction site waste generation;
- Soil erosion and sediment control from materials sourcing areas and site preparation activities;
- Fugitive dust and other emissions (e.g. from vehicle traffic, land clearing activities, and materials stockpiles);
- Noise from heavy equipment and truck traffic;
- Potential for hazardous materials and oil spills associated with heavy equipment operation and fueling activities.

### 1.1 Environmental

Environmental issues during the construction phase of power transmission and distribution projects specific to this industry sector include the following:

- Terrestrial habitat alteration
- Aquatic habitat alteration
- Electric and magnetic fields
- Hazardous materials

### Terrestrial Habitat Alteration

The construction and maintenance of transmission line rights-of-way, especially those aligned through forested areas, may result in alteration and disruption to terrestrial habitat, including impacts to avian species and an increased risk of forest fires.

#### *Construction of Right-of-Way<sup>2</sup>*

Right-of-way construction activities may transform habitats, depending on the characteristics of existing vegetation, topographic features, and installed height of the transmission lines. Examples of habitat alteration from these activities includes fragmentation of forested habitat; loss of wildlife habitat, including for nesting; establishment of non-native invasive plant species; and visual and auditory disturbance due to the presence of machinery, construction workers, transmission towers, and associated equipment.<sup>3</sup>

Recommended measures to prevent and control impacts to terrestrial habitats during construction of the right-of-way include:

- Site transmission and distribution rights-of-way, access roads, lines, towers, and substations to avoid critical habitat through use of existing utility and transport corridors for transmission and distribution, and existing roads and tracks for access roads, whenever possible;<sup>4</sup>
- Installation of transmission lines above existing vegetation to avoid land clearing;

<sup>2</sup> Also known as a "wayleave" or "easement" in some countries, but referred to as right-of-way for the purposes of these Guidelines.

<sup>3</sup> Alteration of terrestrial habitat for construction of transmission and distribution projects may also yield benefits for wildlife such as the creation of protective nesting, rearing, and foraging habitat for certain species; the establishment of travel and foraging corridors for ungulates and other large mammals; and nesting and perching opportunities for large bird species atop transmission towers and associated infrastructures. California Energy Commission (2005).

<sup>4</sup> Considering potential for electrical interference with telecommunication lines and railway lines due to mutual induction.

- Avoidance of construction activities during the breeding season and other sensitive seasons or times of day;
- Revegetation of disturbed areas with native plant species;
- Removal of invasive plant species during routine vegetation maintenance (see right-of-way maintenance section below);
- Management of construction site activities as described in relevant sections of the **General EHS Guidelines**.

### *Right-of-Way Maintenance*

Regular maintenance of vegetation within the rights-of-way is necessary to avoid disruption to overhead power lines and towers. Unchecked growth of tall trees and accumulation of vegetation within rights-of-way may result in a number of impacts, including power outages through contact of branches and trees with transmission lines and towers; ignition of forest and brush fires; corrosion of steel equipment; blocking of equipment access; and interference with critical grounding equipment.

Regular maintenance of rights-of-way to control vegetation may involve the use of mechanical methods, such as mowing or pruning machinery that may disrupt wildlife and their habitats, in addition to manual hand clearing and herbicide use. Vegetation management should not eradicate all vegetation, but aim to maintain trees and plant growth that may negatively affect infrastructure at a level that is under an economically-damaging threshold. Excessive vegetation maintenance may remove unnecessary amounts of vegetation resulting in the continual replacement of successional species and an increased likelihood of the establishment of invasive species.

Recommended measures to prevent and control impacts from right-of-way vegetation maintenance include:

- Implementation of an integrated vegetation management approach (IVM). The selective removal of tall-growing tree species and the encouragement of low-growing grasses and shrubs is the common approach to vegetation management in transmission line rights-of-way. Alternative vegetation management techniques should be selected based on environmental and site considerations including potential impacts to non-target, endangered and threatened species;<sup>5</sup>
- Removal of invasive plant species, whenever possible, cultivating native plant species;
- Scheduling activities to avoid breeding and nesting seasons for any critically endangered or endangered wildlife species;
- Observing manufacturer machinery and equipment guidelines, procedures with regard to noise, and oil spill prevention and emergency response;
- Avoiding clearing in riparian areas;
- Avoiding use of machinery in the vicinity of watercourses.

An integrated approach to vegetation management may indicate that use of herbicides is the preferred approach to control fast-growing vegetation within transmission and distribution rights-of-way. In this case, the following guidance on herbicide application, storage, and handling should be considered.

If herbicides (in this sector, herbicides are the most common type of pesticide used) application is warranted, they should be managed to avoid their migration into off-site land or water

<sup>5</sup> Mowing with heavy-duty power equipment may be used to control growth of ground covers and prevent the establishment of trees and shrubs in the right-of-way. Herbicides, in combination with mowing, may control fast-growing weedy species that have a potential to mature to heights over those permitted within the right-of-way. Trimming and pruning may be utilized at the boundaries of rights-of-way to maintain corridor breadth and prevent the encroachment of tree branches. Hand removal or removal of vegetation, while labor intensive, may be used in the vicinity of structures, streams, fences, and other obstructions which make the use of machinery difficult or dangerous.

environments (see Pesticides under the Hazardous Materials section).

### *Forest Fires*

If underlying growth is left unchecked, or slash from routine maintenance is left to accumulate within right-of-way boundaries, sufficient fuel can accumulate that may promote forest fires.

Recommended measures to prevent and control risk of forest fire include:

- Monitoring right-of-way vegetation according to fire risk;<sup>6</sup>
- Removing blowdown and other high-hazard fuel accumulations;
- Time thinning, slashing, and other maintenance activities to avoid forest fire seasons;
- Disposal of maintenance slash by truck or controlled burning<sup>7</sup>. Controlled burning should adhere to applicable burning regulations, fire suppression equipment requirements, and typically must be monitored by a fire watcher;
- Planting and managing fire resistant species (e.g. hardwoods) within, and adjacent to, rights-of-way;
- Establishing a network of fuel breaks of less flammable materials or cleared land to slow progress of fires and allow fire fighting access.

<sup>6</sup> As an example, the British Columbia Transmission Corporation (BCTC) maintains a Wildfire Risk Management System (WRMS) that classifies wildfire risk and provides a variety of corresponding mitigation measures. See (Blackwell et al., 2004).

<sup>7</sup> Controlled burning should only be performed after considering potential impacts to air quality and according to the local air quality management requirements.

### *Avian and Bat Collisions and Electrocutions*

The combination of the height of transmission towers and distribution poles and the electricity carried by transmission and distribution lines can pose potentially fatal risk to birds and bats through collisions and electrocutions.<sup>8</sup> Avian collisions with power lines can occur in large numbers if located within daily flyways or migration corridors, or if groups are traveling at night or during low light conditions (e.g. dense fog).<sup>9</sup> In addition, bird and bat collisions with power lines may result in power outages and fires.

Recommended prevention and control measures to minimize avian and bat collisions and electrocutions include<sup>10</sup>:

- Aligning transmission corridors to avoid critical habitats (e.g. nesting grounds, heronries, rookeries, bat foraging corridors, and migration corridors);
- Maintaining 1.5 meter (60-inch)<sup>11</sup> spacing between energized components and grounded hardware or, where spacing is not feasible, covering energized parts and hardware;
- Retrofitting existing transmission or distribution systems by installing elevated perches, insulating jumper loops, placing obstructive perch deterrents (e.g. insulated "V's"), changing the location of conductors, and / or using raptor hoods;<sup>12</sup>

<sup>8</sup> Birds and bats may be electrocuted by power lines in one of three ways: i) Simultaneously touching an energized wire and a neutral wire; ii) Simultaneously touching two live wires; and iii) Simultaneously touching an energized wire and any other piece of equipment on a pole or tower that is bonded to the earth through a ground wire. Raptor Protection Video Group (2000)

<sup>9</sup> Larger species (e.g. hawks, falcons, owls, vultures, cranes, egrets, and ravens) are at particular risk of simultaneously touching two wires or components while flying due to their long wingspans. Anderson (1991)

<sup>10</sup> Further information is available from Avian Power Line Interaction Committee (2005) and the U.S. Fish and Wildlife Service (2005).

<sup>11</sup> Manville (2005)

<sup>12</sup> California Energy Commission (2005)

- Considering the installation of underground transmission and distribution lines in sensitive areas (e.g. critical natural habitats);
- Installing visibility enhancement objects such as marker balls, bird deterrents, or diverters.<sup>13</sup>

### Aquatic Habitat Alteration

Power transmission and distribution lines, and associated access roads and facilities, may require construction of corridors crossing aquatic habitats that may disrupt watercourses and wetlands, and require the removal of riparian vegetation. In addition, sediment and erosion from construction activities and storm water runoff may increase turbidity of surface watercourses.

Recommended measures to prevent and control impacts to aquatic habitats include:

- Site power transmission towers and substations to avoid critical aquatic habitat (e.g. watercourses, wetlands, and riparian areas), as well as fish spawning habitat, and critical fish over-wintering habitat;
- Maintaining fish access when road crossings of watercourses are unavoidable by utilizing clearspan bridges, open-bottom culverts, or other approved methods;
- Minimizing clearing and disruption to riparian vegetation;
- Management of construction site activities as described in the relevant sections of the **General EHS Guidelines**.

### Marine Habitat Alteration

Transmission across ocean stretches may require use of submarine transmission cables on the ocean floor. Submarine

cables are also occasionally used to transmit high-voltage power across long stretches of water to islands and other locations that are inaccessible by conventional techniques. Cables are installed using a cable-laying vessel and a remotely operated, underwater vehicle. Issues associated with marine habitat alteration include disruption to intertidal vegetation (e.g. eelgrass), coral reefs, and marine life, including marine mammals, and sedimentation resulting in turbidity and reductions in water quality.

Recommended measures to prevent and control impacts to marine habitats include:

- Locating and siting cable routes, and shore access, to avoid critical marine habitats (e.g. breeding grounds and eelgrass) and coral reefs;
- Burying submarine cables when traversing sensitive intertidal habitat;
- Monitoring cable laying path for presence of marine mammals;
- Avoiding laying submarine cable during fish and marine mammals breeding periods, calving periods, and spawning seasons.

### Electric and Magnetic Fields

Electric and magnetic fields (EMF) are invisible lines of force emitted by and surrounding any electrical device (e.g. power lines and electrical equipment). Electric fields are produced by voltage and increase in strength as the voltage increases. Electric field strength is measured in volts per meter (V/m). Magnetic fields result from the flow of electric current and increase in strength as the current increases. Magnetic fields are measured in units of gauss (G) or tesla (T), where 1T equals 10,000G. Electric fields are shielded by materials that conduct electricity, and other materials, such as trees and building

<sup>13</sup> Several studies have found that bird diverters that are installed to increase the visibility of power lines reduce collision rates considerably. Crowder and Rhodes (1999).

materials. Magnetic fields pass through most materials and are difficult to shield. Both electric and magnetic fields decrease rapidly with distance. Power frequency EMF typically has a frequency in the range of 50 – 60 Hertz (Hz), and is considered Extremely Low Frequency (ELF).<sup>14</sup>

Although there is public and scientific concern over the potential health effects associated with exposure to EMF (not only high-voltage power lines and substations, but also from everyday household uses of electricity), there is no empirical data demonstrating adverse health effects from exposure to typical EMF levels from power transmissions lines and equipment.<sup>15</sup> However, while the evidence of adverse health risks is weak, it is still sufficient to warrant limited concern.<sup>16</sup>

Recommendations applicable to the management of EMF exposures include:

- Evaluating potential exposure to the public against the reference levels developed by the International Commission on Non-Ionizing Radiation Protection (ICNIRP).<sup>17,18</sup> Average and peak exposure levels should

remain below the ICNIRP recommendation for General Public Exposure<sup>19</sup>;

- Considering siting new facilities so as to avoid or minimize exposure to the public. Installation of transmission lines or other high voltage equipment above or adjacent to residential properties or other locations intended for highly frequent human occupancy, (e.g. schools or offices), should be avoided;
- If EMF levels are confirmed or expected to be above the recommended exposure limits, application of engineering techniques should be considered to reduce the EMF produced by power lines, substations, or transformers. Examples of these techniques include:
  - Shielding with specific metal alloys<sup>20</sup>
  - Burying transmission lines<sup>21</sup>
  - Increasing height of transmission towers
  - Modifications to size, spacing, and configuration of conductors

## Hazardous Materials

Hazardous materials in this sector include insulating oils / gases (e.g. Polychlorinated Biphenyls [PCB] and sulfur hexafluoride [SF6], and fuels, in addition to chemicals or products for wood preservation for poles and associated wood construction material. The use of herbicides for right-of-way vegetation maintenance is discussed in the above section on 'Right-of-Way Maintenance'.

<sup>14</sup> National Institute of Environmental Health Sciences (2002)

<sup>15</sup> International Commission on Non-Ionizing Radiation Protection (ICNIRP) (2001); International Agency for Research on Cancer (2002); U.S. National Institute of Health (2002); Advisory Group to the Radiation Protection Board of the UK (2001), and U.S. National Institute of Environmental Health Sciences (1999).

<sup>16</sup> U.S. National Institute of Environmental Health Sciences (2002)

<sup>17</sup> ICNIRP is a non-governmental organization formally recognized by the World Health Organization (WHO), which published the "Guidelines for Limiting Exposure to Time-varying Electric, Magnetic, and Electromagnetic Fields" following reviews of all the peer-reviewed scientific literature, including thermal and non-thermal effects. The standards are based on evaluations of biological effects that have been established to have health consequences. The main conclusion from the WHO reviews is that exposures below the limits recommended by the ICNIRP international guidelines do not appear to have any known consequence on health.

<sup>18</sup> An additional source of information is the Institute of Electrical and Electronics Engineers. See IEEE (2005).

<sup>19</sup> The ICNIRP exposure guidelines for General Public Exposure are listed in Section 2.1 of this Guideline.

<sup>20</sup> This is effective for reduction of electric field exposure, but not for reduction of magnetic field exposure.

<sup>21</sup> Ibid.

### *Insulating Oils and Fuels*

Highly-refined, mineral insulating oils are used to cool transformers and provide electrical insulation between live components. They are typically found in the largest quantities at electrical substations and maintenance shops. Sulfur Hexafluoride (SF<sub>6</sub>) may also be used as a gas insulator for electrical switching equipment and in cables, tubular transmission lines, and transformers. SF<sub>6</sub> may be used as an alternative to insulating oils. However, the use of SF<sub>6</sub>, a greenhouse gas with a significantly higher global warming potential (GWP) than CO<sub>2</sub>, should be minimized. In cases the gas is used for applications involving high voltages (>350 KV), equipment with a low leakage- rate (<99 percent) should be used.

Liquid petroleum fuels for vehicles and other equipment may also be used and stored at transmission and distribution projects. Recommendations for prevention and control of hazards associated with spill prevention, emergency response, clean-up, and contaminated soil remediation are addressed in the **General EHS Guidelines**.

Polychlorinated Biphenyls (PCB) were widely used as a dielectric fluid to provide electrical insulation, although their use has been largely discontinued due to potential harmful effects on human health and the environment. Recommendations for the management of PCB include:

- Replacing existing transformers and other electrical equipment containing PCB, and ensuring appropriate storage, decontamination, and disposal of contaminated units;
- Prior to final disposal, retired transformers and equipment containing PCB should be stored on a concrete pad with curbs sufficient to contain the liquid contents of these

containers should they be spilled or leaked. The storage area should also have a roof to prevent precipitation from collecting in the storage area. Disposal should involve facilities capable of safely transporting and disposing of hazardous waste containing PCB;<sup>22</sup>

- Surrounding soil exposed to PCB leakage from equipment should be assessed, and appropriate removal and / or remediation measures should be implemented, as addressed in the section on contaminated soil in the **General EHS Guidelines**.

### *Wood Preservatives*

The majority of wooden utility poles are treated with pesticide preservatives to protect against insects, bacteria, and fungi, and to prevent rot. The preservatives most commonly used for power poles are oil-based pesticides such as creosote, pentachlorophenol (PCP), and chromated copper arsenate (CCA). Use of these preservatives is being limited in some countries due to their toxic effects on the environment. While in use, poles may leach preservatives into soils and groundwater, however, levels are highest directly beside poles and decrease to within normal levels at approximately 30 centimeters (cm) distance from the pole.<sup>23</sup> The most significant potential environmental impacts occur at specialized wood treatment facilities if not managed appropriately.

Poles should be pretreated at an appropriate facility to ensure chemical fixation and prevent leaching, and to impede the formation of surface residues at the right-of-way<sup>24</sup>. Further

<sup>22</sup> For a complete discussion on the identification and management of PCB in this industry sector, please see the UNEP publication "PCB Transformers and Capacitors: From Management to Reclassification and Disposal" (2002). Available at: <http://www.chem.unep.ch/pops/pdf/PCBtranscap.pdf>

<sup>23</sup> Zagury et al. (2003)

<sup>24</sup> Lebow and Tippie (2001)

information is available in the **EHS Guidelines for Sawmilling and Wood-based Products**.

Recommended measures to prevent and control the impacts of wood preservatives at the point of use include:

- Evaluating the cost and benefit of using alternative pole materials (e.g. steel, concrete, and fiberglass);
- Consider use of alternative preservatives (e.g. copper azote);
- Undertake appropriate disposal of used poles. Landfill facilities should be capable of handling wastes that may have chemical leaching properties. Disposal through incineration or through recycling should consider associated air emissions and secondary product residues of preservative chemicals.

### *Pesticides*

Pesticide use should be established as part of an Integrated Pest Management (IPM) strategy and a documented Pest Management Plan (PMP). The following stages should be considered when designing and implementing an IPM strategy, giving preference to alternative pest management strategies, with the use of synthetic chemical pesticides as a last option.

**Alternatives to Pesticide Application** - The following alternatives to pesticides should be considered:

- Provide those responsible for deciding on pesticides application with training in pest identification, weed identification, and field scouting;
- Use mechanical weed control and / or thermal weeding;
- Support and use beneficial organisms, such as insects, birds, mites, and microbial agents, to perform biological control of pests;

- Protect natural enemies of pests by providing a favorable habitat, such as bushes for nesting sites and other original vegetation that can house pest predators;
- Use animals to graze areas and manage plant coverage;
- Use mechanical controls such as traps, barriers, light, and sound to kill, relocate, or repel pests.

**Pesticide Application** - If pesticide application is warranted, users should take the following precautions:

- Train personnel to apply pesticides and ensure that personnel have received applicable certifications or equivalent training where such certifications are not required;<sup>25</sup>
- Review the manufacturer's directions on maximum recommended dosage or treatment, as well as published reports on using the reduced rate of pesticide application without loss of effect, and apply the minimum effective dose;
- Apply pesticides based on criteria (e.g. field observations, weather data, time of treatment, and dosage) and maintain a pesticide logbook to record such information;
- Avoid the use of pesticides that fall under the World Health Organization Recommended Classification of Pesticides by Hazard Classes 1a and 1b;
- Avoid the use of pesticides that fall under the World Health Organization Recommended Classification of Pesticides by Hazard Class II if the project host country lacks restrictions on distribution and use of these chemicals, or if they are likely to be accessible to personnel without proper training,

<sup>25</sup> Examples of certification schemes are provided by the US EPA (2006), which classifies pesticides as either "unclassified" or "restricted" and requires workers that apply unclassified pesticides to be trained according to the Worker Protection Standard (40 CFR Part 170) for Agricultural Pesticides. It further requires restricted pesticides to be applied by or in the presence of a certified pesticide applicator.

equipment, and facilities to handle, store, apply, and dispose of these products properly;

- Avoid the use of pesticides listed in Annexes A and B of the Stockholm Convention, except under the conditions noted in the convention;<sup>26</sup>
- Use only pesticides that are manufactured under license and registered and approved by the appropriate authority and in accordance with the Food and Agriculture Organization's (FAO) International Code of Conduct on the Distribution and Use of Pesticides<sup>27</sup>;
- Use only pesticides that are labeled in accordance with international standards and norms, such as the FAO Revised Guidelines for Good Labeling Practice for Pesticides<sup>28</sup>;
- Select application technologies and practices designed to reduce unintentional drift or runoff only as indicated in an IPM program, and under controlled conditions;
- Maintain and calibrate pesticide application equipment in accordance with manufacturer's recommendations;
- Establish untreated buffer zones or strips along water sources, rivers, streams, ponds, lakes, and ditches to help protect water resources.

**Pesticide Handling and Storage** - Contamination of soils, groundwater, or surface water resources, due to accidental spills during transfer, mixing, and storage of pesticides should be prevented by following the hazardous materials storage and handling recommendations presented in the **General EHS Guidelines**. Additional recommendations include the following:

- Store pesticides in their original packaging, in a dedicated, dry, cool, frost-free, and well aerated location that can be locked and properly identified with signs, with access limited to authorized people<sup>29</sup>. No human or animal food may be stored in this location. The store room should also be designed with spill containment measures and sited in consideration of potential for contamination of soil and water resources;
- Mixing and transfer of pesticides should be undertaken by trained personnel in ventilated and well lit areas, using containers designed and dedicated for this purpose.
- Containers should not be used for any other purpose (e.g. drinking water). Contaminated containers should be handled as hazardous waste, and should be treated accordingly. Disposal of containers contaminated with pesticides should be done in a manner consistent with FAO guidelines and with manufacturer's directions;<sup>30</sup>
- Purchase and store no more pesticide than needed and rotate stock using a "first-in, first-out" principle so that pesticides do not become obsolete.<sup>31</sup> Additionally, the use of obsolete pesticides should be avoided under all circumstances;<sup>32</sup> A management plan that includes measures for the containment, storage and ultimate destruction of all obsolete stocks should be prepared in accordance to guidelines by FAO and consistent with country commitments under the Stockholm, Rotterdam and Basel Conventions.
- Collect rinse water from equipment cleaning for reuse (such as for the dilution of identical pesticides to concentrations used for application);

<sup>26</sup> The Stockholm Convention on Persistent Organic Pollutants (2001) controls the use of the following POPs-pesticides: Aldrin, Chlordane, DDT, Dieldrin, Endrin, Heptachlor, Hexachlorobenzene, Mirex, and Toxaphene.

<sup>27</sup> FAO (2002)

<sup>28</sup> FAO (2000)

<sup>29</sup> FAO (2002)

<sup>30</sup> See FAO Guidelines for the Disposal of Waste Pesticides and Pesticide Containers.

<sup>31</sup> See FAO (1996).

<sup>32</sup> See the FAO publication on pesticide storage and stock control manual. FAO Pesticide Disposal Series No. 3 (1996).

- Ensure that protective clothing worn during pesticide application is either cleaned or disposed of in an environmentally responsible manner
- Implement groundwater supply wellhead setbacks for pesticide application and storage
- Maintain records of pesticide use and effectiveness.

## 1.2 Occupational Health and Safety

Most occupational health and safety issues during the construction, operation, maintenance, and decommissioning of electric power distribution projects are common to those of large industrial facilities, and their prevention and control is discussed in the **General EHS Guidelines**. These impacts include, among others, exposure to physical hazards from use of heavy equipment and cranes; trip and fall hazards; exposure to dust and noise; falling objects; work in confined spaces; exposure to hazardous materials; and exposure to electrical hazards from the use of tools and machinery.

Occupational health and safety hazards specific to electric power transmission and distribution projects primarily include:

- Live power lines
- Working at height
- Electric and magnetic fields
- Exposure to chemicals

### Live Power Lines

Workers may be exposed to occupational hazards from contact with live power lines during construction, maintenance, and operation activities. Prevention and control measures associated with live power lines include:

- Only allowing trained and certified workers to install, maintain, or repair electrical equipment;

- Deactivating and properly grounding live power distribution lines before work is performed on, or in close proximity, to the lines;
- Ensuring that live-wire work is conducted by trained workers with strict adherence to specific safety and insulation standards. Qualified or trained employees working on transmission or distribution systems should be able to achieve the following<sup>33</sup>:
  - Distinguish live parts from other parts of the electrical system
  - Determine the voltage of live parts
  - Understand the minimum approach distances outlined for specific live line voltages
  - Ensure proper use of special safety equipment and procedures when working near or on exposed energized parts of an electrical system
- Workers should not approach an exposed energized or conductive part even if properly trained unless:
  - The worker is properly insulated from the energized part with gloves or other approved insulation; or,
  - The energized part is properly insulated from the worker and any other conductive object; or,
  - The worker is properly isolated and insulated from any other conductive object (live-line work).
- Where maintenance and operation is required within minimum setback distances, specific training, safety measures, personal safety devices, and other precautions should be defined in a health and safety plan. (Table 2 in Section 2.2 provides recommended minimum safety setbacks for workers);

<sup>33</sup> Further information is available from the Occupational Safety and Health Administration (OSHA). Available at: <http://www.osha.gov/SLTC/powertransmission/standards.html>

- Workers not directly associated with power transmission and distribution activities who are operating around power lines or power substations should adhere to local legislation, standards, and guidelines relating to minimum approach distances for excavations, tools, vehicles, pruning, and other activities;
- Minimum hot stick distances may only be reduced provided that the distance remaining is greater than the distance between the energized part and a grounded surface.

### Working at height on poles and structures

Workers may be exposed to occupational hazards when working at elevation during construction, maintenance, and operation activities. Prevention and control measures for working at height include:

- Testing structures for integrity prior to undertaking work;
- Implementation of a fall protection program that includes training in climbing techniques and use of fall protection measures; inspection, maintenance, and replacement of fall protection equipment; and rescue of fall-arrested workers, among others;
- Establishment of criteria for use of 100 percent fall protection (typically when working over 2 meters above the working surface, but sometimes extended to 7 meters, depending on the activity). The fall protection system should be appropriate for the tower structure and necessary movements, including ascent, descent, and moving from point to point;
- Installation of fixtures on tower components to facilitate the use of fall protection systems;
- Provision of an adequate work-positioning device system for workers. Connectors on positioning systems should be

compatible with the tower components to which they are attached;

- Hoisting equipment should be properly rated and maintained and hoist operators properly trained;
- Safety belts should be of not less than 16 millimeters (mm) (5/8 inch) two-in-one nylon or material of equivalent strength. Rope safety belts should be replaced before signs of aging or fraying of fibers become evident;
- When operating power tools at height, workers should use a second (backup) safety strap;
- Signs and other obstructions should be removed from poles or structures prior to undertaking work;
- An approved tool bag should be used for raising or lowering tools or materials to workers on structures.

### Electric and magnetic fields

Electric and magnetic fields (EMF) are described in Section 1.1 above. Electric utility workers typically have a higher exposure to EMF than the general public due to working in proximity to electric power lines.<sup>34,35</sup> Occupational EMF exposure should be prevented or minimized through the preparation and implementation of an EMF safety program including the following components:

- Identification of potential exposure levels in the workplace, including surveys of exposure levels in new projects and the use of personal monitors during working activities;

<sup>34</sup> A 1994 study estimated the average exposure of electrical workers (including jobs in electric utilities and other industries) in Los Angeles, California to be 9.6 milligauss (mG), compared to 1.7 mG for workers in other fields (S. J. London et al., 1994).

<sup>35</sup> Although detailed studies of workplace exposure to EMF in the United States, Canada, France, England, and several Northern European countries have found no conclusive link or correlation between typical occupational EMF exposure and adverse health effects, some studies have identified a possible association between occupational exposure to EMF and cancer, such as brain cancer (U.S. National Institute of Environmental Health Sciences 2002) indicating there is evidence to warrant limited concern.

- Training of workers in the identification of occupational EMF levels and hazards;
- Establishment and identification of safety zones to differentiate between work areas with expected elevated EMF levels compared to those acceptable for public exposure, limiting access to properly trained workers;
- Implementation of action plans to address potential or confirmed exposure levels that exceed reference occupational exposure levels developed by international organizations such as the International Commission on Non-Ionizing Radiation Protection (ICNIRP), and the Institute of Electrical and Electronics Engineers (IEEE)<sup>36</sup>. Personal exposure monitoring equipment should be set to warn of exposure levels that are below occupational exposure reference levels (e.g. 50 percent). Action plans to address occupational exposure may include limiting exposure time through work rotation, increasing the distance between the source and the worker, when feasible, or the use of shielding materials.

## Exposure to chemicals

Occupational exposures to chemicals in this sector primarily include handling of pesticides (herbicides) used for right-of-way maintenance, and exposure to PCB in transformers and other electrical components.

### *Pesticides*

Occupational health and safety impacts associated with pesticides are similar to those for other hazardous substances, and their prevention and control are discussed in the **General EHS Guidelines**. Potential exposures to pesticides include dermal contact and inhalation during their storage, preparation

<sup>36</sup> The ICNIRP exposure guidelines for Occupational Exposure are listed in Section 2.2 of this Guideline.

and application. The effect of such impacts may be increased by climatic conditions such as wind, which may increase the chance of unintended drift, or high temperatures, which may deter the use of personal protective equipment (PPE).

Recommendations specific to the use of pesticides include:

- Train personnel to apply pesticides and ensure that personnel have received the necessary certifications,<sup>37</sup> or equivalent training where such certifications are not required;
- Respect post-treatment intervals to avoid operator exposure during reentry to crops with residues of pesticides;
- Ensure hygiene practices are followed (in accordance to FAO and PMP) to avoid exposure of family members to pesticides residues.

### *PCBs*

Maintenance shops and other facilities, and activities may involve potential contact with PCB or PCB-contaminated machinery. Recommendations for chemical exposure, including PCB, are addressed in the **General EHS Guidelines**.<sup>38</sup>

## 1.3 Community Health and Safety

Community health and safety impacts during the construction and decommissioning of transmission and distribution power lines are common to those of most large industrial facilities, and

<sup>37</sup> The US EPA classifies pesticides as either "unclassified" or "restricted." All workers that apply unclassified pesticides must be trained according to the Worker Protection Standard (40 CFR Part 170 and 171) for Agricultural Pesticides. Restricted pesticides must be applied by or in the presence of a certified pesticide applicator. For more information, see <http://www.epa.gov/pesticides/health/worker.htm>

<sup>38</sup> Further information on the management of occupational exposure to PCB can be obtained at UNEP publication "PCB Transformers and Capacitors: From Management to Reclassification and Disposal" (2002) available at: <http://www.chem.unep.ch/pops/pdf/PCBtranscap.pdf>

are discussed in the **General EHS Guidelines**. These impacts include, among others, dust, noise, and vibration from construction vehicle transit, and communicable diseases associated with the influx of temporary construction labor. In addition to general health and safety standards outlined in the **General EHS Guidelines**, the operation of live power distribution lines and substations may generate the following industry-specific impacts:

- Electrocutation
- Electromagnetic interference
- Visual amenity
- Noise and Ozone
- Aircraft Navigation Safety

### Electrocutation

Hazards most directly related to power transmission and distribution lines and facilities occur as a result of electrocutation from direct contact with high-voltage electricity or from contact with tools, vehicles, ladders, or other devices that are in contact with high-voltage electricity. Recommended techniques to prevent these hazards include:

- Use of signs, barriers (e.g. locks on doors, use of gates, use of steel posts surrounding transmission towers, particularly in urban areas), and education / public outreach to prevent public contact with potentially dangerous equipment;
- Grounding conducting objects (e.g. fences or other metallic structures) installed near power lines, to prevent shock.

### Electromagnetic Interference

The corona of overhead transmission line conductors and high-frequency currents of overhead transmission lines may result in

the creation of radio noise. Typically, transmission line rights-of-way and conductor bundles are created to ensure radio reception at the outside limits remains normal. However, periods of rain, sleet or freezing rain sharply increases the streaming corona on conductors and may affect radio reception in residential areas near transmission lines.

### Visual Amenity

Power transmission and distribution are necessary to transport energy from power facilities to residential communities, but may be visually intrusive and undesirable to local residents. To mitigate the visual impact of power distribution projects, the following mitigation measures should be implemented:

- Extensive public consultation during the planning of power line and power line right-of-way locations;
- Accurate assessment of changes in property values due to power line proximity;
- Siting power lines, and designing substations, with due consideration to landscape views and important environmental and community features;
- Location of high-voltage transmission and distribution lines in less populated areas, where possible;
- Burying transmission or distribution lines when power must be transported through dense residential or commercial areas.

### Noise and Ozone

Noise in the form of buzzing or humming can often be heard around transformers or high voltage power lines producing corona. Ozone, a colorless gas with a pungent odor, may also be produced. Neither the noise nor ozone produced by power

distribution lines or transformers carries any known health risks.<sup>39</sup>

The acoustic noise produced by transmission lines is greater with high voltage power lines (400-800 kilo volts [kV]) and even greater with ultra-high voltage lines (1000 kV and higher)<sup>40</sup>. Noise from transmission lines reaches its maximum during periods of precipitation, including rain, sleet, snow or hail, or as the result of fog. The sound of rain typically masks the increase in noise produced by the transmission lines, but during other forms of precipitation (e.g. snow and sleet) and fog, the noise from overhead power lines can be troubling to nearby residents.

Measures to mitigate this impact may be addressed during project planning stages to locate rights-of-way away from human receptors, to the extent possible. Use of noise barriers or noise canceling acoustic devices should be considered as necessary.

### Aircraft Navigation Safety

Power transmission towers, if located near an airport or known flight paths, can impact aircraft safety directly through collision or indirectly through radar interference. Aircraft collision impacts may be mitigated by:

- Avoiding the siting of transmission lines and towers close to airports and outside of known flight path envelopes;
- Consultation with regulatory air traffic authorities prior to installation;
- Adherence to regional or national air traffic safety regulations;
- Use of buried lines when installation is required in flight sensitive areas.

<sup>39</sup> WHO (1998)

<sup>40</sup> Gerasimov (2003)

## 2.0 Performance Indicators and Monitoring

### 2.1 Environment

#### Emissions and Effluent Guidelines

The power transmission and distribution sector does not typically give rise to significant air emissions or effluents. Where dust or potentially contaminated water runoff exists, site operations should comply with principles and guidelines described in the **General EHS Guidelines** to meet ambient air and surface water guidelines. Table 1 lists exposure limits for general public exposure to electric and magnetic fields published by the International Commission on Non-Ionizing Radiation Protection (ICNIRP).

**Table 1. ICNIRP exposure limits for general public exposure to electric and magnetic fields.**

Frequency	Electric Field (V/m)	Magnetic Field (μT)
50 Hz	5000	100
60 Hz	4150	83

Source: ICNIRP (1998) : "Guidelines for limiting exposure to time-varying electric, magnetic, and electromagnetic fields (up to 300 GHz).

#### Environmental Monitoring

Environmental monitoring programs for this sector should be implemented to address all activities that have been identified to have potentially significant impacts on the environment during normal operations and upset conditions. Environmental monitoring activities should be based on direct or indirect indicators of emissions, effluents, and resource use applicable to the particular project. Monitoring frequency should be sufficient to provide representative data for the parameter being monitored.

Monitoring should be conducted by trained individuals following monitoring and record-keeping procedures and using properly calibrated and maintained equipment. Monitoring data should be analyzed and reviewed at regular intervals and compared with the operating standards so that any necessary corrective actions can be taken. Additional guidance on applicable sampling and analytical methods for emissions and effluents is provided in the **General EHS Guidelines**.

## 2.2 Occupational Health and Safety

### Occupational Health and Safety Guidelines

Occupational health and safety performance should be evaluated against internationally published exposure guidelines, of which examples include the Threshold Limit Value (TLV®) occupational exposure guidelines and Biological Exposure Indices (BEIs®) published by American Conference of Governmental Industrial Hygienists (ACGIH),<sup>41</sup> the Pocket Guide to Chemical Hazards published by the United States National Institute for Occupational Health and Safety (NIOSH),<sup>42</sup> Permissible Exposure Limits (PELs) published by the Occupational Safety and Health Administration of the United States (OSHA),<sup>43</sup> Indicative Occupational Exposure Limit Values published by European Union member states,<sup>44</sup> or other similar sources.

Additional indicators specifically applicable to electric power transmission and distribution activities include the minimum safe working distances for trained employees listed in Table 2 and the ICNIRP exposure limits for occupational exposure to electric and magnetic fields listed in Table 3.

<sup>41</sup> Available at: <http://www.acgih.org/TLV/> and <http://www.acgih.org/store/>

<sup>42</sup> Available at: <http://www.cdc.gov/niosh/npg/>

<sup>43</sup> Available at: [http://www.osha.gov/pls/oshaweb/owadisp.show\\_document?p\\_table=STANDAR DS&p\\_id=9992](http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDAR DS&p_id=9992)

<sup>44</sup> Available at: [http://europe.osha.eu.int/good\\_practice/risks/ds/oe/](http://europe.osha.eu.int/good_practice/risks/ds/oe/)

**Table 2. Alternating Current - Minimum Working Distances for Trained Employees<sup>a</sup>**

Voltage Range (phase to phase – Kilovolts)	Minimum Working and Clear Hot Stick Distance (meters)
2.1 to 15	0.6
15.1 to 35	0.71
35.1 to 46	0.76
46.1 to 72.5	0.91
72.6 to 121	1.01
138 to 145	1.06
161 to 169	1.11
230 to 242	1.5
345 to 362	2.13 <sup>b</sup>
500 to 552	3.35 <sup>b</sup>
700 to 765	4.5 <sup>b</sup>

<sup>a</sup> OSHA

<sup>b</sup> NOTE: From 345-362 kv., 500-552 kv., and 700-765 kv., the minimum working distance and the minimum clear hot stick distance may be reduced provided that such distances are not less than the shortest distance between the energized part and a grounded surface.

**Table 3. ICNIRP exposure limits for occupational exposure to electric and magnetic fields.**

Frequency	Electric Field (V/m)	Magnetic Field (μT)
50 Hz	10,000	500
60 Hz	8300	415

Source: ICNIRP (1998) : "Guidelines for limiting exposure to time-varying electric, magnetic, and electromagnetic fields (up to 300 GHz)

### Accident and Fatality Rates

Projects should try to reduce the number of accidents among project workers (whether directly employed or subcontracted) to a rate of zero, especially accidents that could result in lost work time, different levels of disability, or even fatalities. Facility rates may be benchmarked against the performance of facilities in this sector in developed countries through consultation with

published sources (e.g. US Bureau of Labor Statistics and UK Health and Safety Executive)<sup>45</sup>.

### **Occupational Health and Safety Monitoring**

The working environment should be occupational hazards relevant to the specific project. Monitoring should be designed and implemented by accredited professionals<sup>46</sup> as part of an occupational health and safety monitoring program. Facilities should also maintain a record of occupational accidents and diseases and dangerous occurrences and accidents. Additional guidance on occupational health and safety monitoring programs is provided in the **General EHS Guidelines**.

---

<sup>45</sup> Available at: <http://www.bls.gov/iif/> and <http://www.hse.gov.uk/statistics/index.htm>

<sup>46</sup> Accredited professionals may include Certified Industrial Hygienists, Registered Occupational Hygienists, or Certified Safety Professionals or their equivalent.

### 3.0 References and Additional Sources

- Ahlbom, E. Cardis et al: Review of the epidemiologic literature on EMF and health. *Environ Health Perspect* 109:911-933, 2001.
- Alberta Human Resources and Employment. 2003. Alberta Occupational Health & Safety Code. Available online at: <http://www3.gov.ab.ca/hre/whs/law/ohs.asp>.
- Anderson, S.H. 1991. *Managing our wildlife resources*. Prentice Hall. Englewood Cliffs, New Jersey.
- Avian Power Line Interaction Committee. 2005. Avian Protection Plan (APP) Guidelines.
- BC Hydro. 2006. BC Hydro 7 Steps to Electrical Safety. Available online at: <http://www.bchydro.com/safety/work/work671.html>.
- Blackwell B.A., G. Shrimpton, F. Steele, D.W. Ohlson and A. Needoba. 2004. Development of a Wildfire Risk Management System for BC Transmission Corporation Rights-of-Way. Technical Report submitted to British Columbia Transmission Corporation.
- Carlisle, S.M., and J.T. Trevors. 1987. Glyphosate in the environment. *Water, Air, and Soil Poll.* 39:409-20.
- California Energy Commission. 2005. Assessment of Avian Mortality from Collisions and Electrocutions. Staff Report prepared June, 2005.
- Crowder, Michael R. and Olin E. Rhodes, Jr. 1999. Avian Collisions with Power Lines: A Review. Proceedings of a workshop on Avian Interactions With Utility and Communication Structures Charleston, South Carolina, December 2-3 1999. Edited by Richard G. Carlton. Electric Power Research Institute.
- Danish Agricultural Advisory Service (DAAS), 2000. Reduced pesticide use without loss of effect.
- Duke Energy. 2006. Transmission Right of Way. Online at: <http://www.nantahalapower.com/community/row/whatis/transmission.asp>
- Feldman, Jay and Terry Shistar. 1997. *Poison Poles: A Report about Their Toxic Trail and Safer Alternatives*. Prepared by the National Coalition Against the Misuse of Pesticides.
- Food and Agriculture Organization (FAO) International Code of Conduct on the Distribution and Use of Pesticides (2003). Available online at: <http://www.fao.org/DOCREP/005/Y4544E/Y4544E00.HTM>
- FAO. 1995. Revised Guidelines on Good Labeling Practice for Pesticides. Rome: FAO. Available at <http://www.fao.org/WAICENT/FAOINFO/AGRICULT/AGP/AGPP/Pesticid/r.htm>
- FAO. 1996. Pesticide Storage and Stock Control Manual. FAO Pesticide Disposal Series N°3. Rome: FAO. Available at [http://www.fao.org/AG/AGP/AGPP/Pesticid/Disposal/index\\_en.htm](http://www.fao.org/AG/AGP/AGPP/Pesticid/Disposal/index_en.htm) [http://www.fao.org/documents/show\\_cdr.asp?url\\_file=/docrep/V8966E/V8966E0.htm](http://www.fao.org/documents/show_cdr.asp?url_file=/docrep/V8966E/V8966E0.htm)
- FAO. 1999. Guidelines for the Management of Small Quantities of Unwanted and Obsolete Pesticides. FAO Pesticide Disposal Series N°7. Rome: UNEP/WHO/FAO. Available at [http://www.fao.org/documents/show\\_cdr.asp?url\\_file=/docrep/X1531E/X1531E00.htm](http://www.fao.org/documents/show_cdr.asp?url_file=/docrep/X1531E/X1531E00.htm)
- FAO. 2000. Guideline and Reference Material on Integrated Soil and Nutrient Management and Conservation for Farmer Field Schools. AGL/MISC/27/2000. Rome: FAO, Land and Plant Nutrition Management Division. Available at <http://www.fao.org/organicag/frame2-e.htm> <ftp://ftp.fao.org/agl/agll/docs/misc27.pdf>
- FAO. 2001. Guidelines on Procedures for the Registration, Certification and Testing of New Pesticide Equipment. Available at: <http://www.fao.org/docrep/006/Y2683E/Y2683E00.HTM#1>
- FAO. 2002. International Code of Conduct on the Distribution and Use of Pesticides (revised version November 2002). Rome: FAO. Available at <http://www.fao.org/WAICENT/FAOINFO/AGRICULT/AGP/AGPP/Pesticid/Code/Download/Code.doc>
- Georgia Power. 2006. Managing Transmission Rights of Way: Vegetation Management. Available online at: <http://www.southerncompany.com/gapower/community/vegetation.asp?mnuOpc=o=gpc&mnuType=sub&mnuItem=tt>
- Health Physics Society (1998) Guidelines for Limiting Exposure to Time-Varying Electric, Magnetic, and Electromagnetic Fields (Up to 300 GHz), International Commission on Non-Ionizing Radiation Protection (ICNIRP). Volume 74, Number 4, pp 494-521
- Gerasimov, A.S. 2003. Environmental, Technical and Safety Codes, Laws and Practices Related to Power Line Construction in Russia.
- Health Effects from Exposure to Power-Line Frequency Electric and Magnetic Fields: National Institutes of Health, Research Triangle Park, NC, 1999. Available online at: [http://www.niehs.nih.gov/emfrapid/html/EMF\\_DIR\\_RPT/Report\\_18f.htm](http://www.niehs.nih.gov/emfrapid/html/EMF_DIR_RPT/Report_18f.htm)
- Institute of Electronics and Electrical Engineers. 2005. Standard C95.1-2005: IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3kHz to 300GHz
- International Agency for Research on Cancer. 2002. Static and extremely low-frequency (ELF) electric and magnetic fields. Report No. 80. Available online at: <http://www.cie.iarc.fr/htdocs/monographs/vol80/80.html>
- International Commission on Non-Ionizing Radiation Protection (ICNIRP), Guidelines for Limiting Exposure to Time-varying Electric, Magnetic, and Electromagnetic Fields, *Health Physics* 74 (4): 494-522 (1998). Available online at: <http://www.icnirp.de/documents/emfgdl.pdf>
- Lebow, Stan T. and Michael Tippie. 2001. Guide for Minimizing the Effect of Preservative-Treated Wood on Sensitive Environments. Technical report prepared for the United States Department of Agriculture.
- London, S.J., J.D. Bowman, E. Sobel, D.C. Thomas, D.H. Garabrant, N. Pearce, L. Bernstein, and J. M. Peters. 1994. Exposure to magnetic fields among

electrical workers in relation to leukemia risk in Los Angeles County. *American Journal of Industrial Medicine* 26:47-60.

Manville, Albert M. 2005. Tall Structures: Best Management Practices for Bird-Friendly Tall Buildings, Towers and Bridges – U.S. Fish and Wildlife Service Recommendations to Address the Problem. Prepared for the U.S. Fish and Wildlife Service.

New Zealand Ministry of Consumer Affairs. 2001. New Zealand Code of Practice for Electrical Safe Distances.

Raptor Protection Video Group. 2000. Raptors at Risk. EDM International, Inc. Fort Collins, Colorado.

Santee Cooper. 2002. Vegetation Management FAQ. Online at: [www.santeecooper.com/environment/vegmanagement/vegetation\\_faq.html](http://www.santeecooper.com/environment/vegmanagement/vegetation_faq.html)

Stockholm Convention on Persistent Organic Pollutants (2001). Available online at: <http://www.pops.int/>

Tse, Norman C. and Haboush, Alfred L. 1990. World's Tallest Towers Support 500-kV River Crossing. *Transmission & Distribution International*.

United Kingdom (U.K.) Parliament. Trade and Industry. 2001: Tenth Report. Available online at: <http://www.publications.parliament.uk/pa/cm200001/cmselect/cmtrdind/330/33002.htm#evidence>

U.K. Health and Safety Executive, HSE statistics. Available online at: <http://www.hse.gov.uk/statistics/index.htm>

United Kingdom National Radiological Protection Board (NRPB) (now the Radiation Protection Division of the Health Protection Agency). Advisory Group on Non-Ionising Radiation (AGNIR). 2001. ELF Electromagnetic Fields and the Risk of Cancer: Report of an Advisory Group on Non-Ionising Radiation. Didcot, UK: NRPB.

United States (U.S.) Environmental Protection Agency. 2006. Polychlorinated Biphenyls (PCB's). Available online at: <http://www.epa.gov/pcb/pubs/effects.html>

U.S. Department of Defense. 2004. Unified Facilities Criteria: Power Distribution Systems. Available online at: [http://www.wbdg.org/ccb/DOD/UFC/ufc\\_3\\_550\\_03n.pdf](http://www.wbdg.org/ccb/DOD/UFC/ufc_3_550_03n.pdf)

U.S. Bureau of Labor Statistics. Injuries, Illnesses, and Fatalities program. Available online at: <http://www.bls.gov/iif/>

U.S. Occupational Safety and Health Administration. 1994. The Electric Power Generation, Transmission and Distribution Standards. Available online at: [www.osha.gov](http://www.osha.gov).

U.S. National Institute of Environmental Health Sciences. 2002. EMF Questions and Answers. EMF Rapid. Electric and Magnetic Fields Research and Public Information and Dissemination Program. Available online at: <http://www.niehs.nih.gov/emfrapid/booklet>.

U.S. National Institute of Environmental Health Sciences. 1999. NIEHS Report on Health Effects from Exposure to Power-Line Frequency Electric and Magnetic Fields.

Western Australia Office Of Energy. 1998. Guidelines for Electricity Transmission and Distribution Work in Western Australia. Available online at: [http://www.energysafety.wa.gov.au/energysafety/media\\_include/code\\_trans\\_dist.pdf](http://www.energysafety.wa.gov.au/energysafety/media_include/code_trans_dist.pdf).

World Health Organization. 1998. Electromagnetic fields and public health: extremely low frequency (ELF) Fact Sheet. Available online at: <http://www.who.int/mediacentre/factsheets/fs205/en/>.

World Health Organization (WHO). 2005. The WHO Recommended Classification of Pesticides by Hazard and Guidelines to Classification: 2004. Geneva: WHO. Available at [http://www.who.int/ipcs/publications/pesticides\\_hazard/en/index.html](http://www.who.int/ipcs/publications/pesticides_hazard/en/index.html) and [http://www.who.int/ipcs/publications/pesticides\\_hazard\\_rev\\_3.pdf](http://www.who.int/ipcs/publications/pesticides_hazard_rev_3.pdf)

Worksafe B.C. Occupational Health and Safety Regulation. 2006. Part 19 Electrical Safety. Available online at: <http://www2.worksafebc.com/publications/OHSRegulation/Part19.asp>.

Zagury, GJ; Samson, R; Deschenes, L. 2003. Occurrence of metals in soil and ground water near chromated copper arsenate-treated utility poles. *J. Environ. Qual.* 32(2):507-14.

Zielke, K., J.O. Boateng, N. Caldicott and H. Williams. 1992. Broom and Gorse in British Columbia A Forest Perspective Analysis. BC Ministry of Forests, Silviculture branch. 19 pp.

## Annex A: General Description of Industry Activities

Electric power transmission is the bulk transfer of electricity from one place to another. Typically, power transmission occurs between a power generation facility and a substation located in close proximity to consumers. Power distribution refers to the delivery of electricity from a substation to consumers located in residential, commercial, and industrial areas.

Due to the large amount of power involved, transmission-level voltages are generally considered those above 110 kilo volts (kV). Voltages between 110 kV and 33 kV are typically considered sub-transmission voltages, but are occasionally used for long transmission systems with light loads. Voltages of less than 33 kV are representative of distribution projects.

Electric power transmission and distribution systems are often located in conjunction with highway, road, and other rights-of-way to minimize both costs and disturbance to ecological, socio-economic and cultural resources. Other factors, including land value, view sheds, archaeological resources, geotechnical hazards, accessibility, parks and other important features also contribute to the locating of transmission and distribution line right-of-way alignments.

Project development and construction activities typically include access road construction or upgrade, site preparation and development, removal of select vegetation, if any, and the grading and excavation of soils for the installation of structural foundations and site utilities. These activities are typical of industrial development projects and depend upon a number of factors, including topography, hydrology, and desired site layout, among others. Activities generally associated with the development and construction of power transmission and distribution include land clearing for transmission line rights-of-way, access road construction or upgrade, equipment staging

areas, substation construction and / or upgrade, site preparation, and installation of transmission line components (e.g. transmission towers and substations, access and maintenance roads).

Operational activities may include maintenance of access to the transmission lines, towers and substations (e.g. low-impact trails or new / improved access roads) and vegetation management. Upgrades and maintenance for existing infrastructure are a consideration throughout the life cycle of the project.

Power transmission and distribution facilities are decommissioned when they are obsolete, damaged (e.g. by corrosion) or replaced due to increased power demand. Many power facilities are replaced with new or updated equipment at the same site or right-of-way. Decommissioning activities depend on the proposed subsequent use of the site, environmental sensitivities (e.g. natural grasslands) and the project specifics (e.g. aboveground or underground power lines). Activities may include demolition and removal of the installed infrastructure (e.g. transmission towers, substations, aboveground and underground utilities and road decommissioning) and reclamation of the project site, including ground stabilization and re-vegetation.

The following sections provide a description of the facilities and activities associated with the construction and operation of power transmission and distribution projects. Facilities and activities common to transmission and distribution projects, including right-of-way management and substations, are outlined below as well as facilities unique to transmission and distribution systems, including towers and utility poles. Typical components of a power transmission and distribution project are illustrated in Figure A-1.

## Power Transmission Systems

The electric power transmission system is often referred to as a grid. Redundant paths and lines are provided so that power can be routed from any generation facility to any customer area through a variety of routes, based on the economics of the transmission path and the cost of power. The redundant paths and lines also allow power flow to be rerouted during planned maintenance and outages due to weather or accidents.

Power transmission occurs via a system of aboveground power lines and towers located between a power plant and a substation. When crossing a dense residential area is necessary, transmission and distribution systems can also be buried within underground conduits. Though the transmission efficiency is typically lower for underground lines and installation and maintenance are costly, locating the transmission system underground reduces impacts on land values, visual aesthetics, and vegetation loss. Submarine cables placed on the ocean floor by cable-laying boats are also occasionally used to transmit high-voltage power across long stretches of water to islands and other locations that are inaccessible by conventional techniques. Submarine cables are typically self-contained and fluid-filled to provide insulation over long distances.

Regional transmission grids consist of several large transmission systems connected by substations that are designed to transport electricity as efficiently as possible. Transmission networks can cover thousands of kilometers and encompass tens of thousands of towers. Energy is typically transmitted using a three-phase alternating current (AC) that is more efficient than a single phase. Energy is generally produced at low voltage (up to 30 kV) at a generating facility and then stepped up by a power station transformer to a higher voltage in order to reduce resistance and reduce the percentage of energy lost during transmission over a long distance. For long distance

transmission, electricity is usually transmitted at voltages between 110 and 1200 kV. At extremely high voltages, such as those over 2000 kV, corona discharge<sup>47</sup> energy losses associated with charged conductors can offset benefits of reductions in energy losses from reduced resistance. Over long distances, energy can also be transmitted via High Voltage Direct Current (HVDC). In these instances, smaller losses in energy and lower construction costs offset the need to construct conversion stations at each end of the transmission line to convert the direct current to alternating current for use in distribution systems.

Transmission towers or pylons are utilized to suspend high-voltage overhead power lines. These systems usually transmit three-phase electric power (the common method for transmission of high-voltage lines of over 50 kV) and, therefore, are designed to carry three (or multiples of three) conductors. One or two ground conductors are often added at the top of each tower for lightning protection. Transmission towers can be constructed from steel, concrete, aluminum, wood and reinforced plastic. The wire conductors on high-voltage lines are generally constructed of aluminum, or aluminum reinforced with steel strands. Each transmission tower or support structure must be constructed to support the load imposed on it by the conductors. As a result, foundations for transmission towers can be large and costly, particularly in areas where ground conditions are poor such as in wetlands. Guy wires can be utilized to stabilize transmission towers and resist some of the force of the conductors.

There are three main types of transmission powers or pylons used in a transmission system. Suspension towers support straight stretches of a transmission line. Deviation towers are

---

<sup>47</sup> A corona discharge is an electrical discharge resulting from the ionization of the air around the conductor, generally generating power losses and ambient noise.

located at points where a transmission line changes direction. Terminal towers are located at the end of overhead transmission lines where they connect with substations or underground cables.

The most common type of transmission tower or pylon used for high-voltage power lines is a steel lattice structure. Tubular steel monopoles are also used to support high or medium voltage transmission lines, usually in urban areas. Transmission towers constructed of a steel framework can be used to support lines of all voltages, but they are most often used for voltages over 50 kV. Lattice towers can be assembled on the ground and erected by cable (which uses a large laydown area), erected by crane, or, in inaccessible areas, by helicopter. Transmission towers typically range from approximately 15 to 55 meters (m) in height.<sup>48</sup>

Wooden transmission towers consisting of single poles, H-frames, or shapes resembling A's or V's are also commonly used to support high-voltage transmission lines. Wooden transmission towers are limited by the height of available trees (approximately 30m), and generally carry voltages of between 23 kV and 230 kV, lower than those carried by steel lattice transmission towers<sup>49</sup>. Aluminum towers are often used in remote areas where they can be transported in and installed by helicopter. Towers of reinforced plastic are now available, but high costs currently restrict their use.

For underground transmission lines, the three wires used to transmit the three-phase power must be located in individual pipes or conduits. These pipes are covered in thermal concrete and surrounded in thermal backfill materials. Underground cable conduit systems typically require trenches of at least 1.5m in

depth and width. Due to difficulties in dissipating heat, underground conduits are typically not used for high-voltage transmission lines over 350 kV.<sup>50</sup>

## Power Distribution Systems

Prior to consumer use, high-voltage energy is stepped down to a lower voltage aboveground line for use in sub-transmission or distribution systems. Distribution lines typically vary from 2.5 to 25 kV. Finally, the energy is transformed to low voltage at the point of residential or commercial use. This voltage ranges between 100 and 600 volts (V) depending on country and customer requirements. Power distribution poles (or utility or telephone poles) are typically constructed of wood, but steel, concrete, aluminum and fiberglass are also used. Distribution poles are typically spaced no further than 60m apart and are at least 12m in height<sup>51</sup>. Wooden distribution poles are limited by the height of available trees (approximately 30m).

## Electrical Substations

Electrical substations are stations along the electricity transmission and distribution system that transform voltage from low to high or high to low using transformers. Step-up transformers are used to increase voltage while decreasing current, while step-down transformers are used to decrease voltage while increasing current. Substations typically consist of one or more transformers, as well as switching, control, and protection equipment. Substations can be located in fenced enclosures, underground, or inside buildings.

There are two main types of electrical substations. Transmission substations contain high-voltage switches used to connect together high-voltage transmission lines or to allow specific

<sup>48</sup> United Kingdom Parliament (2001)

<sup>49</sup> Great River Energy (2006)

<sup>50</sup> American Transmission Company (2005)

<sup>51</sup> United States of America Department of Defense (2004)

systems to be isolated for maintenance. Distribution substations are used to transfer power from the transmission system to the distribution system. Typically at least two transmission or sub-transmission lines enter a distribution substation, where their voltage is reduced to a value suitable for local consumption. Distribution substations can also be used to isolate faults in either the transmission or distribution systems. Complicated distribution substations containing high-voltage switching, switching, and backup systems are often located within large urban centers.

### Rights-of-Way Management

Both aboveground transmission and distribution projects require rights-of-way to protect the system from windfall, contact with trees and branches, and other potential hazards that may result in damage to the system, power failures, or forest fires. Rights-of-way are also utilized to access, service, and inspect transmission and distribution systems. Underground distribution lines also require rights-of-way where excavation is prohibited or strictly monitored, construction activity is limited, and access to lines can be achieved if necessary. Being larger systems transmitting higher voltages, transmission rights-of-way are typically much larger than those for distribution systems and, consequently, require more extensive management.

Right-of-ways widths<sup>52</sup> for transmission lines range from 15 to 100m depending on voltage and proximity to other rights-of-way (typical range is between 15 and 30m)<sup>53</sup>. For overhead distribution power lines up to 35 kV, 12 to 24m corridors (6 to 12m on each side) are recommended<sup>54</sup>. Access roads are often

constructed in conjunction, or within, transmission line rights-of-way to provide access for maintenance and upkeep of the system.

To avoid disruption to overhead power lines and towers, regular maintenance of vegetation within the rights-of-way is required. Unchecked growth of tall trees and accumulation of vegetation within rights-of-way can result in a number of impacts including power outages through contact of branches and trees with transmission lines and towers; ignition of forest and brush fires; corrosion of steel equipment; blocking of equipment access; and interference with critical grounding equipment.

Regular maintenance and clearing of rights-of-way prevents natural forest succession and the establishment and growth of tall trees. Typically, tall trees of approximately 4.5m or more are not permitted within aboveground rights-of-way.<sup>55</sup> Underground rights-of-way have far fewer vegetation restrictions, though trees with deep tap roots that may interfere with duct banks are usually prohibited from being grown within the right-of-way. Vegetation maintenance of rights-of-way can be accomplished with the following measures.

Mowing with heavy-duty power equipment is used to control growth of ground covers and prevent the establishment of trees and shrubs in the right-of-way. Herbicides, in combination with mowing, control fast-growing weedy species that have a potential to mature to heights over those permitted within the right-of-way. Trimming and pruning is utilized at the boundaries of rights-of-way to maintain corridor breadth and prevent the encroachment of tree branches. Hand removal or removal of vegetation is costly and time-consuming but is often used in the vicinity of structures, streams, fences, and other obstructions making the use of machinery difficult or dangerous.

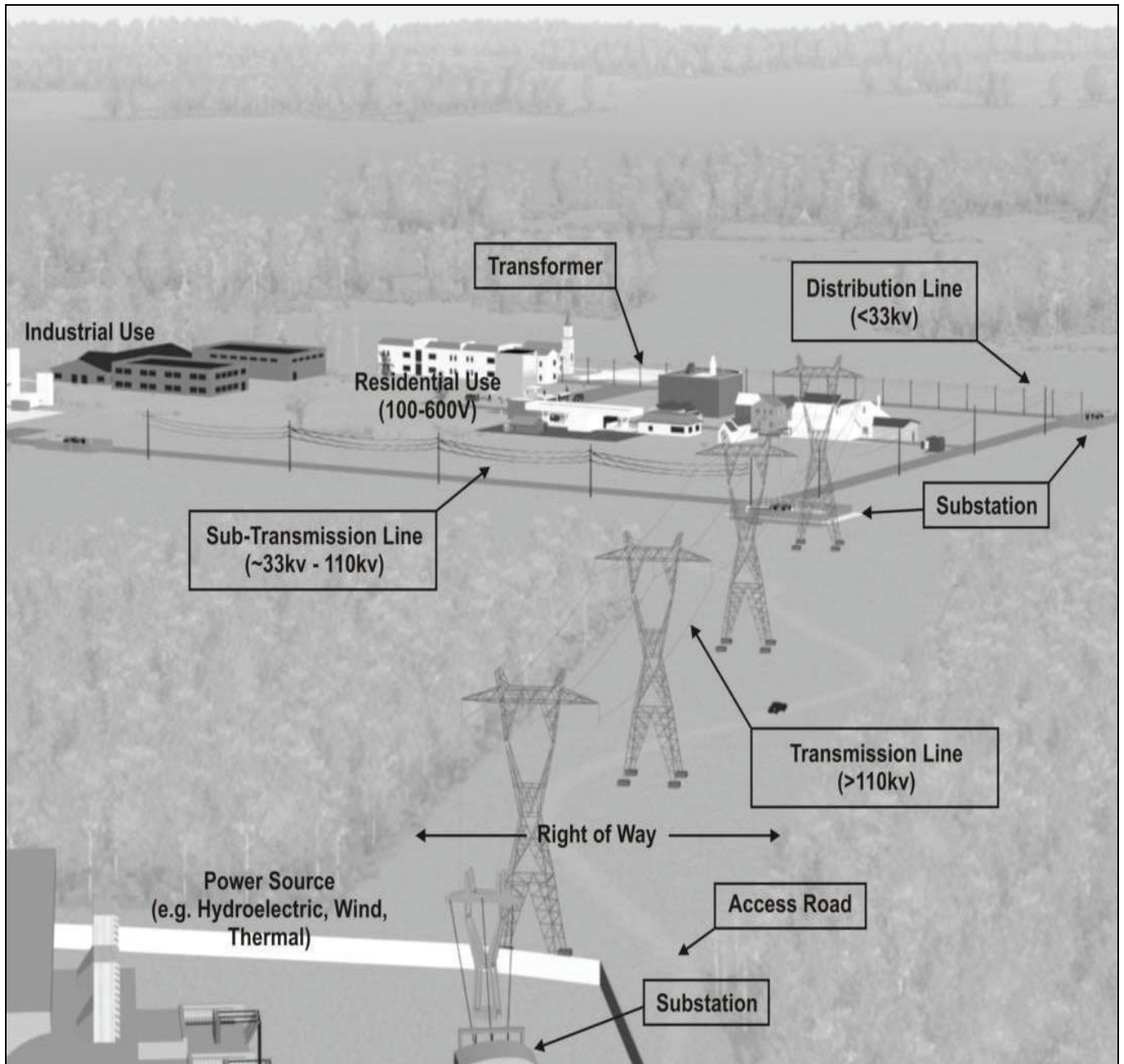
<sup>52</sup> For example, Duke Energy prescribes 21-meter minimum rights-of-way for voltages between 44 and 100 kV, 46-meter minimum rights-of-way for voltages of 230 kV, and 61-meter minimum rights-of-way for voltages of 525 kV (Duke Energy, 2006).

<sup>53</sup> Santee Cooper (2002)

<sup>54</sup> United States of America Department of National Defense (2004)

<sup>55</sup> Georgia Power (2006)

Figure A-1: Electric Power Transmission and Distribution





# APPENDIX

## **3-2** *ZESCO SHEQ POLICY*







**ZESCO**  
Powering the Nation

CO.14900.SHEQ.00002

## **SHEQ POLICY**

ZESCO Limited, Generates, Transmits and Distributes electricity in Zambia and the Region. The Corporation is committed to attaining excellence through effective and efficient ways of service delivery. ZESCO is also dedicated to delivering a consistent level of customer satisfaction through safe and healthy practices, while upholding environmental integrity, in line with its vision. In order to achieve this, the Corporation operates an integrated Safety, Health, Environment and Quality (SHEQ) management system and an Information Security Management System, based on, but not limited to, the requirements of relevant ISO 45001, ISO 14001, ISO 9001 and ISO/IEC 27001 international standards.

ZESCO's commitment to Safety, Health, Environment, Quality and information security is achieved through:

- Ensuring that ZESCO's operations are safe by minimising risk and eliminating harm to stakeholders and assets;
- Establishing and reviewing of Safety, Health, Environment, Quality and information security objectives;
- Ensuring increased access to reliable and safe supply of electricity that sustains business continuity;
- Ensuring environmental sustainability through infrastructure development and operations;
- Ensuring compliance to statutory and other requirements;
- Ensuring a secure and robust cyberspace through confidentiality, integrity and availability of all information;
- Ensuring effective and efficient communication with all stakeholders on all matters relating to electricity service provision;
- Ensuring consistent provision of resources, training, equipment and other support systems;
- Ensuring consultation and participation of workers and their representatives; and
- Ensuring continual improvement of the SHEQ management system.

It is the duty of all stakeholders to comply with this policy in order to entrench a SHEQ driven culture within the Corporation.

This policy is communicated to all employees and is available to all stakeholders on request and on ZESCO website: **[www.zesco.co.zm](http://www.zesco.co.zm)**.

For and on behalf of the Board, Corporate Leadership and Staff of ZESCO Limited.

**VICTOR B. MAPANI**  
**MANAGING DIRECTOR**



# APPENDIX

**3-3**

*WBG EHS*

*GUIDELINES - WASTE  
MANAGEMENT*







## 1.6 Waste Management

Applicability and Approach .....	46
General Waste Management .....	47
Waste Management Planning .....	47
Waste Prevention .....	47
Recycling and Reuse .....	48
Treatment and Disposal .....	48
Hazardous Waste Management .....	48
Waste Storage .....	48
Transportation .....	49
Treatment and Disposal .....	49
Commercial or Government Waste Contractors .....	49
Small Quantities of Hazardous Waste .....	50
Monitoring .....	50

### Applicability and Approach

These guidelines apply to projects that generate, store, or handle any quantity of waste across a range of industry sectors. It is not intended to apply to projects or facilities where the primary business is the collection, transportation, treatment, or disposal of wastes. Specific guidance for these types of facilities is presented in the Environmental Health and Safety (EHS) Guidelines for Waste Management Facilities.

A *waste* is any solid, liquid, or contained gaseous material that is being discarded by disposal, recycling, burning or incineration. It can be byproduct of a manufacturing process or an obsolete commercial product that can no longer be used for intended purpose and requires disposal.

*Solid (non-hazardous) wastes* generally include any garbage, refuse. Examples of such waste include domestic trash and garbage; inert construction / demolition materials; refuse, such as metal scrap and empty containers (except those previously used to contain hazardous materials which should, in principle, be managed as a hazardous waste); and

residual waste from industrial operations, such as boiler slag, clinker, and fly ash.

*Hazardous waste* shares the properties of a hazardous material (e.g. ignitability, corrosivity, reactivity, or toxicity), or other physical, chemical, or biological characteristics that may pose a potential risk to human health or the environment if improperly managed. Wastes may also be defined as “hazardous” by local regulations or international conventions, based on the origin of the waste and its inclusion on hazardous waste lists, or based on its characteristics.

Sludge from a waste treatment plant, water supply treatment plant, or air pollution control facility, and other discarded material, including solid, liquid, semisolid, or contained gaseous material resulting from industrial operations needs to be evaluated on a case-by-case basis to establish whether it constitutes a hazardous or a non-hazardous waste.

Facilities that generate and store wastes should practice the following:

- Establishing waste management priorities at the outset of activities based on an understanding of potential Environmental, Health, and Safety (EHS) risks and impacts and considering waste generation and its consequences
- Establishing a waste management hierarchy that considers prevention, reduction, reuse, recovery, recycling, removal and finally disposal of wastes.
- Avoiding or minimizing the generation waste materials, as far as practicable
- Where waste generation cannot be avoided but has been minimized, recovering and reusing waste

- Where waste can not be recovered or reused, treating, destroying, and disposing of it in an environmentally sound manner

### General Waste Management

The following guidance applies to the management of non-hazardous and hazardous waste. Additional guidance specifically applicable to hazardous wastes is presented below. Waste management should be addressed through a Waste management system that addresses issues linked to waste minimization, generation, transport, disposal, and monitoring.

### Waste Management Planning

Facilities that generate waste should characterize their waste according to composition, source, types of wastes produced, generation rates, or according to local regulatory requirements. Effective planning and implementation of waste management strategies should include:

- Review of new waste sources during planning, siting, and design activities, including during equipment modifications and process alterations, to identify expected waste generation, pollution prevention opportunities, and necessary treatment, storage, and disposal infrastructure
- Collection of data and information about the process and waste streams in existing facilities, including characterization of waste streams by type, quantities, and potential use/disposition
- Establishment of priorities based on a risk analysis that takes into account the potential EHS risks during the waste cycle and the availability of infrastructure to manage the waste in an environmentally sound manner
- Definition of opportunities for source reduction, as well as reuse and recycling

- Definition of procedures and operational controls for on-site storage
- Definition of options / procedures / operational controls for treatment and final disposal

### Waste Prevention

Processes should be designed and operated to prevent, or minimize, the quantities of wastes generated and hazards associated with the wastes generated in accordance with the following strategy:

- Substituting raw materials or inputs with less hazardous or toxic materials, or with those where processing generates lower waste volumes
- Applying manufacturing process that convert materials efficiently, providing higher product output yields, including modification of design of the production process, operating conditions, and process controls<sup>50</sup>
- Instituting good housekeeping and operating practices, including inventory control to reduce the amount of waste resulting from materials that are out-of-date, off-specification, contaminated, damaged, or excess to plant needs
- Instituting procurement measures that recognize opportunities to return usable materials such as containers and which prevents the over ordering of materials
- Minimizing hazardous waste generation by implementing stringent waste segregation to prevent the commingling of non-hazardous and hazardous waste to be managed

<sup>50</sup> Examples of waste prevention strategies include the concept of Lean Manufacturing found at <http://www.epa.gov/epaoswer/hazwaste/minimize/lean.htm>

### *Recycling and Reuse*

In addition to the implementation of waste prevention strategies, the total amount of waste may be significantly reduced through the implementation of recycling plans, which should consider the following elements:

- Evaluation of waste production processes and identification of potentially recyclable materials
- Identification and recycling of products that can be reintroduced into the manufacturing process or industry activity at the site
- Investigation of external markets for recycling by other industrial processing operations located in the neighborhood or region of the facility (e.g., waste exchange)
- Establishing recycling objectives and formal tracking of waste generation and recycling rates
- Providing training and incentives to employees in order to meet objectives

### *Treatment and Disposal*

If waste materials are still generated after the implementation of feasible waste prevention, reduction, reuse, recovery and recycling measures, waste materials should be treated and disposed of and all measures should be taken to avoid potential impacts to human health and the environment. Selected management approaches should be consistent with the characteristics of the waste and local regulations, and may include one or more of the following:

- On-site or off-site biological, chemical, or physical treatment of the waste material to render it non-hazardous prior to final disposal
- Treatment or disposal at permitted facilities specially designed to receive the waste. Examples include: composting operations for organic non-hazardous

wastes; properly designed, permitted and operated landfills or incinerators designed for the respective type of waste; or other methods known to be effective in the safe, final disposal of waste materials such as bioremediation.

### *Hazardous Waste Management*

Hazardous wastes should always be segregated from non-hazardous wastes. If generation of hazardous waste can not be prevented through the implementation of the above general waste management practices, its management should focus on the prevention of harm to health, safety, and the environment, according to the following additional principles:

- Understanding potential impacts and risks associated with the management of any generated hazardous waste during its complete life cycle
- Ensuring that contractors handling, treating, and disposing of hazardous waste are reputable and legitimate enterprises, licensed by the relevant regulatory agencies and following good international industry practice for the waste being handled
- Ensuring compliance with applicable local and international regulations<sup>51</sup>

### *Waste Storage*

Hazardous waste should be stored so as to prevent or control accidental releases to air, soil, and water resources in area location where:

---

<sup>51</sup> International requirements may include host-country commitments under the Basel Convention on the Control of Transboundary Movements of Hazardous Waste and their disposal (<http://www.basel.int/>) and Rotterdam Convention on the prior Inform Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (<http://www.pic.int/>)

- Waste is stored in a manner that prevents the commingling or contact between incompatible wastes, and allows for inspection between containers to monitor leaks or spills. Examples include sufficient space between incompatibles or physical separation such as walls or containment curbs
- Store in closed containers away from direct sunlight, wind and rain
- Secondary containment systems should be constructed with materials appropriate for the wastes being contained and adequate to prevent loss to the environment
- Secondary containment is included wherever liquid wastes are stored in volumes greater than 220 liters. The available volume of secondary containment should be at least 110 percent of the largest storage container, or 25 percent of the total storage capacity (whichever is greater), in that specific location
- Provide adequate ventilation where volatile wastes are stored.

Hazardous waste storage activities should also be subject to special management actions, conducted by employees who have received specific training in handling and storage of hazardous wastes:

- Provision of readily available information on chemical compatibility to employees, including labeling each container to identify its contents
- Limiting access to hazardous waste storage areas to employees who have received proper training
- Clearly identifying (label) and demarcating the area, including documentation of its location on a facility map or site plan
- Conducting periodic inspections of waste storage areas and documenting the findings

- Preparing and implementing spill response and emergency plans to address their accidental release (additional information on Emergency Plans is provided in Section 3 of this document)
- Avoiding underground storage tanks and underground piping of hazardous waste

### *Transportation*

On-site and Off-site transportation of waste should be conducted so as to prevent or minimize spills, releases, and exposures to employees and the public. All waste containers designated for off-site shipment should be secured and labeled with the contents and associated hazards, be properly loaded on the transport vehicles before leaving the site, and be accompanied by a shipping paper (i.e., manifest) that describes the load and its associated hazards, consistent with the guidance provided in Section 3.4 on the Transport of Hazardous Materials.

### *Treatment and Disposal*

In addition to the recommendations for treatment and disposal applicable to general wastes, the following issues specific to hazardous wastes should be considered:

#### **Commercial or Government Waste Contractors**

In the absence of qualified commercial or government-owned waste vendors (taking into consideration proximity and transportation requirements), facilities generating waste should consider using:

- Have the technical capability to manage the waste in a manner that reduces immediate and future impact to the environment
- Have all required permits, certifications, and approvals, of applicable government authorities

- Have been secured through the use of formal procurement agreements

In the absence of qualified commercial or government-owned waste disposal operators (taking into consideration proximity and transportation requirements), project sponsors should consider using:

- Installing on-site waste treatment or recycling processes
- As a final option, constructing facilities that will provide for the environmental sound long-term storage of wastes on-site (as described elsewhere in the General EHS Guidelines) or at an alternative appropriate location up until external commercial options become available

### Small Quantities of Hazardous Waste

Hazardous waste materials are frequently generated in small quantities by many projects through a variety of activities such as equipment and building maintenance activities. Examples of these types of wastes include: spent solvents and oily rags, empty paint cans, chemical containers; used lubricating oil; used batteries (such as nickel-cadmium or lead acid); and lighting equipment, such as lamps or lamp ballasts. These wastes should be managed following the guidance provided in the above sections.

### Monitoring

Monitoring activities associated with the management of hazardous and non-hazardous waste should include:

- Regular visual inspection of all waste storage collection and storage areas for evidence of accidental releases and to verify that wastes are properly labeled and stored. When significant quantities of hazardous wastes

are generated and stored on site, monitoring activities should include:

- Inspection of vessels for leaks, drips or other indications of loss
- Identification of cracks, corrosion, or damage to tanks, protective equipment, or floors
- Verification of locks, emergency valves, and other safety devices for easy operation (lubricating if required and employing the practice of keeping locks and safety equipment in standby position when the area is not occupied)
- Checking the operability of emergency systems
- Documenting results of testing for integrity, emissions, or monitoring stations (air, soil vapor, or groundwater)
- Documenting any changes to the storage facility, and any significant changes in the quantity of materials in storage
- Regular audits of waste segregation and collection practices
- Tracking of waste generation trends by type and amount of waste generated, preferably by facility departments
- Characterizing waste at the beginning of generation of a new waste stream, and periodically documenting the characteristics and proper management of the waste, especially hazardous wastes
- Keeping manifests or other records that document the amount of waste generated and its destination
- Periodic auditing of third party treatment, and disposal services including re-use and recycling facilities when significant quantities of hazardous wastes are managed by third parties. Whenever possible, audits should include site visits to the treatment storage and disposal location

- Regular monitoring of groundwater quality in cases of Hazardous Waste on site storage and/or pretreatment and disposal
- Monitoring records for hazardous waste collected, stored, or shipped should include:
  - Name and identification number of the material(s) composing the hazardous waste
  - Physical state (i.e., solid, liquid, gaseous or a combination of one, or more, of these)
  - Quantity (e.g., kilograms or liters, number of containers)
  - Waste shipment tracking documentation to include, quantity and type, date dispatched, date transported and date received, record of the originator, the receiver and the transporter
  - Method and date of storing, repacking, treating, or disposing at the facility, cross-referenced to specific manifest document numbers applicable to the hazardous waste
  - Location of each hazardous waste within the facility, and the quantity at each location

# APPENDIX

## **3-4** *WBG EBRD GUIDELINES - WORKER ACCOMMODATIONS*





---

# Workers' accommodation: processes and standards

A guidance note by IFC and the EBRD



The EBRD is an international financial institution that supports projects from central Europe to central Asia. Investing primarily in private sector clients whose needs cannot be fully met by the market, we foster transition towards open and democratic market economies. In all our operations we follow the highest standards of corporate governance and sustainable development.

IFC, a member of the World Bank Group, creates opportunity for people to escape poverty and improve their lives. We foster sustainable economic growth in developing countries by supporting private sector development, mobilising private capital, and providing advisory and risk mitigation services to businesses and governments. Our new investments totalled US\$ 15 billion in fiscal 2009, helping play a prominent role in addressing the financial crisis. For more information, visit [www.ifc.org](http://www.ifc.org).

## About this guidance note

This Guidance Note is aimed at providing practical guidance to IFC and EBRD specialists, consultants and clients on the processes and standards that should be applied to the provision of workers' accommodation in relation to projects funded by IFC or the EBRD. Applying appropriate standards to the construction and operation of worker housing falls within the performance requirements on labour and working conditions expected of clients by both institutions. The Guidance Note also provides examples of good practice approaches that businesses have successfully applied in their operations. IFC and the EBRD have not financed all the projects or companies mentioned in the Note. Some of the information in the Note originates from publicly available sources such as company web sites. IFC and the EBRD have not verified the accuracy of such information nor the companies' practices. This Guidance Note is not intended to establish policy itself; and any issues arising in an IFC- or EBRD-financed project will be assessed and addressed in the context of the particular circumstances of that project. The EBRD and IFC recognise that there are no comprehensive international regulations relating to workers' accommodation, and that good and best practices are constantly evolving. The EBRD and IFC intend to update this Guidance Note to reflect such developments, and would welcome feedback and comments from users to contribute to this process. Comments should be sent to [environmentalsocial@ebrd.com](mailto:environmentalsocial@ebrd.com) and [asksustainability@ifc.org](mailto:asksustainability@ifc.org)

## Contents

EXECUTIVE SUMMARY	1
INTRODUCTION	2
PART I: PLANNING AND ASSESSING REQUIREMENTS FOR WORKERS' ACCOMMODATION	4
I. Assessing the need for workers' accommodation	5
A. Availability of workforce	5
B. Availability of existing housing	5
II. Assessing impacts of workers' accommodation on communities	6
A. Specific impacts during the construction phase	7
B. Community infrastructure	7
C. Community services and facilities	7
D. Local businesses and local employment	7
E. Community health and safety	7
F. Community cohesion	7
G. Land acquisition and resettlement	7
H. Dismantling and reinstatement	7
III. Types of workers' accommodation	9
PART II: STANDARDS FOR AND MANAGEMENT OF WORKERS' ACCOMMODATION	11
I. Standards for workers' accommodation	11
A. National/local standards	11
B. General living facilities	11
C. Room/dormitory facilities	13
D. Sanitary and toilet facilities	14
E. Canteen, cooking and laundry facilities	14
F. Standards for nutrition and food safety	16
G. Medical facilities	17
H. Leisure, social and telecommunication facilities	18
II. Managing workers' accommodation	18
A. Management and staff	18
B. Charging fees for accommodation and services	19
C. Health and safety on site	19
D. Security of workers' accommodation	20
E. Workers' rights, rules and regulations on workers' accommodation	21
F. Consultation and grievance mechanisms	22
G. Management of community relations	22
ANNEX I: CHECKLIST ON WORKERS' ACCOMMODATION	24

# Workers' accommodation: processes and standards

## Public guidance note by IFC and the EBRD

### EXECUTIVE SUMMARY

This guidance note addresses the processes and standards that should be applied to the provision of workers' accommodation in relation to projects funded by the EBRD or IFC. Applying appropriate standards to the construction and operation of worker housing falls within the performance requirements on labour issues expected of clients by both organisations.

There is a range of different types of workers' accommodation that may be required by various projects and at different stages within projects, including temporary exploration camps, construction camps and permanent dormitories. Specific issues arise in relation to each of these. This note reviews various international, national, private sector and public sector standards and guidance that are more generally applicable. In some cases clear standards or good practice have been identified. In others, we present a range of standards that provide some flexibility and adaptability within the local context. In these cases, compliance with at least the minimum standard is expected.

Issues for consideration are organised in terms of a staged process to be undertaken in planning, constructing and then operating worker housing facilities. These issues may be relevant to the direct client or to (sub)contractors undertaking particular elements of a project, such as construction or management of facilities. In cases where contractors are used, it is important to set up appropriate mechanisms and processes (reporting/monitoring) to ensure that performance requirements are complied with.

At the initial stage of any project, there is a need to assess whether accommodation for workers is

required, and if so, whether this can be provided within existing local communities or whether new facilities should be constructed. The likely impact on local communities and the housing market of either option should be assessed.

Before constructing any facilities, other potential impacts should be evaluated. These may include the impact of construction, and the effect of a new housed labour force on community services, such as health, and on community cohesion and safety. These assessments should form part of a project's Environmental and Social Impact Assessment.

The next step is to consider the standards to be applied for the location, arrangement and construction of any facilities. Issues here include consideration of a safe and healthy location, application of appropriate construction standards, provision of adequate and sanitary living conditions and provision of appropriate leisure and health facilities.

There are no universally applicable international regulations relating to workers' accommodation standards in general. However, there are some international standards/guidance on food safety, water sanitation and waste management that should be applied, and national or local building regulations that must be complied with.

Lastly, when the accommodation has been completed, there are issues around its operation and management. These include the type of staff who will manage it, development of appropriate management policies, such as security and grievance procedures, and ongoing liaison with local communities. All such policies should be subject to regular review.

## INTRODUCTION

This guidance note looks at the provision of housing or accommodation for workers by employers and the issues that arise from the planning, construction and management of such facilities.

Generally, workers are housed by their employers in cases where, either the number or the type of workers required cannot be sourced from or accommodated within local communities. Thus provision of workers' accommodation is often associated with the importation of an external workforce into an area. This can occur because the local labour supply or skills base is inadequate, because the workers are simply not available due to the remote location of the worksite or the particular skills required or because labour requirements can only be satisfied by migrant workers due to the nature of the work or the working conditions.

Provision of worker housing may relate to a temporary phase of a project (for example an exploration or construction camp) or may be more permanent (for example a factory dormitory or plantation camp). Depending on the type of accommodation, there are a range of considerations relating to both the living conditions of the workers themselves, and to the impact that workers' housing facilities may have on surrounding communities. The provision of workers' accommodation is a frequent component of large-scale projects funded by institutions such as the EBRD or IFC.

This note is aimed at providing practical guidance to IFC and EBRD specialists, consultants and clients on appropriate policies and standards relating to workers' accommodation. Both the EBRD and IFC apply environmental and social performance standards in relation to their investments that include provisions on labour and working conditions. The EBRD has included a specific provision in its *Environmental and Social Policy* addressing workers' accommodation; paragraph 16 of *Performance Requirement 2 (PR2)* stipulates:

*Where a client provides accommodation for workers, the accommodation shall be appropriate for its location and be clean, safe and, at a minimum, meet the basic needs of workers. In particular, the provision of accommodation shall meet national legislation and international good practice in relation, but not restricted, to the following: the practice for charging for accommodation; the provision of minimum amounts of space for each worker; provision of sanitary, laundry and cooking facilities*

*and potable water; the location of accommodation in relation to the workplace; any health, fire safety or other hazards or disturbances and local facilities; the provision of first aid and medical facilities; and heating and ventilation. Workers' freedom of movement to and from the employer-provided accommodation shall not be unduly restricted.*

IFC Performance Standard 2 (PS2) aims to promote "safe and healthy working conditions, and to protect and promote the health of workers." Arguably this covers living conditions as well when these are the responsibility of employers. *IFC Guidance Note 2 on Labour and Working Conditions* specifically mentions the potential danger of forced labour when housing is provided to workers in lieu of payment or where inappropriate charges for housing are levied.

In some instances, for example during construction phases of projects, workers will not be directly engaged by the EBRD's or IFC's clients, but by (sub)contractors. However, both the EBRD and IFC require their clients to ensure that non-employee

### Box 1 - Construction camp built and operated by a Chinese contractor

This example illustrates the different mechanisms and processes which can be set up in order to ensure that workers' accommodation standards are being implemented by contractors.

Antea, a Greek client of the EBRD and IFC, and a subsidiary of Titan Cement Co, has contracted out the construction of a cement factory in Albania to a Chinese contractor. The construction involves bringing in 700 migrant workers and housing them in workers' accommodation. As part of the contract with the construction company, Antea has included a Code of Conduct and specific language referring to compliance with national labour law, ILO conventions and IFC PS2 and has developed a supervision and monitoring plan (including safety and labour audits) to ensure the construction company is in compliance with all requirements stated in PS2, that living conditions in particular comply with the guidance provided by the EBRD/IFC and that all conditions enhance a safe and good working and living environment. Safety training courses and integration of best practices in accident prevention have been instigated, while solid waste and wastewater generated in the camp is managed in accordance with Albanian regulations and IFC/EBRD guidelines.

workers, engaged by contractors or other intermediaries to work on a project site to perform work related to the core function of the project, are covered by most of the provisions within PS2 and PR2, including (in the EBRD's case) paragraph 16 on workers' accommodation. To this end, clients should set up mechanisms and processes to ensure that contractors and other intermediaries comply with the EBRD's/IFC's standards. This should involve including contractual covenants related to workers' accommodation standards, reviewing contractor agreements, implementing reporting mechanisms and monitoring the implementation of workers' accommodation standards.

### A process approach

There are several stages to the process of addressing issues raised by workers' accommodation. These are:

- assessing whether housing is needed for the project and if so, what sort
- assessing impacts on local communities and planning mitigation of potential negative impacts
- awareness of the national and local regulatory framework

- determining the standards to apply to the location of facilities, the construction of housing and provision of facilities
- managing accommodation.

There are no comprehensive international regulations relating to workers' accommodation. However, there are legal and regulatory instruments and guidance that relate to particular aspects of the provision of worker housing.<sup>1</sup> This guidance note is based on a review of these instruments and legislation, as well as guidelines and best practices produced by a range of different private and public sector actions at national and international level. As such, the processes and standards cited often represent a range of acceptable practice. Those correspond to the Benchmark paragraphs under each section. The particular standard to be applied will depend on criteria such as the type of project, location, climate and length of project. In all cases at least the minimum standard included in a given range should be applied. However, depending on the particular circumstances the minimum standard may not always be acceptable, in which case the EBRD/IFC will agree an appropriate higher standard with the client, based on the environmental and social due diligence.

**Figure 1: Workers' accommodation, assessment and management process**

<b>Need assessment</b>	Is there a need for workers' accommodation?	<ul style="list-style-type: none"> <li>▶ Assess the availability of the local workforce</li> <li>▶ Assess the availability of existing housing</li> </ul>
<b>Impact assessment</b>	What are the expected impacts (positive and negative) on the communities?	<ul style="list-style-type: none"> <li>▶ Determine specific impacts of the workers' accommodation construction phase (including security and involuntary resettlement)</li> <li>▶ Assess existing community infrastructures, services and facilities</li> <li>▶ Understand the local business and employment context</li> <li>▶ Give special attention to community health and safety issues and social cohesion</li> <li>▶ Think about the consequences of dismantling and reinstatement</li> </ul>
<b>Construction</b>	Which accommodation standards are needed?	<ul style="list-style-type: none"> <li>▶ Identify and review the international, national, regional and sectoral regulations which address workers' accommodation</li> <li>▶ Apply mandatory provisions and use non-binding provisions as guidance</li> <li>▶ Apply at least the minimum requirements set out in this guidance note</li> </ul>
<b>Management</b>	What management systems are required?	<ul style="list-style-type: none"> <li>▶ Design management plans covering health and safety, security, workers' and communities' rights</li> <li>▶ Appoint the right staff or contract the right companies</li> <li>▶ Implement management plans</li> <li>▶ Set up complaint/grievance and conflict resolution mechanisms (for both workers and communities)</li> <li>▶ Review policies</li> </ul>

1. See footnotes under Part I, introductory remark

## PART I: PLANNING AND ASSESSING REQUIREMENTS FOR WORKERS' ACCOMMODATION

In considering worker housing, it is important to first be aware of the international, national and local regulatory framework. At a general level, several international instruments recognise a right to an adequate standard of housing for everyone or for specific categories of the population as part of respecting human rights.<sup>2</sup> To ensure the full realisation of this right, binding instruments generally require the State to take appropriate steps and measures. For workers, the recognition of such a right has been included in ILO Conventions and Recommendations

for both Plantations and for Safety and Health in Agriculture, and in the ILO Recommendation 115 on Workers' Housing (1961) in particular. Although the latter is a non-binding recommendation providing guidance on policy, legislation and practice to the State and to the national authorities in charge of housing in particular, it offers useful guidance on what is expected from employers who provide housing to their employees, and it specifies a number of housing standards (See Box 2).

### Box 2 - ILO Workers' Housing Recommendation 115

- It is generally not desirable for employers to provide housing for their workers directly and employers should use alternatives where possible. If there are no alternatives, specific attention should be paid to renting arrangements, workers' rights and housing standards. In addition, the possibility of worker-occupants acquiring, for a fair price, ownership of housing provided by the employer should also be examined.
- Renting arrangements should be fair. Adequate and decent housing should not cost the worker more than a reasonable proportion of their income and should never include a speculative profit.
- The employer should be entitled to repossess the accommodation within a reasonable time in the event of termination of the worker's contract of employment and the worker should be entitled to a reasonable period of continued occupancy and/or fair compensation when he ceases to exercise his employment.
- During the time workers spend in the workers' accommodation they should enjoy their fundamental human rights and freedom of association in particular. Workers' accommodation arrangements should not restrict workers' rights and freedoms.
- Housing standards should include special attention to the following:
  - ▶ minimum space allocated per person or per family (floor area; cubic volume; or size and number of rooms)
  - ▶ supply of safe water in the workers' dwelling in such quantities as to provide for all personal and household uses
  - ▶ adequate sewage and garbage disposal systems
  - ▶ appropriate protection against heat, cold, damp, noise, fire, and disease-carrying animals, and, in particular, insects
  - ▶ adequate sanitary and washing facilities, ventilation, cooking and storage facilities and natural and artificial lighting
  - ▶ a minimum degree of privacy both between individual persons within the household and for the members of the household against undue disturbance by external factors
  - ▶ the suitable separation of rooms devoted to living purposes from quarters for animals.
- Where accommodations are provided for single workers or workers separated from their families, additional housing standards should be considered:
  - ▶ a separate bed for each worker
  - ▶ separate gender accommodation
  - ▶ adequate sanitary conveniences
  - ▶ common dining rooms, canteens, rest and recreation rooms and health facilities, where not otherwise available in the community.

2. See for example

1948 Universal Declaration of Human Rights (Article 25)

1965 Convention on the elimination of all forms of racial discrimination (Article 5)

1966 International Covenant on Economic, Social and Cultural Rights (Article 11.1)

1979 Convention on the elimination of all forms of discrimination against women (Article 14.2)

At a national or regional level, regulations tend to contain only general provisions requiring employers to provide a decent standard of accommodation to workers. However, in some jurisdictions there are detailed regulations or standards setting out a comprehensive framework to be applied.<sup>3</sup> There may also be building regulations relating to issues such as sanitation, safety or building materials that must be adhered to. Therefore, national regulations and standards are the first place to look when determining the necessary standards for living facilities. However, responsibility for planning and building standards may well lie with regional or local levels of government, so it is important that these local authorities are consulted. Provisions on workers' accommodation can also be found in policy, guidelines or codes of practice adopted by a wide variety of actors such as international bodies, industry associations, national, regional or local authorities.<sup>4</sup> Compliance with national and local law is the basic and essential requirement.

### Benchmarks

1. The international/national/local regulatory frameworks on workers' accommodation have been reviewed.
2. Identified mandatory provisions on workers' accommodation are implemented thoroughly.

## I. Assessing the need for workers' accommodation

Before building and running workers' accommodation, it is important to understand the local housing and labour markets and the potential effects the building of new facilities may have on the surrounding communities.

### A. Availability of workforce

At the initial scoping phase of a project, it is important to consider whether workers' accommodation is needed at all. In this respect, it is worth analysing the project's workforce requirements including skills and likely numbers over the project cycle and to assess the capacity of the local population to meet those workforce requirements either from its current base or as a result of training. It is preferable to source labour from the local communities as this has many advantages; not only in terms of reducing the need for workers' accommodation, but also

as it will increase the direct and indirect benefits to the community arising from the project. This approach is strongly supported by the EBRD and IFC. Any national/local requirements to promote local employment opportunities must also be taken into account. It should be noted that even in the absence of such requirements, new recruitment on EBRD/IFC-financed projects must not be discriminatory.

### Benchmarks

1. There has been an assessment of workers' availability in the neighbouring communities.
2. There has been an assessment of the skills and competencies of the local workforce and how those skills and competencies fit the project needs.
3. There has been an assessment of opportunities to train the local workforce to fulfil the project's needs.

### B. Availability of existing housing

If local workers are unavailable or not sufficiently skilled, the question arises of whether external workers can be accommodated within the existing local housing capacity or whether new facilities are needed. In general, the decision to utilise host-community accommodation or to develop on-site accommodation will be based on factors such as whether project development is occurring near to larger, established population centres and on the capacity of any nearby communities, quality of housing stock and the capacity of the environment to assimilate a new workforce.

If existing capacity is available, in the form, for example, of lodging with local families, hotels, hostels or rented housing, the impact on the local communities and housing market should be assessed. Such off-site housing may create a wide range of economic opportunities such as rental income for local people or development of local businesses (shops and restaurants for instance), which are positive project impacts, and may also result in improvements to existing housing stock. However, off-site housing may also be associated with a range of adverse social impacts including increased demands on infrastructure, services and utilities, development of illicit trade activities (drugs, prostitution, selling of stolen goods) and inflation in local rent and other subsistence items with detrimental

3. See for example:

United States - Occupational Health and Safety Act (Standards 29, paragraph 1910.142)  
 Brazil - Health and safety regulation in the agricultural, livestock farming, forestry and aquaculture sectors, 2005  
 Malaysia - Workers' minimum standards of housing and amenities Act, 1990  
 South Africa - Basic condition of employment Act, 1997  
 New South Wales, Australia - Rural Workers Accommodation Act, 1969  
 Western Australia - Construction camp regulations, 1970  
 Dubai Municipality - Labour camp specifications (last updated in 2007)

4. See for example:

New South Wales, Australia - Accommodation for rural agricultural work, code of practice, 2006  
 Singapore - Code of practice on environmental health, 2005  
 Israel - Guide for Migrant Workers, Housing  
 ILO - Code of Practice, safety and health in forestry work, 1998  
 City of Geraldton-Greenough, Western Australia, Local planning policy - Temporary accommodation camps, 2006  
 Sustainable Agriculture Network Standards, 5.14, 2009.

consequences for the local population. If a project anticipates that the workforce is to be resident within the local communities it is good practice to provide financing options for local residents to develop and/or improve hostels for instance.

Conversely, to provide on-site housing opportunities minimises workforce-host community interactions and reduces the pressure on existing infrastructures and can also pre-empt the development of various external activities such as prostitution.

In some cases, it may be feasible and beneficial to offer workers or certain categories of workers an option between self-accommodation and company-provided accommodation with varying compensation accordingly.

To avoid or mitigate the most negative impacts, it is important to conduct a comprehensive assessment of the housing market and the likely impact of the various options for workers' accommodation. For larger projects, this assessment will best be done at the stage of the Environmental and Social Impact Assessment (ESIA). Measures resulting from this assessment will need to be incorporated in tendering and contracting documentation. Furthermore, in cases where local facilities are utilised, potential mitigation measures for adverse impacts such as increased inflationary rates on local costs must be assessed in the ESIA, and procedures that will be implemented to monitor this must also be presented.

### Benchmarks

1. Prior to building any workers' accommodation, a comprehensive assessment of the local housing market has been conducted and the different types of housing available in the surrounding communities have been identified. For larger projects this assessment has been conducted at the stage of the project's Environmental and Social Impact Assessment.
2. There has been an assessment on communities of the impact of using existing housing opportunities.
3. Measures to mitigate adverse impacts on the local housing market have been identified and included in the Environmental and Social Action Plan (ESAP) or other relevant action plan.

## II. Assessing impacts of workers' accommodation on communities

Where the need to provide new workers' accommodation is identified, it is important to consider how this will impact on the surrounding communities. This may be relevant both to the construction phase of the camp (or other accommodation) and during its operation. Risk identification and assessments specific to the workers' accommodation should be undertaken as part of the Environmental and Social Impact Assessment and any related development of an Environmental and Social Action Plan. This assessment can also be used to determine whether contact between non-local workforce and local communities should be encouraged or minimised.

### Box 3 - Singapore National Environment Agency - Code of Practice on Environmental Health, 2005

The following guidelines shall be used for stand-alone dormitories.

- If the dormitory does not provide a separate space for cupboards/locker rooms, the minimum room space shall be 4 square metres per person (assuming a height of 2.4m).
- If the dormitory provides a separate space for cupboards/locker rooms, the minimum room space shall be 3 square metres per person (assuming a height of 2.4m).
- The room shall be adequately ventilated and lit.
- Adequate number of toilets and sanitary fittings shall be provided (1 toilet, 1 hand wash basin, 1 urinal and 1 bathroom with bench per 15 male workers).
- Where cooking area is to be provided in the dormitories, such provisions shall be in accordance with the requirements stipulated under Section 2.4 of the latest edition of Singapore Standard CP 102.

The above Singapore guidelines are mentioned as an example of "soft" regulations only. The standards described above may be inappropriate in different environments. Other standards apply in other countries.

### A. Specific impacts during the construction phase

The construction of workers' accommodation and its potential impacts on communities should be managed in the same way as for construction of the project itself. Impacts need to be identified and may include health and safety, disturbance issues arising from construction, including traffic (dust, noise and vibration), and involuntary resettlement issues (including physical and economical displacement) when the erecting of workers' accommodation entails land acquisition.

### B. Community infrastructure

Workers' influx in the vicinity of a community may strain existing infrastructure, in particular the water and sanitation, electricity and transport systems. Impacts of the worker facility should be avoided or mitigated, and included within the assessment of the overall project.

In general, where facilities are developed close to local communities it is important to provide adequate transport systems to preserve the right of workers' freedom of movement if they are not to become effectively "trapped". This should be balanced against the need to prevent any unnecessary disruption of and/or to the local communities. Therefore it may be appropriate to limit worker movements, but any restriction should be clearly justified by the need to avoid the disruption of local communities, in particular local communities' transport infrastructures – and to provide maximum security and safety to both workers and communities (see PART II, Section E "Workers' rights, rules and regulations on workers' accommodation", below at page 21).

### C. Community services and facilities

Depending on the size of the workers' accommodation, conditions of engagement (accompanied or unaccompanied) and the level of services offered to those workers, it may be necessary to assess the impact of workers on local medical, social, educational and recreational services and facilities, potentially to the detriment of nearby communities. It must be ensured that such services and facilities can meet increased demand. If not, services must be available to the workers on site.

### D. Local businesses and local employment

Local businesses such as shops, restaurants or bars are likely to benefit from their proximity to workers' living facilities. However, there may also be negative issues that need to be managed such as increases in local prices, crime, prostitution or alcohol consumption (see below Part II, section E).

### E. Community health and safety

The presence of a large number of workers, principally males, can give rise to an increased spread of communicable diseases such as HIV/AIDS in particular and other sexually transmitted diseases. In addition, special attention should be paid to risks such as road accidents, and other detrimental consequences of increased traffic generated by the project (dust, noise, and pollution). If the proposed project has major-accident hazards associated with it, emergency response and evacuation plans in accordance to PS4/PR4 will also need to be in place.

### F. Community cohesion

The impact of the presence of workers with different lifestyles or cultural backgrounds on the host community needs to be assessed and managed, in particular issues such as religious or other cultural proscriptions, local traditions and community structure and the relationship between men and women.

### G. Land acquisition and resettlement

Impacts and mitigation plans relating to land used for workers' accommodation facilities should be managed in the same way as for the project as a whole. As far as possible, land acquisition should be avoided or minimised.

### H. Dismantling and reinstatement

Dismantling and reinstatement of workers' accommodation should be taken into account at the outset of the project in order to avoid any unnecessary lasting impacts of the accommodations on the communities (land use for instance). Where possible and appropriate, the facilities can be handed over to the communities.

## Benchmarks

1. A community impact assessment has been carried out as part of the Environmental and Social Assessment of the overall project with a view to mitigate the negative impacts of the workers' accommodation on the surrounding communities and to enhance the positive ones.
2. The assessment includes potential health and safety impacts on the communities - including disturbances and safety issues caused by traffic (dust, noise, vibration, road accidents, disease) and consequences of land acquisition and involuntary resettlement occurring during the construction phase of the workers' accommodation.
3. Positive and negative impacts of workers' accommodation on community infrastructures, services and facilities have been included in the assessment, including specific attention to emergency responses and evacuation plans.
4. Impacts of workers' accommodation on community local businesses and local employment have been included in the assessment.
5. General impacts of workers' accommodation on the health of communities (notably the increased risk of road accidents and the increase of communicable diseases) and community social cohesion have been included in the assessment.
6. The assessment includes appropriate mitigation measures to address any adverse impacts identified.

**Table 1: A typology of workers' accommodation**

Category	Subcategory/examples	Common characteristics	Sectors covered	Key issues
Rural workers' accommodation	Logging camp Off-farm accommodation	Permanent or seasonal Remote	Forestry Agriculture	Worker access Monitoring difficulties
Plantation housing	Worker village Off-farm accommodation	Permanent and long term Families	Agriculture	Need to provide sustainable livelihoods Social infrastructures Living conditions
Construction camp	Worker camp Worker village Mobile worker camp	Temporary Migrant workers Gender separation	Extractives Utilities Infrastructure Manufacturing	Enforcement of standards and monitoring difficulties Relations with the communities Living standards Cost
Mine camp	Company towns Dormitories Integrated within existing communities Commuter (fly-in, fly-out)	Long term Remote location Gender separation	Extractives	Relations with communities Remoteness Living standards Worker access Long shifts No rest periods
Factory dormitory		Permanent Urban Internal migrants	Garments/textiles Manufacturing – toys, electronics	Space Privacy Living standards Deduction of excessive rent from wages

### III. Types of workers' accommodation

There is a large variety of workers' living facilities. These may be classified in a number of ways. Table 1 provides one typology. Key criteria may include whether the facilities are temporary or permanent, their location (remote or non-remote), size, or economic sector (agriculture, mining, oil and gas, construction, manufacturing).

The typology above is given as an example only; other classifications are possible. For instance, housing may be categorised in terms

of project phases for example, exploration (fly-in, fly-out camps), construction (temporary construction camp often with large proportion of migrant workers) and operational (permanent, dormitory, possible family accommodation).

Depending on the type of project, specific attention should be given to either providing single workers' accommodation or family accommodation. As a general rule, the more permanent the housing, the greater considerations should be given to enabling workers to live with their families. Such consideration is important where the workforce is

#### Box 4 - Best practice on home-ownership

When access to property schemes is proposed it is important to guarantee the sustainability of workers' investments. To this end, the location of the project and of the workers' accommodation and their integration in existing communities are factors to take into consideration. Caution should be exercised when offering such schemes in remote locations as it might be impossible to create a sustainable community and to develop non-project-related sources of livelihood.

**Affordable housing in a sustainable town:** A provider of affordable housing in South Africa and a provider of housing development for the mining sector worked together on a project to move away from mining hostels and rental villages to providing home-ownership opportunities to workers. To this end they developed a 400-plus unit in a village 20 km from the mine with the idea to create an economically and socially viable community close to the mine. A concern was to integrate people within existing communities with the necessary social amenities and infrastructures and to put the emphasis on better housing conditions, home ownership and affordable housing for mining workers. The success of the project relied on the ability for the service provider to take into account the often difficult financial situation of workers. To overcome over-indebtedness of workers, specific access to property schemes and programmes have been designed

including employer support, economies of scale, low interest rate and stepped payment options.

#### **Affordable housing in a self-sustaining community:**

An FMO (Netherlands Development Finance Company) client operating a mine in a remote location intends to manage and develop a well-planned, secure and independent village for approximately 1,000 employees. The FMO client is expected to provide residents with basic services, including water, electricity and sewerage as well as education, health services, sports facilities, shops, green areas and places of worship. In addition, provision has been made for a light industrial and small business area to support local business development. The long-term vision is for the Village to grow into a self-sustaining community of over 4,000 houses, which is capable of supporting a variety of small businesses and local enterprises. To support the long-term vision of a self-sustaining village and to provide mine employees with an opportunity to build up cash equity (in the form of a house), the FMO client will promote home ownership. In this context, an employee housing scheme has been designed that allows mine employees in all income categories to acquire title to property through mortgage debt all associated rights and obligations. Participation in the scheme is not a prerequisite for employment. The scheme includes several provisions to ensure affordability of home ownership to all mine employees and to protect employees against downside risks.

not sourced locally and in particular where migrant workers are used.<sup>5</sup> Provision for families will affect the other facilities necessary and the management of the accommodation. Best practice includes:

- To provide workers and their families individual family accommodation comprising bedrooms, sanitary and cooking facilities with an adequate level of privacy allowing families to have a normal family life.
- To provide nurseries, schools, clinics and recreational facilities for children, or to make sure that those services are readily available in the surrounding communities and of good quality.

### Benchmarks

1. Consideration has been given to provision of family accommodation.
2. When arrangements for family accommodations are in place:
  - families are provided with individual accommodation comprising bedroom, sanitary and cooking facilities
  - adequate nursery/school facilities are provided
  - special attention is paid to providing adequate safety for children.

#### Additional issue

In projects located in rural and remote locations, issues around the question of how workers can travel to their communities/countries of origin might arise. Alternatively, the possibility to create a sustainable community and to bring in the workers' families might be considered.

#### Box 5 - Best practice on migrant workers' accommodation: Business in the Community - Voluntary Code of Practice on Employing Migrant Workers/Overseas Staff in Great Britain<sup>6</sup>

The Code, which is designed to guide and reinforce best practice in relation to the employment of migrant workers, points out that migrant workers will often have to travel long distances and be in need of accommodation when they take up a job. Consequently, the Code suggests the following.

- Employers should assist with travel costs incurred by migrant workers during the recruitment stage and the repayment of these costs should follow a clear process and the money paid back at an agreed affordable rate over a specified time period. The total amount repayable should be no more than that lent so that workers are not financially disadvantaged.
- Employers, where possible, should support migrant workers in finding suitable accommodation. Workers should not be required to stay in accommodation provided by the employer but should be free to choose their own if they wish to do so. Where employers do provide accommodation, they should ensure that they do not breach the rules relating to the apportionment of wages for payment for accommodation (the accommodation offset rules).
- Employers should help to ensure that, where workers obtain their own accommodation, they are not being exploited, and offer advice and help if requested.
- Employers should ensure that accommodation which is provided is not overcrowded and does not pose a risk to the health and safety of those living there, and that any agreed notice periods are observed.

5. On the increase in the recognition of workers' rights to family life, the ILO Migrant Workers Convention No 143 calls Member States to take all necessary measures which fall within its competence and collaborate with other Members to facilitate the reunion of the families of all migrant workers legally residing in its territory. In the same way, Art 44-2 of the International Convention on the Protection of the Rights of All Migrant Workers and Members of Their Families requires States Parties to take measures that they deem appropriate and that fall within their competence to facilitate the reunion of migrant workers with their spouses [...], as well as with their minor dependent unmarried children.

6. [www.bitc.org.uk/resources/publications/migrant\\_workers\\_1.html](http://www.bitc.org.uk/resources/publications/migrant_workers_1.html)

## PART II: STANDARDS FOR AND MANAGEMENT OF WORKERS' ACCOMMODATION

### I. Standards for workers' accommodation

This section looks at the principles and standards applicable to the location and construction of workers' accommodation, including the transport systems provided, the general living facilities, rooms/dormitories facilities, sanitary facilities, canteen and cooking facilities, food safety, medical facilities and leisure/social facilities.

#### A. National/local standards

The key standards that need to be taken into consideration, as a baseline, are those contained in national/local regulations. Although it is quite unusual to find regulations specifically covering workers' accommodation, there may well be general construction standards which will be relevant. These may include the following standards:

- **Building construction:** for example, quality of material, construction methods, resistance to earthquakes.
- **Housing and public housing:** in some countries regulations for housing and public housing contain requirements on issues such as the basic amenities, and standards of repair.
- **General health, safety and security:** requirements on health and safety are often an important part of building standards and might include provisions on occupation density, minimal air volumes, ventilation, the quality of the flooring (slip-resistant) or security against intrusion.
- **Fire safety:** requirements on fire safety are common and are likely to apply to housing facilities of any type. This can include provision on fire extinguishers, fire alarms, number and size of staircases and emergency exits, restrictions on the use of certain building materials.
- **Electricity, plumbing, water and sanitation:** national design and construction standards often include very detailed provisions on electricity or plumbing fixtures/fittings, water and sanitation connection/equipment.

#### Benchmark

1. The relevant national and local regulations have been identified and implemented.

#### B. General living facilities

Ensuring good standards in living facilities is important in order to avoid safety hazards and to protect workers from diseases and/or illness resulting from humidity, bad/stagnant water (or lack of water), cold, spread of fungus, proliferation of insects or rodents, as well as to maintain a good level of morale. The location of the facilities is important to prevent exposure to wind, fire, flood and other natural hazards. It is also important that workers' accommodation is unaffected by the environmental or operational impacts of the worksite (for example noise, emissions or dust) but is sufficiently close that workers do not have to spend undue amounts of time travelling from their accommodation to the worksite. Living facilities should be built using adequate materials and should always be kept in good repair, clean and free from rubbish and other refuse.

#### Benchmarks

1. Living facilities are located to avoid flooding and other natural hazards.
2. Where possible, living facilities are located within a reasonable distance from the worksite.
3. Transport from the living facilities to worksite is safe and free.
4. The living facilities are built with adequate materials, kept in good repair and kept clean and free from rubbish and other refuse.

#### Drainage

The presence of stagnant water is a factor of proliferation of potential disease vectors such as mosquitoes, flies and others, and must be avoided.

#### Benchmarks

1. The building site is adequately drained to avoid the accumulation of stagnant water.

### Heating, air conditioning, ventilation and light

Heating, air-conditioning and ventilation should be appropriate for the climatic conditions and provide workers with a comfortable and healthy environment to rest and spend their spare time.

#### Benchmarks

1. For facilities located in cold weather zones, the temperature is kept at a level of around 20 degrees Celsius notwithstanding the need for adequate ventilation.
2. For facilities located in hot weather zones, adequate ventilation and/or air conditioning systems are provided.
3. Both natural and artificial lighting are provided and maintained in living facilities. It is best practice that the window area represents not less than 5% to 10% of the floor area. Emergency lighting is provided.

### Water

Special attention to water quality and quantity is absolutely essential. To prevent dehydration, water poisoning and diseases resulting from lack of hygiene, workers should always have easy access to a source of clean water. An adequate supply of potable water must be available in the same buildings where bedrooms or dormitories are provided. Drinking water must meet local or WHO drinking water standards<sup>7</sup> and water quality must be monitored regularly. Depending on the local context, it could either be produced by dedicated catchment and treatment facilities or tapped from existing municipal facilities if their capacity and quality are adequate.

#### Benchmarks

1. Access to an adequate and convenient supply of free potable water is always available to workers. Depending on climate, weather conditions and accommodation standards, 80 to 180 litres per person per day are available.
2. Drinking water meets national/local or WHO drinking water standards.<sup>8</sup>
3. All tanks used for the storage of drinking water are constructed and covered as to prevent water stored therein from becoming polluted or contaminated.

4. Drinking water quality is regularly monitored.

### Wastewater and solid waste

Wastewater treatment and effluent discharge as well as solid waste treatment and disposal must comply with local or World Bank effluent discharge standards<sup>9</sup> and be adequately designed to prevent contamination of any water body, to ensure hygiene and to avoid the spread of infections and diseases, the proliferation of mosquitoes, flies, rodents, and other pest vectors. Depending on the local context, treatment and disposal services can be either provided by dedicated or existing municipal facilities.

#### Benchmarks

1. Wastewater, sewage, food and any other waste materials are adequately discharged, in compliance with local or World Bank standards – whichever is more stringent – and without causing any significant impacts on camp residents, the biophysical environment or surrounding communities.
2. Specific containers for rubbish collection are provided and emptied on a regular basis. Standards range from providing an adequate number of rubbish containers to providing leak proof, non-absorbent, rust and corrosion-resistant containers protected from insects and rodents. In addition it is best practice to locate rubbish containers 30 metres from each shelter on a wooden, metal, or concrete stand. Such containers must be emptied at regular intervals (to be determined based on temperatures and volumes generated) to avoid unpleasant odours associated with decaying organic materials.
3. Pest extermination, vector control and disinfection are carried out throughout the living facilities in compliance with local requirements and/or good practice. Where warranted, pest and vector monitoring should be performed on a regular basis.

7. [www.who.int/water\\_sanitation\\_health/dwq/en/](http://www.who.int/water_sanitation_health/dwq/en/)

8. *ibid*

9. As per the "Pollution Prevention and Abatement Handbook", World Bank Group, July 1998, available from [www.worldbank.org](http://www.worldbank.org)

### C. Room/dormitory facilities

The standards of the rooms or dormitory facilities are important to allow workers to rest properly and to maintain good standards of hygiene. Overcrowding should be avoided particularly. This also has an impact on workers' productivity and reduces work-related accidents. It is generally acknowledged that rooms/dormitories should be kept clean and in a good condition. Exposure to noise and odour should be minimised. In addition, room/dormitory design and equipment should strive to offer workers a maximum of privacy. Resorting to dormitories should be minimised and single or double rooms are preferred. Dormitories and rooms must be single-sex.

#### Benchmarks

1. Rooms/dormitories are kept in good condition.
2. Rooms/dormitories are aired and cleaned at regular intervals.
3. Rooms/dormitories are built with easily cleanable flooring material.
4. Sanitary facilities are located within the same buildings and provided separately for men and women.
5. Density standards are expressed either in terms of minimal volume per resident or of minimal floor space. Usual standards range from 10 to 12.5 cubic metres (volume) or 4 to 5.5 square metres (surface).
6. A minimum ceiling height of 2.10 metres is provided.
7. In collective rooms, which are minimised, in order to provide workers with some privacy, only a reasonable number of workers are allowed to share the same room. Standards range from 2 to 8 workers.
8. All doors and windows should be lockable, and provided with mosquito screens where conditions warrant.
9. There should be mobile partitions or curtains to ensure privacy.
10. Every resident is provided with adequate furniture such as a table, a chair, a mirror and a bedside light.
11. Separate sleeping areas are provided for men and women, except in family accommodation.

#### Additional issue

Irrespective of whether workers are supposed to keep their facilities clean, it is the responsibility of the accommodation manager to ensure that rooms/dormitories and sanitary facilities are in good condition.

#### Bed arrangements and storage facilities

The provision of an adequate numbers of beds of an appropriate size is essential to provide workers with decent, safe and hygienic conditions to rest and sleep. Here again, particular attention should be paid to privacy. Consideration should be given to local customs so beds could be replaced by hammocks or sleeping mats for instance.

#### Benchmarks

1. A separate bed for each worker is provided. The practice of "hot-bedding" should be avoided.
2. There is a minimum space between beds of 1 metre.
3. Double deck bunks are not advisable for fire safety and hygiene reasons, and their use is minimised. Where they are used, there must be enough clear space between the lower and upper bunk of the bed. Standards range from 0.7 to 1.10 metres.
4. Triple deck bunks are prohibited.
5. Each worker is provided with a comfortable mattress, pillow, cover and clean bedding.
6. Bed linen is washed frequently and applied with repellents and disinfectants where conditions warrant (malaria).
7. Facilities for the storage of personal belongings for workers are provided. Standards vary from providing an individual cupboard for each worker to providing 475-litre big lockers and 1 metre of shelf unit.
8. Separate storage for work boots and other personal protection equipment, as well as drying/airing areas may need to be provided depending on conditions.

## D. Sanitary and toilet facilities

It is essential to allow workers to maintain a good standard of personal hygiene but also to prevent contamination and the spread of diseases which result from inadequate sanitary facilities. Sanitary and toilet facilities will always include all of the following: toilets, urinals, washbasins and showers. Sanitary and toilet facilities should be kept in a clean and fully working condition. Facilities should also be constructed of materials that are easily cleanable and ensure privacy. Sanitary and toilet facilities are never shared between male and female residents, except in family accommodation. Where necessary, specific additional sanitary facilities are provided for women.

### Benchmarks

1. Sanitary and toilet facilities are constructed of materials that are easily cleanable.
2. Sanitary and toilet facilities are cleaned frequently and kept in working condition.
3. Sanitary and toilet facilities are designed to provide workers with adequate privacy, including ceiling to floor partitions and lockable doors.
4. Sanitary and toilet facilities are not shared between men and women, except in family accommodation.

### Toilet facilities

Toilet arrangements are essential to avoid any contamination and prevent the spread of infectious disease.

### Benchmarks

1. An adequate number of toilets is provided to workers. Standards range from 1 unit to 15 persons to 1 unit per 6 persons. For urinals, usual standards are 1 unit to 15 persons.
2. Toilet facilities are conveniently located and easily accessible. Standards range from 30 to 60 metres from rooms/dormitories. Toilet rooms shall be located so as to be accessible without any individual passing through any sleeping room. In addition, all toilet rooms should be well-lit, have good ventilation or external windows, have sufficient hand wash basins and be conveniently located. Toilets and other sanitary facilities should be ("must be" in cold climates) in the same building as rooms and dormitories.

### Showers/bathrooms and other sanitary facilities

Hand wash basins and showers should be provided in conjunction with rooms/dormitories. These facilities must be kept in good working condition and cleaned frequently. The flooring for shower facilities should be of hard washable materials, damp-proof and properly drained. Adequate space must be provided for hanging, drying and airing clothes. Suitable light, ventilation and soap should be provided. Lastly, hand washing, shower and other sanitary facilities should be located within a reasonable distance from other facilities and from sleeping facilities in particular.

### Benchmarks

1. Shower/bathroom flooring is made of anti-slip hard washable materials.
2. An adequate number of handwash facilities is provided to workers. Standards range from 1 unit to each 15 persons to 1 unit per 6 workers. Handwash facilities should consist of a tap and a basin, soap and hygienic means of drying hands.
3. An adequate number of shower/bathroom facilities is provided to workers. Standards range from 1 unit to 15 persons to 1 unit per 6 persons.
4. Showers/bathrooms are conveniently located.
5. Shower/bathroom facilities are provided with an adequate supply of cold and hot running water.

## E. Canteen, cooking and laundry facilities

Good standards of hygiene in canteen/dining halls and cooking facilities are crucial. Adequate canteen, cooking and laundry facilities and equipments should also be provided. When caterers are contracted to manage kitchens and canteens, special attention should be paid to ensure that contractors take into account and implement the benchmarks below, and that adequate reporting and monitoring mechanisms are in place. When workers can individually cook their meals, they should be provided with a space separate from the sleeping areas. Facilities must be kept in a clean and sanitary condition. In addition, canteen, kitchen, cooking and laundry floors, ceilings and walls should be made of easily cleanable materials.

### Benchmarks

1. Canteen, cooking and laundry facilities are built in adequate and easy to clean materials.
2. Canteen, cooking and laundry facilities are kept in a clean and sanitary condition.
3. If workers can cook their own meals, kitchen space is provided separate from sleeping areas.

### Laundry facilities

Providing facilities for workers to wash both work and non-work related clothes is essential for personal hygiene. The alternative is for the employer to provide a free laundry service.

### Benchmarks

1. Adequate facilities for washing and drying clothes are provided. Standards range from providing sinks or tubs with hot and cold water, cleaning soap and drying lines to providing washing machines and dryers.
2. When work clothes are used in contact with dangerous substance (for example, application of pesticide), special laundry facilities (washing machines) should be provided.

#### Additional issue

When workers are provided with facilities allowing them to individually do their laundry or cooking, it should be the responsibility of each worker to keep the facilities in a clean and sanitary condition. Nonetheless, it is the responsibility of the accommodation manager to make sure the standards are respected and to provide an adequate cleaning, disinfection and pest/vector control service when necessary.

#### Additional issue

When the employer provides family accommodation, it is best practice to provide each family with a private kitchen or the necessary cooking equipment to allow the family to cook on their own.

### Canteen and cooking facilities

Canteen and cooking facilities should provide sufficient space for preparing food and eating, as well as conform to hygiene and safety requirements.

### Benchmarks

1. Canteens have a reasonable amount of space per worker. Standards range from 1 square metre to 1.5 square metres.
2. Canteens are adequately furnished. Standards range from providing tables, benches, individual drinking cups and plates to providing special drinking fountains.
3. Places for food preparation are designed to permit good food hygiene practices, including protection against contamination between and during food preparation.
4. Kitchens are provided with facilities to maintain adequate personal hygiene including a sufficient number of washbasins designated for cleaning hands with clean, running water and materials for hygienic drying.
5. Wall surfaces adjacent to cooking areas are made of fire-resistant materials. Food preparation tables are also equipped with a smooth durable washable surface. Lastly, in order to enable easy cleaning, it is good practice that stoves are not sealed against a wall, benches and fixtures are not built into the floor, and all cupboards and other fixtures and all walls and ceilings have a smooth durable washable surface.
6. All kitchen floors, ceiling and wall surfaces adjacent to or above food preparation and cooking areas are built using durable, non-absorbent, easily cleanable, non-toxic materials.
7. Wall surfaces adjacent to cooking areas are made of fire-resistant materials. Food preparation tables are equipped with a smooth, durable, easily cleanable, non-corrosive surface made of non-toxic materials. Lastly, in order to enable easy cleaning, it is good practice that stoves are not sealed against a wall, benches and fixtures are not built into the floor, and all cupboards and other fixtures have a smooth, durable and washable surface.
8. Adequate facilities for cleaning, disinfecting and storage of cooking utensils and equipment are provided.
9. Food waste and other refuse are to be adequately deposited in sealable containers and removed from the kitchen frequently to avoid accumulation.

## F. Standards for nutrition and food safety

When cooking for a number of workers, hygiene and food safety are absolutely critical. In addition to providing safe food, providing nutritious food is important as it has a very direct impact on workers' productivity and well-being. An ILO study demonstrates that good nutrition at work leads to gains in productivity and worker morale, prevention of accidents and premature deaths and reductions in health care costs.<sup>10</sup>

## Benchmarks

1. The WHO 5 keys to safer food or an equivalent process is implemented (see Box 6 below).
2. Food provided to workers contains an appropriate level of nutritional value and takes into account religious/cultural backgrounds; different choices of food are served if workers have different cultural/religious backgrounds.
3. Food is prepared by cooks. It is also best practice that meals are planned by a trained nutritionist.

### Box 6 - Five keys to safer food

#### Keep clean

Wash your hands before handling food and often during food preparation.

Wash your hands after going to the toilet.

Wash and sanitise all surfaces and equipment used for food preparation.

Protect kitchen areas and food from insects, pests and other animals.

While most micro organisms do not cause disease, dangerous micro organisms are widely found in soil, water, animals and people. These micro organisms are carried on hands, wiping cloths and utensils, especially cutting boards and the slightest contact can transfer them to food and cause food borne diseases.

#### Separate raw and cooked

Separate raw meat, poultry and seafood from other foods.

Use separate equipment and utensils such as knives and cutting boards for handling raw foods.

Store food in containers to avoid contact between raw and prepared foods.

Raw food, especially meat, poultry and seafood, and their juices, can contain dangerous micro organisms which may be transferred onto other foods during food preparation and storage.

#### Cook thoroughly

Cook food thoroughly, especially meat, poultry, eggs and seafood.

Bring foods like soups and stews to boiling to make sure that they have reached 70°C. For meat and poultry, make sure that juices are clear, not pink. Ideally, use a thermometer.

Reheat cooked food thoroughly.

Proper cooking kills almost all dangerous micro organisms. Studies have shown that cooking food to a temperature of 70°C can help ensure it is safe for consumption. Foods that require special attention include minced meats, rolled roasts, large joints of meat and whole poultry.

#### Keep food at safe temperatures

Do not leave cooked food at room temperature for more than 2 hours.

Refrigerate promptly all cooked and perishable food (preferably below 5°C).

Keep cooked food piping hot (more than 60°C) prior to serving.

Do not store food too long even in the refrigerator.

Do not thaw frozen food at room temperature.

Micro organisms can multiply very quickly if food is stored at room temperature. By holding at temperatures below 5°C or above 60°C, the growth of micro organisms is slowed down or stopped. Some dangerous micro organisms still grow below 5°C.

#### Use safe water and raw materials

Use safe water or treat it to make it safe.

Select fresh and wholesome foods.

Choose foods processed for safety, such as pasteurised milk.

Wash fruits and vegetables, especially if eaten raw.

Do not use food beyond its expiry date.

Raw materials, including water and ice, may be contaminated with dangerous micro organisms and chemicals. Toxic chemicals may be formed in damaged and mouldy foods. Take care in selection of raw materials and implement simple measures such as washing.

**Source:** World Health Organization, *Food Safety*

[www.who.int/foodsafety/publications/consumer/en/5keys\\_en.pdf](http://www.who.int/foodsafety/publications/consumer/en/5keys_en.pdf)

10. C. Wanjek (2005), "Food at Work - Workplace solutions for malnutrition, obesity and chronic disease", International Labour Organization, Geneva.

## G. Medical facilities

Access to adequate medical facilities is important to maintain workers' health and to provide adequate responses in case of health emergency situations. The availability or level of medical facilities provided in workers' accommodation is likely to depend on the number of workers living on site, the medical facilities already existing in the neighbouring communities and the availability of transport. However, first aid must always be available on site.

### First aid facilities

Providing adequate first aid training and facilities can save lives and prevent minor injuries becoming major ones.

### Other medical facilities

Depending on the number of workers living on site and the medical services offered in the surrounding communities, it is important to provide workers with additional medical facilities. Special facilities for sick workers and medical services such as dental care, surgery, a dedicated emergency room can, for instance, be provided.

### Benchmarks

1. A number of first aid kits adequate to the number of residents are available.
2. First aid kits are adequately stocked. Where possible a 24/7 first aid service/facility is available.
3. An adequate number of staff/workers is trained to provide first aid.
4. Where possible and depending on the medical infrastructures existing in the community, other medical facilities are provided (nurse rooms, dental care, minor surgery).

### Box 7 - UK/HSE First Aid facilities

#### What should be in a first aid kit?

There is no standard list and it very much depends on the assessment of the needs in a particular workplace:

- a leaflet giving general guidance on first aid, for example HSE leaflet *Basic advice on first aid at work*
- individually wrapped sterile adhesive dressings (assorted sizes)
- two sterile eye pads
- four individually wrapped triangular bandages (preferably sterile)
- six safety pins
- six medium-sized (approximately 12 cm x 12 cm) individually wrapped sterile unmedicated wound dressings
- two large (approximately 18 cm x 18 cm) sterile individually wrapped unmedicated wound dressings
- one pair of disposable gloves.

What should be kept in the first aid room?

The room should contain essential first aid facilities and equipment. Typical examples of these are:

- a sink with hot and cold running water
- drinking water and disposable cups
- soap and paper towels
- a store for first aid materials
- foot-operated refuse containers, lined with disposable yellow clinical waste bags or a container for the safe disposal of clinical waste
- a couch with waterproof protection, clean pillows and blankets
- a chair
- a telephone or other communication equipment
- a record book for recording incidents where first aid has been given.

Source: UK Health and Safety Executive

## H. Leisure, social and telecommunication facilities

Basic leisure and social facilities are important for workers to rest and also to socialise during their free time. This is particularly true where workers' accommodation is located in remote areas far from any communities. Where workers' accommodation is located in the vicinity of a village or a town, existing leisure or social facilities can be used so long as this does not cause disruption to the access and enjoyment of local community members. But in any case, social spaces should also be provided on site. Exercise and recreational facilities will increase workers' welfare and reduce the impact of the presence of workers in the surrounding communities. In addition it is also important to provide workers with adequate means to communicate with the outside world, especially when workers' accommodation is located in a remote location or where workers live on site without their family or are migrants. Consideration of cultural attitudes is important. Provision of space for religious observance needs to be considered, taking account of the local context and potential conflicts in certain situations.

### Benchmarks

1. Basic collective social/rest spaces are provided to workers. Standards range from providing workers multi-purpose halls to providing designated areas for radio, TV, cinema.
2. Recreational facilities are provided. Standards range from providing exercise equipment to providing a library, swimming pool, tennis courts, table tennis, educational facilities.
3. Workers are provided with dedicated places for religious observance if the context warrants.
4. Workers have access to public phones at affordable/public prices (that is, not inflated).
5. Internet facilities can also be provided, particularly where large numbers of expatriates/Third Country Nationals (TCNs) are accommodated.

### Box 8 - Examples of social/leisure facilities

In Qatar there is a newly built 170-hectare complex which accommodates contractors and more than 35,000 workers for a project run by a major oil company. At the heart of this complex, the recreation area includes extensive sport facilities, a safety-training centre, an outdoor cinema and a park. The purpose of those facilities goes beyond providing adequate accommodation to the large numbers of contractors and workers on this project but is designed to provide the same level of services as a small town. The accommodation complex has a mayor, as well as a dedicated welfare team which is responsible for the workers' welfare, cultural festivals and also acts as the community's advocates.

## II. Managing workers' accommodation

Once the living facilities have been constructed and are operational, effective ongoing management of living facilities is essential. This encompasses issues such as the physical maintenance of buildings, security and consultation with residents and neighbouring communities in order to ensure the implementation of the housing standards in the long term.

### A. Management and staff

Worker camps and housing facilities should have a written management plan, including management policies or plans on health and safety, security, living conditions, workers' rights and representation, relationships with the communities and grievance processes. Part of those policies and plans can take the form of codes of conduct. The quality of the staff managing and maintaining the accommodation facilities will have a decisive impact on the level of standards which are implemented and the well-being of workers (for instance on the food safety or overall hygiene standards). It is therefore important to ensure that managers are competent and other workers are adequately skilled. The manager will be responsible for overseeing staff, for ensuring the implementation of the accommodation standards and for the implementation of the management plans. It is important the accommodation manager has the corresponding authority to do so.

If the facility is being managed by a contractor, as is often the case, the expected housing and management standards should be specified in the relevant contract, and mechanisms to ensure that those standards are implemented should be set up. As part of this process, the accommodation manager (or contractor) should have a duty to monitor the application of the accommodation standards and to report frequently on their implementation to the client.

### Benchmarks

1. There are management plans and policies especially in the field of health and safety (with emergency responses), security, workers' rights, relationships with the communities.
2. An appointed person with the adequate background and experience is in charge of managing the workers' accommodation.
3. If contractors are being used, there are clear contractual management responsibilities and monitoring and reporting requirements.
4. Depending on the size of the accommodation, there is a sufficient number of staff in charge of cleaning, cooking and of general maintenance.
5. Such staff are recruited from the local communities.
6. Staff have received basic health and safety training.
7. Persons in charge of the kitchen are trained in nutrition and food-handling and adequately supervised.

### B. Charging fees for accommodation and services

Charging fees for the accommodation or the services provided to workers such as food or transport should be avoided where workers do not have the choice to live or eat anywhere else, or if deemed unavoidable, should take into account the specific nature of workers' accommodation. Any charges should be transparent, discussed during recruitment and specified in workers' contracts. Any such charges should still leave workers with sufficient income and should never lead to a worker becoming indebted to an employer.

### Benchmarks

1. When fees are charged, workers are provided with clear information and a detailed description of all payments made such as rent, deposit and other fees.
2. When company housing is considered to be part of workers' wages, it is best practice that workers are provided with an employment contract clearly specifying housing arrangements and regulations, in particular rules concerning payments and fees, facilities and services offered and rules of notice.
3. When fees are charged, the renting arrangements are fair and do not cost the worker more than a small proportion of income and never include a speculative profit.
4. Food and other services are free or are reasonably priced, never above the local market price.
5. The provision of accommodation or other services by employers as a payment for work is prohibited.

#### Additional issue

To avoid that fair renting arrangements turn into unfair ones, any deposit of advance should be set at a reasonable level and it is best practice that renting prices include a fixed fee covering the water needed and the use of the energy required to the functioning of the heating/cooling/ventilation/cooking systems. However, in such cases it might be necessary to raise workers' awareness to ensure that workers will use the facilities responsibly, particularly in areas where water is scarce.

### C. Health and safety on site

The company or body in charge of managing the workers' accommodation should have the prime responsibility for ensuring workers' physical well-being and integrity. This involves making sure that the facilities are kept in good condition (ensuring that sanitary standards or fire regulations are respected for instance) and that adequate health and safety plans and standards are designed and implemented.

### Benchmarks

1. Health and safety management plans including electrical, mechanical, structural and food safety have been carefully designed and are implemented.
2. The person in charge of managing the accommodation has a specific duty to report to the health authorities the outbreak of any contagious diseases, food poisoning and other important casualties.
3. An adequate number of staff/workers is trained to provide first aid.
4. A specific fire safety plan is prepared, including training of fire wardens, periodic testing and monitoring of fire safety equipment and periodic drills.
5. Guidance on the detrimental effects of the abuse of alcohol and drugs and other potentially harmful substances and the risk and concerns relating to HIV/AIDS and of other health risk-related activities is provided to workers. It is best practice to develop a clear policy on this issue.
6. Workers have access to adequate preventive measures such as contraception (condoms in particular) and mosquito nets.
7. Workers have easy access to medical facilities and medical staff. Where possible, female doctors/nurses should be available for female workers.
8. Emergency plans on health and fire safety are prepared. Depending on the local context, additional emergency plans are prepared as needed to handle specific occurrences (earthquakes, floods, tornadoes).

### D. Security of workers' accommodation

Ensuring the security of workers and their property on the accommodation site is of key importance. To this end, a security plan must be carefully designed including appropriate measures to protect workers against theft and attacks. Policies regarding the use of force (force can only be used for preventive and defensive purposes in proportion to the nature and the extent of the threat) should also be

carefully designed. To implement those plans, it may be necessary to contract security services or to recruit one or several staff whose main responsibility is to provide security to safeguard workers and property. Before making any security arrangements, it is necessary to assess the risks of such arrangements to those within and outside the workers' accommodation and to respect best international practices, including IFC PS4 and EBRD PR4 and applicable law.<sup>11</sup> Particular attention should be paid to the safety and security of women workers.

### Benchmarks

1. A security plan including clear measures to protect workers against theft and attack is implemented.
2. A security plan including clear policies on the use of force has been carefully designed and is implemented.
3. Security staff have been checked to ensure that they have not been implicated in any previous crimes or abuses. Where appropriate, security staff from both genders are recruited.
4. Security staff have a clear mandate and have received clear instruction about their duties and responsibilities, in particular their duties not to harass, intimidate, discipline or discriminate against workers.
5. Security staff have received adequate training in dealing with domestic violence and the use of force.
6. Security staff have a good understanding about the importance of respecting workers' rights and the rights of the communities.
7. Body searches are only allowed in specific circumstances and are performed by specially trained security staff using the least-intrusive means possible. Pat down searches on female workers can only be performed by female security staff.
8. Security staff adopt an appropriate conduct towards workers and communities.
9. Workers and members of the surrounding communities have specific means to raise concerns about security arrangement and staff.

11. See for instance the Voluntary Principles on Security and Human Rights. [www.voluntaryprinciples.org/principles](http://www.voluntaryprinciples.org/principles)

## E. Workers' rights, rules and regulations on workers' accommodation

Freedoms and human rights of workers should be recognised and respected within their living quarters just as within the working environment. House rules and regulations should be reasonable and non-discriminatory. It is best practice that workers' representatives are consulted about those rules. House rules and regulations should not prevent workers from exercising their basic rights. In particular, workers' freedom of movement needs to be preserved if they are not to become effectively "trapped". To this end it is good practice to provide workers with 24/7 access to the accommodation and free transport services to and from the surrounding communities. Any restriction to this freedom of movement should be limited and duly justified. Penalties for breaking the rules should be proportional and implemented through a proper procedure allowing workers to defend themselves and to challenge the decision taken. The relationship between continuing employment and compliance with the rules of the workers' accommodation should be clear and particular attention should be paid to ensure that housing rules do not create indirect limitation of the right to freedom of association. Best practice might include a code of conduct relating to the accommodation to be signed together with the contract of employment.

### Box 9 - Dole housing plantation regulation in Costa Rica

In every plantation there is an internal accommodation regulation that every worker is required to sign together with his/her employment contract. That document describes the behaviour which is expected from workers at all times and basic rules such as the prohibition of alcohol and the interdiction to make noise after a certain time at night. In case there is any problem concerning the application of those internal rules, a set of disciplinary procedures which have been designed with the workers' representatives can be enforced. Workers are absolutely free to enter or leave the site and do not have any restrictions in relation to accessing their living quarters. Families are not allowed in the living quarters unless they have been registered for a visit.

## Benchmarks

1. Restriction of workers' freedom of movement to and from the site is limited and duly justified. It is good practice to provide workers 24/7 access to the accommodation site. Any restrictions based on security reasons should be balanced by the necessity to respect workers' freedom of movement.
2. Where possible, an adequate transport system to surrounding communities is provided. It is good practice to provide workers with free transportation to and from local communities.
3. Withholding workers' ID papers is prohibited.
4. Freedom of association is expressly respected. Provisions restricting workers' rights on site should take into account the direct and indirect effect on workers' freedom of association. It is best practice to provide trade union representatives access to workers in the accommodation site.
5. Workers' gender and religious, cultural and social backgrounds are respected. In particular, workers should be provided with the possibility of celebrating religious holidays and observances.
6. Workers are made aware of their rights and obligations and are provided with a copy of the internal workers' accommodation rules, procedures and sanction mechanisms in a language or through a media which they understand.
7. Housing regulations, including those relating to allocation of housing, should be non-discriminatory. Any justifiable discriminatory rules – for example all-male dormitories – should be strictly limited to the rules which are necessary to ensure the smooth running of the worker camp and to maintain a good relationship with the surrounding communities.
8. Where possible, visitor access should be allowed.
9. Decisions should be made on whether to prohibit alcohol, tobacco and third party access or not from the camp and the relevant rules should be clearly communicated to all residents and workers.
10. A fair and non-discriminatory procedure exists to implement disciplinary procedures including the right of workers to defend themselves (see also next section).

## F. Consultation and grievance mechanisms

All residents should be made aware of any rules governing the accommodation and the consequences of breaking such rules. Processes that allow for consultation between site management and the resident workers will assist in the smooth running of an accommodation site. These may include a dormitory or camp committee as well as formal processes that allow workers to lodge any grievances about their accommodation.

### Benchmarks

1. Mechanisms for workers' consultation have been designed and implemented. It is best practice to set up a review committee which includes representatives elected by workers.
2. Processes and mechanisms for workers to articulate their grievances are provided to workers. Such mechanisms are in accordance with PS2/PR2.
3. Workers subjected to disciplinary proceedings arising from behaviour in the accommodation should have access to a fair and transparent hearing with the possibility to contest decisions and refer the dispute to independent arbitration or relevant public authorities.
4. In case conflicts between workers themselves or between workers and staff break out, workers have the possibility of easily accessing a fair conflict resolution mechanism.
5. In cases where more serious offences occur, including serious physical or mental abuse, there are mechanisms to ensure full cooperation with the police authority (where adequate).

#### Additional issue

Alcohol is a complex issue and requires a very clear policy from the workers' accommodation management. If a non-alcohol policy is taken, special attention should be paid to clearly communicate the interdiction, how it applies and the consequences for breaching this rule. Special attention should also be paid to enforce it adequately.

## G. Management of community relations

Workers' living facilities have various ongoing impacts on adjacent communities. In order to manage these, it is good practice to design a thorough community relations management plan. This plan will contain the processes to implement the findings of the preliminary community impact assessment and to identify, manage, mitigate or enhance ongoing impacts of the workers' accommodation on the surrounding communities.

Issues to be taken into consideration include:

- community development – impact of workers' camp on local employment, possibility of enhancing local employment and income generation through local sourcing of goods and services
- community needs – ways to identify and address community needs related to the arrival of specific infrastructures such as telecommunications, water sanitation, roads, health care, education, housing
- community health and safety – addressing and reducing the risk in the increase in communicable diseases, corruption, trade in illegal substances such as drugs, alcohol (in the Muslim context), petty crimes and other sorts of violence, road accidents
- community social and cultural cohesion – ways to mitigate the impact of the presence of large numbers of foreign workers, often males, with different cultural and religious background, ways to mitigate the possible shift in social, economic and political structures due to changes in access to income generation opportunities.

### Benchmarks

1. Community relations plans addressing issues around community development, community needs, community health and safety and community social and cultural cohesion have been designed and implemented.
2. Community relations plans include the setting up of a liaison mechanism allowing a constant exchange of information and consultation with the local communities in order to identify and respond quickly to any problems and maintain good working relationships.
3. A senior manager is in charge of implementing the community relations management plan and liaising with the community.

4. The impacts of workers' accommodation on local communities are periodically reviewed, mitigated or enhanced.
5. Community representatives are provided with an easy means to voice their opinions and to lodge complaints.
6. There is a transparent and efficient process for dealing with community grievances, in accordance with PS1/PR10.

**Box 10 - Examples of community relations management**

**Community consultation in the Baku-Tbilisi-Ceyhan (BTC) pipeline**

The BTC pipeline's Environment and Social Management Plans incorporated a Worker Camp Management Plan to be implemented by the construction contractor. As part of ongoing community liaison over the project as a whole, community liaison officers were appointed for worker camps who were responsible for meeting regularly with communities, identifying issues and addressing community concerns. A particular responsibility was to review HR records and disciplinary logs at worker camps to assess that rules were being implemented effectively and that any community liaison after any incidents was effective.

## ANNEX I: CHECKLIST ON WORKERS' ACCOMMODATION

	Y	N	N/A	Comments
<b>General regulatory framework</b>				
Have the international/national/local regulatory frameworks been reviewed?				
Are mandatory provisions on workers' accommodation identified?				
<b>Assessing the need for workers' accommodation</b>				
<b>Availability of the workforce</b>				
Has there been an assessment of workers' availability in the neighbouring communities?				
Has there been an assessment of the skills and competencies of the local workforce and how do those skills and competencies fit the project's need?				
Has there been an assessment of the possibility of training a local workforce in order to fulfil the project's needs?				
<b>Availability of housing</b>				
Has there been a comprehensive assessment of the different type of housing available in the surrounding communities prior to building any workers' accommodation?				
For a larger project: is that assessment included in the Environmental and Social Impact Assessment?				
Has there been an assessment of the impact on the communities of using existing housing opportunities?				
Have measures to mitigate adverse impacts on the local housing market been identified and included in the Environmental and Social Action Plan (ESAP) or other relevant action plan?				

Y	N	N/A	Comments
---	---	-----	----------

### Assessing impacts of workers' accommodation on communities

Has a community impact assessment been carried out as part of the Environmental and Social Assessment of the overall project with a view to mitigate the negative impacts of the workers' accommodation on the surrounding communities and to enhance the positive ones?				
Have the potential health and safety impacts and consequences of land acquisition and involuntary resettlement occurring during the construction phase of the workers' accommodation been included in the assessment?				
Have the impacts of workers' accommodation on community infrastructures, services and facilities been included in the assessment?				
Have the impacts on local community's businesses and local employment been included in the assessment?				
Have general impacts of workers' accommodation on communities' health, (notably the increased risk of road accidents and of communicable diseases), and community social cohesion been included in the assessment?				
Does the assessment include appropriate mitigation measures to address any adverse impacts identified?				

### Types of workers' accommodation

Has consideration been given to provision of family accommodation?				
Are individual accommodations comprising bedrooms, sanitary and cooking facilities provided as part of the family accommodation?				
Are adequate nursery/school facilities provided?				
Is special attention paid to providing adequate safety for children?				

Y	N	N/A	Comments
---	---	-----	----------

## Standards for workers' accommodation

### National/local standards

Have the relevant national/local regulations been identified and implemented?

--	--	--	--

### General living facilities

Is the location of the facilities designed to avoid flooding or other natural hazards?

--	--	--	--

Are the living facilities located within a reasonable distance from the worksite?

--	--	--	--

Is transport provided to worksite safe and free?

--	--	--	--

Are the living facilities built using adequate materials, kept in good repair and kept clean and free from rubbish and other refuse?

--	--	--	--

### Drainage

Is the site adequately drained?

--	--	--	--

### Heating, air conditioning, ventilation and light

Depending on climate are living facilities provided with adequate heating, ventilation, air conditioning and light systems including emergency lighting?

--	--	--	--

### Water

Do workers have easy access to a supply of clean/potable water in adequate quantities?

--	--	--	--

Does the quality of the water comply with national/local requirements or WHO standards?

--	--	--	--

Are tanks used for the storage of drinking water constructed and covered to prevent water stored therein from becoming polluted or contaminated?

--	--	--	--

Is the quality of the drinking water regularly monitored?

--	--	--	--

Y	N	N/A	Comments
---	---	-----	----------

**Wastewater and solid waste**

Are wastewater, sewage, food and any other waste materials adequately discharged in compliance with local or World Bank standards and without causing any significant impacts on camp residents, the environment or surrounding communities?				
Are specific containers for rubbish collection provided and emptied on a regular basis?				
Are pest extermination, vector control and disinfection undertaken throughout the living facilities?				

**Rooms/dormitories facilities**

Are the rooms/dormitories kept in good condition?				
Are the rooms/dormitories aired and cleaned at regular intervals?				
Are the rooms/dormitories built with easily cleanable flooring material?				
Are the rooms/dormitories and sanitary facilities located in the same buildings?				
Are residents provided with enough space?				
Is the ceiling height high enough?				
Is the number of workers sharing the same room/dormitory minimised?				
Are the doors and windows lockable and provided with mosquito screens when necessary?				
Are mobile partitions or curtains provided?				
Is suitable furniture such as table, chair, mirror, bedside light provided for every worker?				
Are separate sleeping areas provided for men and women?				

	Y	N	N/A	Comments
<b>Bed arrangements and storage facilities</b>				
Is there a separate bed provided for every worker?				
Is the practice of “hot-bedding” prohibited?				
Is there a minimum space of 1 metre between beds?				
Is the use of double deck bunks minimised?				
When double deck bunks are in use, is there enough clear space between the lower and upper bunk of the bed?				
Are triple deck bunks prohibited?				
Are workers provided with comfortable mattresses, pillows and clean bed linens?				
Are the bed linen washed frequently and applied with adequate repellents and disinfectants (where conditions warrant)?				
Are adequate facilities for the storage of personal belongings provided?				
Are there separate storages for work clothes and PPE and depending on condition, drying/airing areas?				
<b>Sanitary and toilet facilities</b>				
Are sanitary and toilet facilities constructed from materials that are easily cleanable?				
Are sanitary and toilet facilities cleaned frequently and kept in working condition?				
Are toilets, showers/bathrooms and other sanitary facilities designed to provide workers with adequate privacy including ceiling to floor partitions and lockable doors?				
Are separate sanitary and toilet facilities provided for men and women?				

	Y	N	N/A	Comments
<b>Toilet facilities</b>				
Is there an adequate number of toilets and urinals?				
Are toilet facilities conveniently located and easily accessible?				
<b>Showers/bathrooms and other sanitary facilities</b>				
Is the shower flooring made of anti-slip hard washable materials?				
Is there an adequate number of hand wash basins and showers/bathrooms facilities provided?				
Are the sanitary facilities conveniently located?				
Are shower facilities provided with an adequate supply of cold and hot running water?				
<b>Canteen, cooking and laundry facilities</b>				
Are canteen, cooking and laundry facilities built with adequate and easy to clean materials?				
Are the canteen, cooking and laundry facilities kept in clean and sanitary condition?				
If workers cook their own meals, is kitchen space provided separately from the sleeping areas?				
<b>Laundry facilities</b>				
Are adequate facilities for washing and drying clothes provided?				
<b>Canteen and cooking facilities</b>				
Are workers provided with enough space in the canteen?				
Are canteens adequately furnished?				
Are kitchens provided with the facilities to maintain adequate personal hygiene?				

	Y	N	N/A	Comments
Are places for food preparation adequately ventilated and equipped?				
Are kitchen floor, ceiling and wall surfaces adjacent to or above food preparation and cooking areas built in non-absorbent, durable, non-toxic, easily cleanable materials?				
Are wall surfaces adjacent to cooking areas made of fire-resistant materials and food preparation tables equipped with a smooth, durable, non-corrosive, non-toxic, washable surface?				
Are adequate facilities for cleaning, disinfecting and storage of cooking utensils and equipment provided?				
Are there adequate sealable containers to deposit food waste and other refuse? Is refuse frequently removed from the kitchen to avoid accumulation?				
<b>Standards for nutrition and food safety</b>				
Is there a special sanitary process such as the WHO "5 keys to safer food" implemented in relation to food safety?				
Does the food provided contain appropriate nutritional value?				
Does the food provided take into account workers' religious/cultural backgrounds?				
<b>Medical facilities</b>				
Are first aid kits provided in adequate numbers?				
Are first-aid kits adequately stocked?				
Is there an adequate number of staff/workers trained to provide first aid?				
Are there any other medical facilities/services provided on site? If not, why?				
<b>Leisure, social and telecommunications facilities</b>				
Are basic social collective spaces and adequate recreational areas provided to workers?				
Are workers provided with dedicated places for religious observance?				
Can workers access a telephone at an affordable/public price?				
Are workers provided with access to internet facilities?				

Y	N	N/A	Comments
---	---	-----	----------

## Managing workers' accommodation

### Management and staff

Are there carefully designed worker camp management plans and policies especially in the field of health and safety (including emergency responses), security, workers' rights and relationships with the communities?				
Where contractors are used, have they clear contractual management responsibilities and duty to report?				
Does the person appointed to manage the accommodation have the required background, competency and experience to conduct his mission and is he/she provided with the adequate responsibility and authority to do so?				
Is there enough staff to ensure the adequate implementation of housing standards (cleaning, cooking and security in particular)?				
Are staff members recruited from surrounding communities?				
Have the staff received basic health and safety training?				
Are the persons in charge of the kitchen particularly trained in nutrition and food handling and adequately supervised?				

### Charging fees for accommodation and services

Are the renting arrangements fair and transparent?				
Are workers provided with adequate information about payment made?				
Where appropriate, are renting arrangements and regulations clearly included in workers' employment contracts?				
Are food and other services provided for free or reasonably priced, that is, not above the local market price?				
Is the payment in kind for accommodation and services prohibited?				

	Y	N	N/A	Comments
<b>Health and safety on site</b>				
Have health and safety management plans including electrical, mechanical, structural and food safety been designed and implemented?				
Has the accommodation manager a duty to report to the health authority specific diseases, food poisoning or casualties?				
Is there an adequate number of staff/workers trained in providing first aid?				
Has a specific and adequate fire safety management plan been designed and implemented?				
Is guidance on alcohol, drug and HIV/AIDS and other health risk-related activities provided to workers?				
Are contraception measures (condoms in particular) and mosquito nets (where relevant) provided to workers?				
Do workers have an easy access to medical facilities and medical staff, including female doctors/nurses where appropriate?				
Have emergency plans on health and fire safety been prepared?				
Depending on circumstances, have specific emergency plans (earthquakes, floods, tornadoes) been prepared?				
<b>Security on workers' accommodation</b>				
Has a security plan including clear measures to protect workers against theft and attack been designed and implemented?				
Has a security plan including clear provisions on the use of force been designed and implemented?				
Have the backgrounds of security staff been checked for previous crimes or abuses?				
Has the recruitment of security staff from both genders been considered?				
Have security staff received clear instruction about their duty and responsibility?				
Have security staff been adequately trained in dealing with domestic violence and the use of force?				

	Y	N	N/A	Comments
Are body searches only performed in exceptional circumstances by specifically trained security staff of both genders?				
Do security staff have a good understanding about the importance of respecting workers' rights and the rights of the surrounding communities and adopt appropriate conduct?				
Do workers and communities have specific means to raise concerns about security arrangements and staff?				
<b>Workers' rights, rules and regulations on workers' accommodation</b>				
Are limitations on workers' freedom of movement limited and justified?				
Is an adequate transport system to the surrounding communities provided?				
Is the practice of withholding workers' ID papers prohibited?				
Is freedom of association expressly respected?				
Are workers' religious, cultural and social backgrounds respected?				
Are workers made aware of their rights and obligations and provided with a copy of the accommodations' internal rules, procedures and sanction mechanisms in a language or through a media they understand?				
Are house regulations non discriminatory, fair and reasonable?				
Are regulations on alcohol, tobacco and third parties' access to the camp clear and communicated to workers?				
Is a fair and non-discriminatory procedure to implement disciplinary procedures, including the right for workers to defend themselves, set up?				

	Y	N	N/A	Comments
<b>Consultation and grievance mechanisms</b>				
Have mechanisms for workers' consultation been designed and implemented?				
Are workers provided with processes and mechanisms to articulate their grievances in accordance with PS2/PR2?				
Have workers subjected to disciplinary proceedings arising from conduct in the accommodation had access to a fair and transparent hearing with the possibility to appeal the decision?				
Are there fair conflict resolution mechanisms in place?				
In cases where serious offences occur, are there mechanisms to ensure full cooperation with police authorities?				
<b>Management of community relations</b>				
Have community relation management plans addressing issues around community development, community needs, community health and safety and community social and cultural cohesion been designed and implemented?				
Do community relation management plans include the setting up of liaison mechanisms to allow a constant exchange of information and consultation of the surrounding communities?				
Is there a senior manager in charge of implementing the community relation management plan?				
Is there a senior manager in charge of liaising with the surrounding communities?				
Are the impacts generated by workers' accommodation periodically reviewed, mitigated or enhanced?				
Are community representatives provided with easy means to voice their opinions and lodge complaints?				
Is there a transparent and efficient process for dealing with community grievances, in accordance with PS1/PR10?				

## Acknowledgements

“Workers’ accommodation: processes and standards” is a joint publication of the EBRD and IFC, who co-commissioned Ergon Associates to research and draft the document.

### **EBRD team:**

Environment and Sustainability Department: Alke Schmidt,  
Michaela Bergman, Debbie Cousins, Frederic Giovannetti, Jeff Jeter  
Editorial and Desktop Publishing: Natasha Treloar, Bryan Whitford

### **IFC team:**

Environment and Social Development Department: Larissa Luy, Sofie Fleischer Michaelsen,  
Diana Baird, Wenlei Zhou, Piotr Mazurkiewicz, Robert Gerrits.  
Editorial: Anna Hidalgo

### **Ergon Associates team:**

Jean-Baptiste Andrieu, Stuart Bell, Amber Frugte, Steve Gibbons

This version of the Guidance Note benefited from valuable input from a number of external parties including Mary Boomgard (OPIC), Melinda Buckland (BHP Billiton), Kerry Connor (Bechtel), Alan Fine (Anglo Gold Ashanti), George Jaksch (Chiquita), Birgitte B. Nielsen (IFU), Roberto Vega (Dole), Karin Verstralen (FMO), Petter Vilsted (Norfund) and Elizabeth Wild (BP). We would also like to thank all companies that agreed to contribute practical examples.

### **For more information please contact**

EBRD Environment and Sustainability Department, European Bank for Reconstruction and Development (EBRD) One Exchange Square,  
London EC2A 2JN United Kingdom  
Tel: +44 20 7338 6000  
Email: [environmentalsocial@ebrd.com](mailto:environmentalsocial@ebrd.com)

IFC Environment and Social Development Department: International Finance Corporation, 2121 Pennsylvania Ave. NW,  
Washington, DC 20433, United States  
Tel: +1 (202) 473 1000 Fax: +1 (202) 974 4349  
Email: [asksustainability@ifc.org](mailto:asksustainability@ifc.org)

© European Bank for Reconstruction and Development and International Finance Corporation, 2009  
European Bank for Reconstruction and Development  
One Exchange Square London EC2A 2JN United Kingdom  
Tel: +44 20 7338 6000 Fax: +44 20 7338 6100 SWIFT: EBRDGB2L

The material in this publication is copyrighted. IFC and the EBRD encourage the dissemination of the content for educational purposes. Content from this publication may be used freely without prior permission, provided that clear attribution is given to IFC and the EBRD and that content is not used for commercial purposes. If you do wish to use it for commercial purposes, please contact the EBRD address above for permission.



# APPENDIX

## **4-1** *INCIDENT FORM TEMPLATE*



FOR BANK AND BORROWER USE

## EXTRACT FOR OFFICIAL USE ONLY

### ANNEX 2a: Incident Form (for all incident types except SEA/SH and Discrimination/Violence on the basis of SOGI)

## Incident Form

### Part A: To be completed by TTL

A1: Project Details		
Project ID:	Project Name:	ADM TTL Name:
ADM Environment Spec. Name:	ADM Social Development Spec. Name:	# Prior ESIRT Notifications:
PIU Name:	PIU Rep.:	Date of Form Completed:
Country of Incident:	City of Incident:	Incident Location:
Financing/Lending Instrument:		
A2: Project Background (Summary)		
A3: Project Implementation Arrangements (Summary)		
<p><b>Form of Construction Contract (tick those that apply):</b>            N/A <input type="checkbox"/>; Works <input type="checkbox"/>; Underground Works <input type="checkbox"/>; Works Design and Build <input type="checkbox"/>; Works Design, Build and Operate <input type="checkbox"/>;            Works EPC/Turnkey <input type="checkbox"/>; Works Output and Performance Based <input type="checkbox"/>; Small works <input type="checkbox"/>; Plant <input type="checkbox"/>; Goods <input type="checkbox"/>; Consulting Services <input type="checkbox"/>;            Non-Consulting Services <input type="checkbox"/>; Other ..... <input type="checkbox"/>            International Competitive Procurement <input type="checkbox"/>; National Competitive Procurement <input type="checkbox"/>;            Prior Review <input type="checkbox"/>; Post Review <input type="checkbox"/></p>		

## Part B: To be completed by Borrower within 24 hours

B1: Incident Details			
Date of Incident:	Time:	Date Reported to PIU:	Date Reported to WB:
Reported to PIU by:	Reported to WB by:	Notification Type: Email/'phone call/media notice/other	
Trading Name of Main Contractor:		Trading Name of Subcontractor:	

B2: Type of incident (please check all that apply) <sup>1</sup>
Fatality <input type="checkbox"/> Lost Time Injury <input type="checkbox"/> Displacement Without Due Process <input type="checkbox"/> Child Labor <input type="checkbox"/> Acts of Violence/Protest <input type="checkbox"/> Disease Outbreaks <input type="checkbox"/> Forced Labor <input type="checkbox"/> Unexpected impacts on heritage resources <input type="checkbox"/> Unexpected impacts on biodiversity resources <input type="checkbox"/> Environmental pollution incident <input type="checkbox"/> Dam failure <input type="checkbox"/> Other <input type="checkbox"/>

See Annex for definitions

B3: Description/Narrative of Incident
<p><i>Please replace text in italics with brief description, noting for example:</i></p> <ol style="list-style-type: none"> <li><i>I. What is the incident?</i></li> <li><i>II. What were the conditions or circumstances under which the incident occurred (if known)?</i></li> <li><i>III. Are the basic facts of the incident clear and uncontested, or are there conflicting versions? What are those versions?</i></li> <li><i>IV. Is the incident still ongoing or is it contained?</i></li> <li><i>V. Have any relevant authorities been informed?</i></li> </ol>

B4: Actions taken to contain the incident			
Short Description of Action	Responsible Party	Expected Date	Status

**For incidents involving a contractor:**  
 Have the works been suspended (for example, under Contract GCC7.6 or GCC8.9 of Works)? Yes ; No ;  
 Please attach a copy of the instruction suspending the works.

B5: What support has been provided to affected people

## Part C: To be completed by Borrower (following investigation)

### C1: Investigation Findings

Please replace text in italics with findings, noting for example:

- I. *where and when the incident took place*
- II. *who was involved, and how many people/households were affected*
- III. *what happened and what conditions and actions influenced the incident*
- IV. *what were the expected working procedures and were they followed*
- V. *did the organization or arrangement of the work influence the incident*
- VI. *were there adequate training/competent persons for the job, and was necessary and suitable equipment available*
- VII. *what were the underlying causes; where there any absent risk control measures or any system failures*

### C2: Corrective Actions from the investigation to be implemented (to be fully described in Corrective Action Plan)

Action	Responsible Party	Expected Date

## Part C cont.: To be completed by Borrower (following investigation)

**C3a: Fatality/Lost time Injury information**

Cause of fatality/injury for worker or member of the public (please check all that apply):

1. Caught in or between objects  2. Struck by falling objects  3. Stepping on, striking against, or struck by objects

4. Drowning  5. Chemical, biochemical, material exposure  6. Falls, trips, slips  7. Fire & explosion

8. Electrocution  9. Homicide  10. Medical Issue  11. Suicide  12. Others

*Vehicle Traffic:* 13. Project Vehicle Work Travel  14. Non-project Vehicle Work Travel  15. Project Vehicle Commuting

16. Non-project Vehicle Commuting  17. Vehicle Traffic Accident (Members of Public Only)

Name	Age/DOB	Date of Death/Injury	Gender	Nationality	Cause of Fatality/Injury	Worker (Employer)/Public

**C3b: Financial Support/Compensation Types (To be fully described in Corrective Action Plan template)**

1. Contractor Direct  2. Contractor Insurance  3. Workman's Compensation/National Insurance

4. Court Determined Judicial Process  5. Other  6. No Compensation Required

Name	Compensation Type	Amount (US\$)	Responsible Party

**C4: Supplementary Narrative**

**For incidents involving a contractor:**  
 Have the works been suspended in part or whole (for example, while corrective actions are put in place under Contract GCC7.6 or 8.9 of Works)? Yes ; No ;  
**Please attach a copy of the instruction suspending the works.**

END

# APPENDIX

## **5-1** *GENERAL ENVIRONMENTAL MANAGEMENT CONDITIONS FOR CONSTRUCTION CONTRACTS*





## General Environmental Management Conditions for Construction Contracts

### General

1. In addition to these general conditions, the Contractor shall comply with any specific Environmental Management Plan (EMP) or Environmental and Social Management Plan (ESMP) for the works he is responsible for. The Contractor shall inform himself about such an EMP, and prepare his work strategy and plan to fully take into account relevant provisions of that EMP. If the Contractor fails to implement the approved EMP after written instruction by the Supervising Engineer (SE) to fulfill his obligation within the requested time, the Owner reserves the right to arrange through the SE for execution of the missing action by a third party on account of the Contractor.
2. Notwithstanding the Contractor's obligation under the above clause, the Contractor shall implement all measures necessary to avoid undesirable adverse environmental and social impacts wherever possible, restore work sites to acceptable standards, and abide by any environmental performance requirements specified in an EMP. In general these measures shall include but not be limited to:
  - (a) Minimize the effect of dust on the surrounding environment resulting from earth mixing sites, asphalt mixing sites, dispersing coal ashes, vibrating equipment, temporary access roads, etc. to ensure safety, health and the protection of workers and communities living in the vicinity dust producing activities.
  - (b) Ensure that noise levels emanating from machinery, vehicles and noisy construction activities (e.g. excavation, blasting) are kept at a minimum for the safety, health and protection of workers within the vicinity of high noise levels and nearby communities.
  - (c) Ensure that existing water flow regimes in rivers, streams and other natural or irrigation channels is maintained and/or re-established where they are disrupted due to works being carried out.
  - (d) Prevent bitumen, oils, lubricants and waste water used or produced during the execution of works from entering into rivers, streams, irrigation channels and other natural water bodies/reservoirs, and also ensure that stagnant water in uncovered borrow pits is treated in the best way to avoid creating possible breeding grounds for mosquitoes.
  - (e) Prevent and minimize the impacts of quarrying, earth borrowing, piling and building of temporary construction camps and access roads on the biophysical environment including protected areas and arable lands; local communities and their settlements. In as much as possible restore/rehabilitate all sites to acceptable standards.
  - (f) Upon discovery of ancient heritage, relics or anything that might or believed to be of archeological or historical importance during the execution of works, immediately report such findings to the SE so that the appropriate authorities may be expeditiously contacted for fulfillment of the measures aimed at protecting such historical or archaeological resources.
  - (g) Discourage construction workers from engaging in the exploitation of natural resources such as hunting, fishing, collection of forest products or any other activity that might have a negative impact on the social and economic welfare of the local communities.
  - (h) Implement soil erosion control measures in order to avoid surface run off and prevents siltation, etc.
  - (i) Ensure that garbage, sanitation and drinking water facilities are provided in construction workers camps.
  - (j) Ensure that, in as much as possible, local materials are used to avoid importation of foreign material and long distance transportation.
  - (k) Ensure public safety, and meet traffic safety requirements for the operation of work to avoid accidents.
3. The Contractor shall indicate the period within which he/she shall maintain status on site after completion of civil works to ensure that significant adverse impacts arising from such works have been appropriately addressed.

4. The Contractor shall adhere to the proposed activity implementation schedule and the monitoring plan / strategy to ensure effective feedback of monitoring information to project management so that impact management can be implemented properly, and if necessary, adapt to changing and unforeseen conditions.
5. Besides the regular inspection of the sites by the SE for adherence to the contract conditions and specifications, the Owner may appoint an Inspector to oversee the compliance with these environmental conditions and any proposed mitigation measures. State environmental authorities may carry out similar inspection duties. In all cases, as directed by the SE, the Contractor shall comply with directives from such inspectors to implement measures required to ensure the adequacy rehabilitation measures carried out on the bio-physical environment and compensation for socio-economic disruption resulting from implementation of any works.

### **Worksite/Campsite Waste Management**

6. All vessels (drums, containers, bags, etc.) containing oil/fuel/surfacing materials and other hazardous chemicals shall be banded in order to contain spillage. All waste containers, litter and any other waste generated during the construction shall be collected and disposed off at designated disposal sites in line with applicable government waste management regulations.
7. All drainage and effluent from storage areas, workshops and camp sites shall be captured and treated before being discharged into the drainage system in line with applicable government water pollution control regulations.
8. Used oil from maintenance shall be collected and disposed off appropriately at designated sites or be re-used or sold for re-use locally.
9. Entry of runoff to the site shall be restricted by constructing diversion channels or holding structures such as banks, drains, dams, etc. to reduce the potential of soil erosion and water pollution.
10. Construction waste shall not be left in stockpiles along the road, but removed and reused or disposed of on a daily basis.
11. If disposal sites for clean spoil are necessary, they shall be located in areas, approved by the SE, of low land use value and where they will not result in material being easily washed into drainage channels. Whenever possible, spoil materials should be placed in low-lying areas and should be compacted and planted with species indigenous to the locality.

### **Material Excavation and Deposit**

12. The Contractor shall obtain appropriate licenses/permits from relevant authorities to operate quarries or borrow areas.
13. The location of quarries and borrow areas shall be subject to approval by relevant local and national authorities, including traditional authorities if the land on which the quarry or borrow areas fall in traditional land.
14. New extraction sites:
  - a) Shall not be located in the vicinity of settlement areas, cultural sites, wetlands or any other valued ecosystem component, or on high or steep ground or in areas of high scenic value, and shall not be located less than 1km from such areas.
  - b) Shall not be located adjacent to stream channels wherever possible to avoid siltation of river channels. Where they are located near water sources, borrow pits and perimeter drains shall surround quarry sites.
  - c) Shall not be located in archaeological areas. Excavations in the vicinity of such areas shall proceed with great care and shall be done in the presence of government authorities having a mandate for their protection.

- d) Shall not be located in forest reserves. However, where there are no other alternatives, permission shall be obtained from the appropriate authorities and an environmental impact study shall be conducted.
  - e) Shall be easily rehabilitated. Areas with minimal vegetation cover such as flat and bare ground, or areas covered with grass only or covered with shrubs less than 1.5m in height, are preferred.
  - f) Shall have clearly demarcated and marked boundaries to minimize vegetation clearing.
15. Vegetation clearing shall be restricted to the area required for safe operation of construction work. Vegetation clearing shall not be done more than two months in advance of operations.
  16. Stockpile areas shall be located in areas where trees can act as buffers to prevent dust pollution. Perimeter drains shall be built around stockpile areas. Sediment and other pollutant traps shall be located at drainage exits from workings.
  17. The Contractor shall deposit any excess material in accordance with the principles of these general conditions, and any applicable EMP, in areas approved by local authorities and/or the SE.
  18. Areas for depositing hazardous materials such as contaminated liquid and solid materials shall be approved by the SE and appropriate local and/or national authorities before the commencement of work. Use of existing, approved sites shall be preferred over the establishment of new sites.

#### **Rehabilitation and Soil Erosion Prevention**

19. To the extent practicable, the Contractor shall rehabilitate the site progressively so that the rate of rehabilitation is similar to the rate of construction.
20. Always remove and retain topsoil for subsequent rehabilitation. Soils shall not be stripped when they are wet as this can lead to soil compaction and loss of structure.
21. Topsoil shall not be stored in large heaps. Low mounds of no more than 1 to 2m high are recommended.
22. Re-vegetate stockpiles to protect the soil from erosion, discourage weeds and maintain an active population of beneficial soil microbes.
23. Locate stockpiles where they will not be disturbed by future construction activities.
24. To the extent practicable, reinstate natural drainage patterns where they have been altered or impaired.
25. Remove toxic materials and dispose of them in designated sites. Backfill excavated areas with soils or overburden that is free of foreign material that could pollute groundwater and soil.
26. Identify potentially toxic overburden and screen with suitable material to prevent mobilization of toxins.
27. Ensure reshaped land is formed so as to be inherently stable, adequately drained and suitable for the desired long-term land use, and allow natural regeneration of vegetation.
28. Minimize the long-term visual impact by creating landforms that are compatible with the adjacent landscape.
29. Minimize erosion by wind and water both during and after the process of reinstatement.
30. Compacted surfaces shall be deep ripped to relieve compaction unless subsurface conditions dictate otherwise.

31. Revegetate with plant species that will control erosion, provide vegetative diversity and, through succession, contribute to a resilient ecosystem. The choice of plant species for rehabilitation shall be done in consultation with local research institutions, forest department and the local people.

### **Water Resources Management**

32. The Contractor shall at all costs avoid conflicting with water demands of local communities.
33. Abstraction of both surface and underground water shall only be done with the consultation of the local community and after obtaining a permit from the relevant Water Authority.
34. Abstraction of water from wetlands shall be avoided. Where necessary, authority has to be obtained from relevant authorities.
35. Temporary damming of streams and rivers shall be done in such a way avoids disrupting water supplies to communities down stream, and maintains the ecological balance of the river system.
36. No construction water containing spoils or site effluent, especially cement and oil, shall be allowed to flow into natural water drainage courses.
37. Wash water from washing out of equipment shall not be discharged into water courses or road drains.
38. Site spoils and temporary stockpiles shall be located away from the drainage system, and surface run off shall be directed away from stockpiles to prevent erosion.

### **Traffic Management**

39. Location of access roads/detours shall be done in consultation with the local community especially in important or sensitive environments. Access roads shall not traverse wetland areas.
40. Upon the completion of civil works, all access roads shall be ripped and rehabilitated.
41. Access roads shall be sprinkled with water at least five times a day in settled areas, and three times in unsettled areas, to suppress dust emissions.

### **Blasting**

42. Blasting activities shall not take place less than 2km from settlement areas, cultural sites, or wetlands without the permission of the SE.
43. Blasting activities shall be done during working hours, and local communities shall be consulted on the proposed blasting times.
44. Noise levels reaching the communities from blasting activities shall not exceed 90 decibels.

### **Disposal of Unusable Elements**

45. Unusable materials and construction elements such as electro-mechanical equipment, pipes, accessories and demolished structures will be disposed of in a manner approved by the SE. The Contractor has to agree with the SE which elements are to be surrendered to the Client's premises, which will be recycled or reused, and which will be disposed of at approved landfill sites.
46. As far as possible, abandoned pipelines shall remain in place. Where for any reason no alternative alignment for the new pipeline is possible, the old pipes shall be safely removed and stored at a safe place to be agreed upon with the SE and the local authorities concerned.
47. AC-pipes as well as broken parts thereof have to be treated as hazardous material and disposed of as specified above.
48. Unsuitable and demolished elements shall be dismantled to a size fitting on ordinary trucks for transport.

## **Health and Safety**

49. In advance of the construction work, the Contractor shall mount an awareness and hygiene campaign. Workers and local residents shall be sensitized on health risks particularly of AIDS.
50. Adequate road signs to warn pedestrians and motorists of construction activities, diversions, etc. shall be provided at appropriate points.
51. Construction vehicles shall not exceed maximum speed limit of 40km per hour.

## **Repair of Private Property**

52. Should the Contractor, deliberately or accidentally, damage private property, he shall repair the property to the owner's satisfaction and at his own cost. For each repair, the Contractor shall obtain from the owner a certificate that the damage has been made good satisfactorily in order to indemnify the Client from subsequent claims.
53. In cases where compensation for inconveniences, damage of crops etc. are claimed by the owner, the Client has to be informed by the Contractor through the SE. This compensation is in general settled under the responsibility of the Client before signing the Contract. In unforeseeable cases, the respective administrative entities of the Client will take care of compensation.

## **Contractor's Health, Safety and Environment Management Plan (HSE-MP)**

54. Within 6 weeks of signing the Contract, the Contractor shall prepare an EHS-MP to ensure the adequate management of the health, safety, environmental and social aspects of the works, including implementation of the requirements of these general conditions and any specific requirements of an EMP for the works. The Contractor's EHS-MP will serve two main purposes:
  - For the Contractor, for internal purposes, to ensure that all measures are in place for adequate HSE management, and as an operational manual for his staff.
  - For the Client, supported where necessary by a SE, to ensure that the Contractor is fully prepared for the adequate management of the HSE aspects of the project, and as a basis for monitoring of the Contractor's HSE performance.
55. The Contractor's EHS-MP shall provide at least:
  - a description of procedures and methods for complying with these general environmental management conditions, and any specific conditions specified in an EMP;
  - a description of specific mitigation measures that will be implemented in order to minimize adverse impacts;
  - a description of all planned monitoring activities (e.g. sediment discharges from borrow areas) and the reporting thereof; and
  - the internal organizational, management and reporting mechanisms put in place for such.
56. The Contractor's EHS-MP will be reviewed and approved by the Client before start of the works. This review should demonstrate if the Contractor's EHS-MP covers all of the identified impacts, and has defined appropriate measures to counteract any potential impacts.

## **HSE Reporting**

57. The Contractor shall prepare bi-weekly progress reports to the SE on compliance with these general conditions, the project EMP if any, and his own EHS-MP. An example format for a Contractor HSE report is given below. It is expected that the Contractor's reports will include information on:
  - HSE management actions/measures taken, including approvals sought from local or national authorities;
  - Problems encountered in relation to HSE aspects (incidents, including delays, cost consequences, etc. as a result thereof);
  - Lack of compliance with contract requirements on the part of the Contractor;
  - Changes of assumptions, conditions, measures, designs and actual works in relation to HSE aspects; and
  - Observations, concerns raised and/or decisions taken with regard to HSE management during site meetings.

58. It is advisable that reporting of significant HSE incidents be done "as soon as practicable". Such incident reporting shall therefore be done individually. Also, it is advisable that the Contractor keep his own records on health, safety and welfare of persons, and damage to property. It is advisable to include such records, as well as copies of incident reports, as appendixes to the bi-weekly reports. Example formats for an incident notification and detailed report are given below. Details of HSE performance will be reported to the Client through the SE's reports to the Client.

### **Training of Contractor's Personnel**

59. The Contractor shall provide sufficient training to his own personnel to ensure that they are all aware of the relevant aspects of these general conditions, any project EMP, and his own EHS-MP, and are able to fulfil their expected roles and functions. Specific training should be provided to those employees that have particular responsibilities associated with the implementation of the EHS-MP. General topics should be:

- HSE in general (working procedures);
- emergency procedures; and
- social and cultural aspects (awareness raising on social issues).

### **Cost of Compliance**

60. It is expected that compliance with these conditions is already part of standard good workmanship and state of art as generally required under this Contract. The item "Compliance with Environmental Management Conditions" in the Bill of Quantities covers these costs. No other payments will be made to the Contractor for compliance with any request to avoid and/or mitigate an avoidable HSE impact.

## Example Format: HSE Report

**Contract:**

**Period of reporting:**

**HSE management actions/measures:**

Summarize HSE management actions/measures taken during period of reporting, including planning and management activities (e.g. risk and impact assessments), HSE training, specific design and work measures taken, etc.

**HSE incidents:**

Report on any problems encountered in relation to HSE aspects, including its consequences (delays, costs) and corrective measures taken. Include relevant incident reports.

**HSE compliance:**

Report on compliance with Contract HSE conditions, including any cases of non-compliance.

**Changes:**

Report on any changes of assumptions, conditions, measures, designs and actual works in relation to HSE aspects.

**Concerns and observations:**

Report on any observations, concerns raised and/or decisions taken with regard to HSE management during site meetings and visits.

**Signature (Name, Title Date):**

Contractor Representative

**Example Format: HSE Incident Notification**

Provide within 24 hrs to the Supervising Engineer

**Originators Reference No:**

**Date of Incident:**                      **Time:**

**Location of incident:**

**Name of Person(s) involved:**

**Employing Company:**

**Type of Incident:**

**Description of Incident:**

Where, when, what, how, who, operation in progress at the time (only factual)

**Immediate Action:**

Immediate remedial action and actions taken to prevent reoccurrence or escalation

**Signature (Name, Title, Date):**

Contractor Representative

# APPENDIX

## **5-2** *LIST OF GBV AND HIV/AIDS SERVICE PROVIDERS*



## Examples of organisations that works nationally on GBV and/or HIV/AIDS

Organisations	Comment
Norwegian Church Aid (Technical Lead) <ul style="list-style-type: none"> <li>- Zambia Episcopal Conference,</li> <li>- Forum for African Women Educationalists of Zambia (FAWESA)</li> <li>- Women for Change</li> <li>- Lusitu Chambers</li> </ul>	Implementing organisations in the EU-funded Natwampane Project on GBV in Luapula Province (2019-2023)
World Vision (Technical Lead) <ul style="list-style-type: none"> <li>- Catholic Medical Mission Board</li> <li>- Sport in Action</li> <li>- Women and Law in Southern Africa (WLSA)</li> </ul>	Implementing organisations in the Natwampane Project on GBV in Northern Province (2019-2023)
Zambia Centre for Communication Programmes (ZCCP) Kwatu	Implementing organizations in the STOP GBV Programme (2018-2023) and Zambia Community HIV program
FHI 360 (Technical Lead) <ul style="list-style-type: none"> <li>- Afya Mzuri</li> <li>- Zambia Health Education and Communication Trust (ZHECT)</li> <li>- Zambia Inter-faith Networking Group on HIV/AIDS (ZINGO)</li> </ul>	Implementing organizations in the Corridors of Hope (COH) III/ROADS II project (2009-2014), implemented in Chirundu/Siavonga, Chipata, Kazungula, Livingstone, Nakonde, Solwezi, Chililabombwe, Sesheke, Katete and Kapiri Mposhi.
Non-governmental Gender Organisation Coordination Council (NGOCC)	Umbrella organization with over 100 women rights organisations as partners, spread across all provinces and districts
Champz	Company providing HIV prevention and response services in the Lusaka, Water Supply, Sanitation and Drainage Project among other projects
PACT (Technical Lead) <ul style="list-style-type: none"> <li>- Center for Infectious Disease Research in Zambia</li> <li>- Circles of Hope,</li> <li>- Mothers2Mothers,</li> <li>- Coper Rose Zambia</li> <li>- Zambia Network of Young People Living with HIV</li> <li>- Viamo.</li> </ul>	USAID: Zambia Integrated Health and HIV Activity In Central, Northwestern and Copperbelt Province

**List over OSCs, Provincial and Districts OSC Coordinators, Provincial and District Aids Coordination Advisors (PACA and DACAs) and local organisations working on HIV prevention**

Provinces and Districts	Name of OSC and OSC Coordinators	PACA and DACA	Local HIV/AIDS Organisations
NORTHERN	James Mwansa Provincial OSC Coordinator 0977-758727 jamesmwansa13@gmail.com	Tilandile Kabota PACA 0977196670 tkabota@nacsec.org.zm	
Kasama	Kasama OSC Beatrice Mwamba 0979756005 beatricechishimba67@gmail.com	Lewis Komani DACA 0977481503 lewiskomani@gmail.com	Natwafwane HIV Support group
Mungwi	Mungwi OSC Charles Miti 0956705220 miticharles90@gmail.com	Racheal Chileshe DACA 0977481503 rachealsilombars@gmail.com	Community Based Care Foundation (CBCF)
Senga Hill	Senga OSC Juliet Kalida 0972143052 jmazila.kalida@gmail.com	Chilolo Lukwesa DACA 097 7771830 chilololuks@yahoo.com	Maround Care Group Coalition
MUCHINGA	Chaka Phiri Provincial OSC Coordinator 0977961738 chakaphiri122@gmail.com	Silumesi Siyanga PACA achanda@nacsec.org.zm	
Kanchibiya	Kanchibiya OSC Caroline Ndlovu 0977484137 ndlovucaroline28@gmail.com	Poster Mukankata DACA 0979586520 postermukankata@gmail.com	Action HIV Kwitu
Lavushimanda	Lavushimanda OSC Juliet Chimponda Mweemba 0965011751 chipondamweemba84@gmail.com	Jessy Matatila DACA 0979236966 essylubemba@gmail.com	Action HIV
Mpika	Mpika OSC Modester Kalolo 0976751308 modesterkalolo87@gmail.com	Charles Silabo DACA 0977439439 silaboc@yahoo.com	<ul style="list-style-type: none"> <li>Action for Nature</li> <li>Youth Alive Zambia</li> <li>Equip</li> </ul>
Nakonde	Nakonde OSC Muma Beatrice 0977962857 bibimmambwe@gmail.com	Boyd Chishimba DACA 0963146110 chishimbajb@gmail.com	<ul style="list-style-type: none"> <li>Muchinga Corridor</li> <li>Movement for Promoting Women Affairs and Conflict Resolution</li> <li>Forum for Persons with Disabilities</li> </ul>
CENTRAL	Kelvin Kapembwa Provincial OSC Coordinator 0978494027 kapskelvin.kk@gmail.com	Nickson Kapansa PACA 0977307778 nkapansa@nacsec.org.zm nickkapansa@gmail.com	
Serenje	Serenje OSC Martha Chirwa 0973202053	Thomas Banda DACA 0964878960 sandymbm@gmail.com	<ul style="list-style-type: none"> <li>Ibolelo Covcc</li> <li>Twalubuka Community initiative</li> <li>Help to Help</li> </ul>
Chitambo	Chitambo GBV Help Desk (will be turned into a OSC) Dr Chapa 0961235400	Bwalya Mwila DACA 0964878960 sandymbm@gmail.com	Christian Women Rock (CWR)