

**KENYA MEDICAL RESEARCH INSTITUTE
REPUBLIC OF KENYA**

**PREPARATORY SURVEY REPORT
ON
THE PROJECT FOR STRENGTHENING
THE RESEARCH CAPACITY OF
KENYA MEDICAL RESEARCH INSTITUTE
IN
REPUBLIC OF KENYA**

NOVEMBER 2023

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

ORIENTAL CONSULTANTS GLOBAL CO., LTD.

FUJITA PLANNING CO., LTD.

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PREFACE

Japan International Cooperation Agency (JICA) decided to conduct the preparatory survey for the Project for Strengthening the Research Capacity of Kenya Medical Research Institute and entrust the survey to the Joint Venture consist of Oriental Consultants Global Co. Ltd. (OCG) and Fujita Planning Co., Ltd.

The survey team held a series of discussions with the officials concerned of the Government of the Republic of Kenya and conducted field investigations from December 2021 until November 2023. As a result of further studies in Japan, the present report was finalized.

I hope that this report will contribute to the promotion of the project and to the enhancement of friendly relations between our two countries.

Finally, I wish to express my sincere appreciation to the officials concerned of the Government of the Republic of Kenya for their close cooperation extended to the survey team.

November 2023

Haruko KAMEI
Director General,
Human Development Department
Japan International Cooperation Agency

SUMMARY

1. Country Overview

Located in East Africa, the Republic of Kenya (hereinafter referred to as "Kenya") has a land area of 583,000 square kilometres facing the Indian Ocean and sharing borders with five countries: Tanzania, Uganda, South Sudan, Ethiopia, and Somalia. The land area is 569,140 km² and the population is 53.77 million (according to the 2020 World Bank Survey), which is a continuous increase compared to 16.42 million in 1980, 23.72 million in 1990, 31.96 million in 2000, and 42.03 million in 2010. Population growth has been increasing. The population is expected to continue to grow, with a 2019 fertility rate of 3.42 children. Kenya's GNI per capita is US\$1,878 (World Bank, 2020) and GDP is US\$201 billion (World Bank, 2020). It is an agrarian country, mainly producing crops such as coffee, tea, and corn, although it is highly industrialized in food processing, beer, and tobacco processing.

2. Background, History and Outline of the Project

The Government of the Republic of Kenya is working on infectious disease control as a priority area for achieving Universal Health Coverage (hereinafter referred to as "UHC") in the national development plan "Vision2030". Infectious diseases and maternal and child / nutritional diseases remain as part of the top four causes of death in Kenya (Global Burden of Disease 2019). Unexpected epidemics of various infectious diseases have been reported in recent years because of insufficient investment for public health. Furthermore, the pandemic of the Coronavirus Disease (hereinafter referred to as "COVID-19") has caused the health system to be overwhelmed by the increase of new infections and a serious impact on people's lives and socioeconomics in Kenya through curfews and the restriction of movement in the country.

Kenya Medical Research Institute (hereinafter referred to as "KEMRI") was established as a medical research institute in 1979, and Japan has been supporting the development of facilities such as research departments and laboratories and human resource development for about half a century. As a result, KEMRI has become a leading research institute for infectious disease control in East Africa, and has developed collaborative research with foreign research institutes using external funds and third-country training for neighbouring countries. In response to COVID-19, KEMRI has a key role in PCR testing in Kenya, and approximately 50% of the tests have been conducted at peak times by KEMRI. In addition, KEMRI has been nominated by the Africa Centers for Disease Control and Prevention (hereinafter referred to as "Africa CDC") as the Centre of excellence in evaluation of COVID-19 tests in the continent and has participated in the evaluation of COVID-19 test kits used in the African region.

On the other hand, in response to the global pandemic of COVID-19, both the infectious disease research and emergency early detection/diagnosis functions currently undertaken by KEMRI need to be further strengthened in order to respond to emerging infectious diseases that may occur in the future. In particular, it is essential to utilize biosafety level (hereinafter referred to as "BSL")

3 laboratories for research and examination/diagnosis on emerging infectious diseases such as COVID-19 and high-risk pathogens. However, the existing BSL3 laboratory (constructed under the Japanese Grant Aid Project "Medical Research Institute Improvement Plan", 1997) is too small to accommodate research workers for multiple experiments, tests, and diagnoses at once. Therefore, it is necessary to add more BSL3 laboratories. In addition, the equipment needs to be updated because they are aging. The need to optimize the utilization and maintenance of equipment in the entire KEMRI by prioritizing the investment of equipment that can be shared across research programs was confirmed.

"The Project for Strengthening the Research Capacity of Kenya Medical Research Institute" (hereinafter referred to as "the Project") will contribute to the strengthening of infectious disease research and early response to testing and diagnosis in the event of a global pandemic through the investment of research facilities and equipment in KEMRI. This will strengthen the capacity of Kenya and East Africa on health security including responding to emerging infectious diseases, and contribute to the realization of "Vision 2030."

The Project aims to strengthen research capacity of KEMRI for various infectious diseases including COVID-19 by the provision of facilities and equipment for research on infectious diseases and early response to testing and diagnosis, and thereby contribute to strengthening health security in Kenya and Africa (particularly in the East African region).

3. Outline of the Survey Results and Project Description

(1) Field Survey

The survey team carried out a total of two field surveys on the following dates.

- 1st Field Survey: 18 January - 7 February of 2022
- 2nd Field Survey: 22 July - 31 July of 2022

(2) Design Policy

The project site (approximately 5,800 m²) will be located on a part of the combined site owned by KEMRI. The layout plan consists of two main zones (bio risk control zone and conference zone) that will serve as the core of the new facility, taking into consideration the flow line with the inspection and research departments located in the existing training building adjacent to the west side of the project site.

The infectious wastewater generated in the new facility will be sterilized in the new facility, and then treated in a septic tank located outside the facility together with general wastewater in a separate system via a neutralization tank outside the facility and connected to the public sewage system.

Access for people and vehicles to the new facility is planned to be via the existing main front gate on the KEMRI site, using an internal road, and approaching the entrance to the new facility via the new dedicated parking area from the existing gate on the project area.

(3) Basic Plan of Facilities

Composition of the Facility Component

Floor	Zone	Room Name	Area [m ²]	Total [m ²]
GF	BSL-3 Laboratory Zone	Main Building		
		BSL3 (Animal) Laboratory (incl. autoclave, 3 ante rooms)	114.4	
		BSL3(2) Laboratory (incl. autoclave, 3 ante rooms)	115.7	
		Preparation Hall (BSL3)	79.0	
		Bio Bank 3 (BSL3)	22.0	
		Service Corridor (P3) (incl. 2 ante rooms)	49.9	
		Changing Rooms (Male)	13.5	
		Changing Rooms (Female)	13.5	
				408.0
	BSL-2 Laboratory Zone	BSL2 (Central) Laboratory (incl. 1 ante room, Electron microscope and 2 Preparation rooms)	87.7	
		BSL2 (Immunology) Laboratory (incl. 1 ante room)	64.8	
		BSL2 (Clinical) Laboratory (incl. 1 ante room)	64.8	
		BSL2 (Molecular) Laboratory (incl. 1 ante room, Master Mix, PCR and Electro Swimming)	104.3	
		Cold room	18.8	
		Preparation Hall (BSL2)	74.8	
		Bio Bank 2 (BSL2)	31.8	
		Sample Storage	50.8	
		Changing Room	16.3	
		Service Corridor	39.4	
		Washroom, Lab. Kitchen	75.7	
		Preparation Corridor	10.5	
		Sample Reception	12.0	
				651.7
GF	Bio Risk Control Zone	Entrance Hall	112.4	
		EV	4.6	
		Hall 2	50.6	
		Toilet	26.9	
		Office, Monitor Corner	84.9	
		Chief Office	20.6	
		Staff Room	31.8	
		Warehouse	50.8	
		Equipment Service Centre	124.1	
		Storage 1	6.1	
		Pantry 1	5.9	
		Mother Room 1	5.3	
		Storage 2	4.3	
		Corridor	40.7	
		EPS	9.5	
		Stair	8.6	
				587.1
1F		Hall 3, Corridor	103.2	
		Data Centre	103.9	
		Research 1	20.6	
		Research 2	19.1	
		Research 3	17.5	
		Research 4	17.5	
		Research 5	53.0	
		Research 6	35.9	
		Storage 3	23.8	
		Pantry 3	5.1	
		Toilet for Disabled	6.4	
		Mother Room 3	4.4	
				439.1

Floor	Zone	Room Name	Area [m ²]	Total [m ²]
		Toilet	26.9	712.3
		EPS	1.8	
GF	Conference Zone	Main Entrance, Corridor	224.5	
		Office 2	23.5	
		Conference Room 1	70.0	
		Conference Room 2	73.1	
		Conference Room 3	73.1	
		Conference Room 4	65.6	
		Conference Room 5	52.4	
		Virtual Lab	52.4	
		Pantry 2	6.2	
		Mother Room 2	7.0	
		Toilet	58.5	
		Stair	5.1	
		EPS	0.9	
1F		Stair	37.6	295.7
BF	M&E	Machine Room	295.7	
1F		HVAC Machine Room	504.2	772.6
		Electrical Room	268.4	
		Main Building Total	3,904.1	
GF		Water Pump Room, Elevated Water Tank Tower	28.6	
		Oil Pump Room	4.8	
		Grand Total	3,937.5	

Total Floor Area

	Main Building				Others		Grand Total
Floor	Basement	Ground Floor	First Floor	Total	Water Pump	Oil Pump	
Area [m ²]	295.7	2,359.1	1,249.3	3,904.1	28.6	4.8	3,937.5
Building Area [m ²]				2,500.5	28.6	4.8	2,533.9

Source: JICA Survey Team

(4) Basic Plan of Equipment

Allocation List

No	Equipment	Total	BSL3 Laboratory (Animal)	BSL3 Laboratory (Cell culture)	BSL2 Central laboratory	BSL2 Immunology	BSL2 Molecular laboratory	P2 Clinical Research	Equipment service centre	Cold room	Virtual Lab.	Conference room
1	Autoclave, vertical	8	2	2	1	1	1	1				
2	Autoclave, double door A	1	1									
3	Autoclave, double door B	1		1								
4	Biosafety cabinet A	4			1	1	1	1				
5	Biosafety cabinet B	2	1	1								
6	Biosafety cabinet C	2	1	1								
7	BSL3 laboratory calibration kit	1							1			
8	Centrifuge, high speed	6	1	1	1	1	1	1				
9	Clean bench, tabletop	1					1					
10	Draft chamber	1						1				
11	Electron microscope	1			1							
12	Glove box A	1	1									
13	Glove box B	1		1								

No	Equipment	Total	BSL3 Laboratory (Animal)	BSL3 Laboratory (Cell culture)	BSL2 Central laboratory	BSL2 Immunology	BSL2 Molecular laboratory	P2 Clinical Research	Equipment service centre	Cold room	Virtual Lab.	Conference room
14	Laboratory sink	5	1	1		1	1	1				
15	Work bench, Central A	8	1	1	1	1	1	1	2			
16	Work bench, Side A	18	1	1	3	3	4	3	2	1		
17	Work bench, Side B	2					2					
18	Work bench, Side C	1			1							
19	UPS	18	4	4	4	2	2	2				
20	Table A	7									7	
21	Table B	58										58
22	Chair A	14									14	
23	Chair B	172										172
	Total	333	13	14	14	10	14	11	5	1	21	230

Source: JICA Survey Team

4. Project Implementation Period and Project Cost Estimation

The implementation period required for this project is 28 months in total, including of 4.5 months for detailed design, 4 months for bidding, and 19.5 months for facility construction and procurement of equipment, taking into account construction constraints due to the scale of construction and weather conditions, and local construction conditions. The project cost to be borne by the Government of Kenya is estimated at JPY 16 million.

5. Project Evaluation

(1) Relevance

According to the reasons presented below, the implementation of the Project through Japanese grant-aid cooperation is relevant:

- Benefits from the Project and relevance of the Project goal
- Consistency with Kenyan health policy
- Consistency with development assistance policy of Japan

(2) Effectiveness

The following are effectiveness indicators related to the direct effects (outputs) of the implementation of the Project and the effects (outcomes) expected to be achieved in the future through the implementation of the entire Project.

1) Quantitative Effect Indicators

As quantitative indicators, “The number of research projects using BSL3 laboratories” and “The number of newly introduced research methods and/or techniques out of those six made possible by the inputs of the Project” and those baseline values and target values will be set as shown in the table below.

Quantitative Effectiveness Indicators

Quantitative Indicators	Value of indicators		Target value (FY 2028) (3 years after completion of the Project)
	Year of baseline	Baseline value	
The number of research projects using BSL3 laboratories	2022	4 projects	Planned value by KEMRI 10 projects
The number of newly introduced research methods and/or techniques out of those made possible by the inputs of the Project below. ① Preclinical studies by animal experiments in BSL3 laboratory ② Pathophysiological studies for BSL3 pathogens by animal experiments ③ Mass spectrometric and molecular structure analyses of unknown chemical compounds ④ Nanotechnology ⑤ Ultrastructural morphological analyses of tissues and cells including pathogens ⑥ Proteomic analyses (comprehensive analysis of proteins)	2022	0/6 methods and/or techniques	Planned value by KEMRI 6/6 methods and/or techniques

Source: JICA Survey Team

2) Qualitative Effect Indicators

Advanced surveillance of infectious disease trends with molecular epidemiological techniques utilizing the BSL laboratories is being performed.

The virtual laboratory is being used for nurturing personnel and academic exchange with sufficient capacity for responding infectious diseases outbreaks and pandemics.

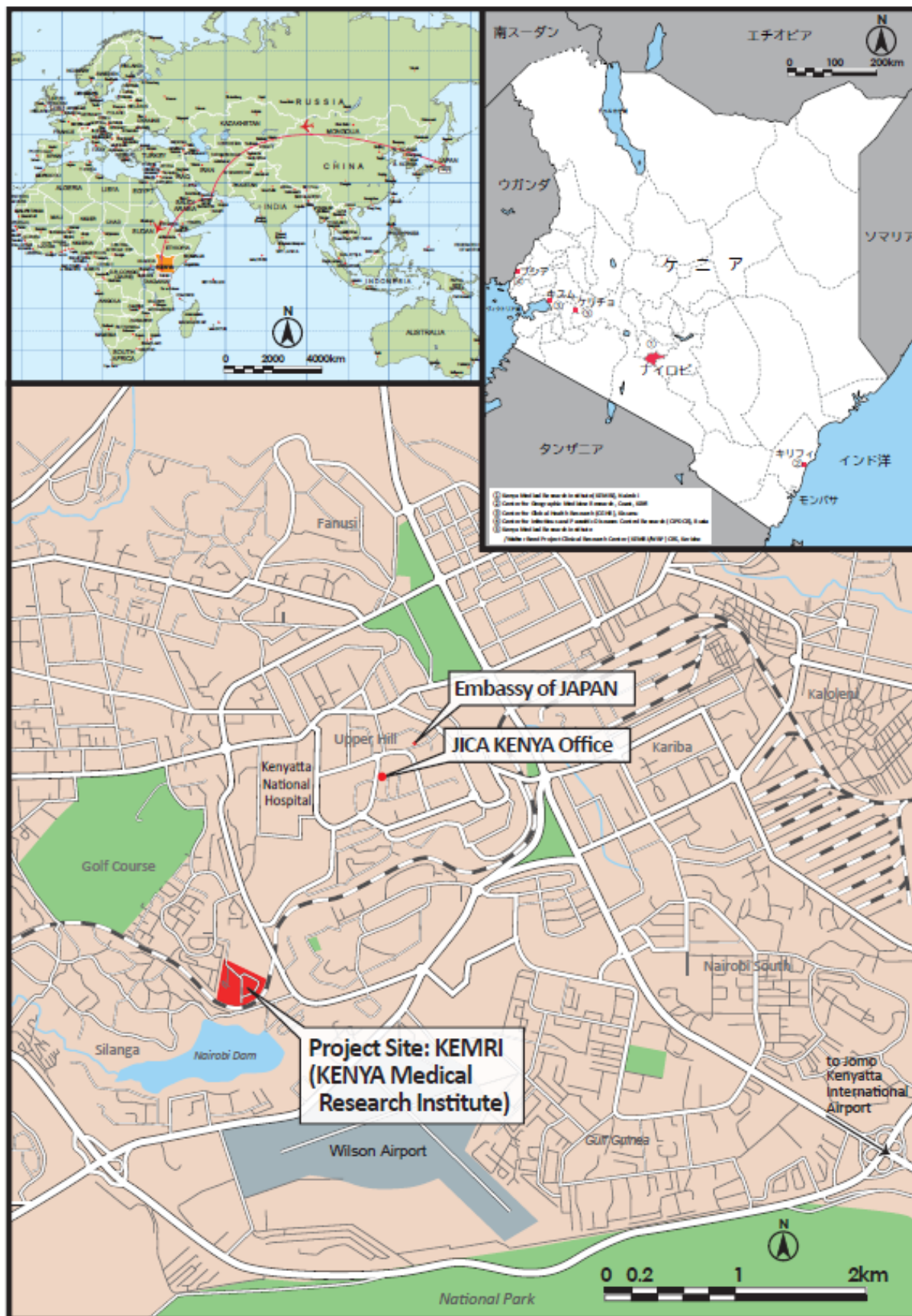
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Source: JICA Survey Team

Location Map



Perspective

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Abbreviations

Abbreviation	English
A/P	Authorization To Pay
Africa CDC	Africa Centers for Disease Control and Prevention
AIDS	Acquired Immunodeficiency Syndrome
ASHRAE	American Society of Heating, Refrigerating and Air-conditioning Engineers, Inc.
ASTM	American Society for Testing and Materials
AVR	Automatic Voltage Regulator
B/A	Banking Arrangement
BH	Borehole
BOD	Biochemical Oxygen Demand
BS	British Standard
BSC	Biosafety Cabinet
BSL	Biosafety Level
CHERP	COVID-19 Health Emergency Response Project
COD	Chemical Oxygen Demand
E/N	Exchange of Notes
EIA	Environmental Impact Assessment
FRP	Fiber Reinforced Plastics
G/A	Grant Agreement
GDP	Gross Domestic Product
GL	Ground Level
HEPA	High Efficiency Particle Air
HIV	Human Immunodeficiency Virus
HPLC	High Performance Liquid Chromatography
IFBA	International Federation of Biosafety Association
IFC	International Finance Corporation
JASS	Japanese Architectural Standard Specification
JICA	Japan International Cooperation Agency
JIS	Japanese Industrial Standards
KEMRI	Kenya Medical Research Institute
KPLC	Kenya Power Lighting Company
LAN	Local Area Network
LCMS	Liquid Chromatography Mass
LED	Light-Emitting Diode
Mbps	Megabits Per Second
NCWSC	Nairobi City Water and Sewerage Company
NGO	Non-Government Organization
PCR	Polymerase Chain Reaction
pH	Potential Hydrogen
PHEIC	Public Health Emergency of International Concern
RC	Reinforced Concrete
RMU	Ring Main Unit
TICAD	Tokyo International Conference on African Development

Abbreviation	English
UHC	Universal Health Coverage
UPS	Uninterruptible Power-Supply System
USD	United States Dollar
VAT	Value Added Tax
VHF	Viral Hemorrhagic Fever
WHO	World Health Organization

Chapter1 Background of the Project

1-1 Background of the Project

The Government of the Republic of Kenya (hereinafter referred to as "Kenya") is working on infectious disease control as a priority area for achieving Universal Health Coverage (hereinafter referred to as "UHC") in the national development plan "Vision2030". Infectious diseases and maternal and child / nutritional diseases remain as part of the top four causes of death in Kenya (Global Burden of Disease 2019). Unexpected epidemics of various infectious diseases have been reported in recent years because of insufficient investment for public health. Furthermore, the pandemic of the Coronavirus Disease (hereinafter referred to as "COVID-19") has caused the health system to be overwhelmed by the increase of new infections and a serious impact on people's lives and socioeconomics in Kenya through curfews and the restriction of movement in the country.

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"The Project for Strengthening the Research Capacity of Kenya Medical Research Institute" (hereinafter referred to as "the Project") will contribute to the strengthening of infectious disease

research and early response to testing and diagnosis in the event of a global pandemic through the investment of research facilities and equipment in KEMRI. This will strengthen the capacity of Kenya and East Africa on health security including responding to emerging infectious diseases, and contribute to the realization of "Vision 2030."

The Project aims to strengthen research capacity of KEMRI for various infectious diseases including COVID-19 by the provision of facilities and equipment for research on infectious diseases and early response to testing and diagnosis, and thereby contribute to strengthening health security in Kenya and Africa (particularly in the East African region).

1-2 Natural Conditions

The project site is located in the Athi/Sabaki River Basin region and has a rainy season from March to May (March-April-May, MAM heavy rainfall season) and October to December (light rainfall season), although this has become less clear in recent years. Rainfall peaks in April, averaging 10.6 inches (269 mm), but in 2018, 1.7 times more rain fell between March 1 and 17 than typically falls during the heavy rainfall season. The annual minimum rainfall averaged 2.6 inches (66 mm) in January. The average annual rainfall is 58.1 inches (1,475.7 mm). The project site has not been affected by natural disasters in the past.

Table 1-1 Weather Data for the Project Site

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
High (° C)	25.6	26.7	26.7	25.0	23.9	22.8	22.2	22.8	25.0	25.6	23.9	24.4
Average (° C)	20.6	21.1	21.1	20.0	18.9	17.8	17.2	17.2	18.9	20.0	19.4	19.4
Low (° C)	15.0	15.6	16.1	16.1	15.0	13.3	12.8	12.8	13.3	15.0	15.6	15.6
Humidity (%)	69	65	66	79	83	79	73	70	66	67	76	78
Wind (km/hr.)	16.8	16.6	16.8	14.9	12.6	11.0	11.4	12.8	14.9	16.8	17.4	17.4

Source: Ministry of Environment and Forestry

1-3 Environmental and Social Considerations

1-3-1 Environmental and Social Impact Assessment

1-3-1-1 Project Components and Outline in Environmental and Social Consideration

The table below shows the main project components that are subject to Environmental and social consideration.

Table 1-2 Environmental and social consideration Project Components and Outline

Item	Project components
Air quality	Soil excavation • Foundation construction, truck • use of heavy equipment, medical emission, and pharmaceutical air pollution
Water quality	Soil excavation • Foundation construction, drainage • gutter • rainwater catchment, medical drainage water, and pharmaceutical water pollution.
Soil quality	Soil excavation • Foundation construction, soil erosion, soil alteration due to medical waste, pharmaceutical soil contamination, and biological pollution.
Waste	Demolished construction, plant • flowerbed replacement, construction and demolition waste, and medical waste.
Noise and Vibration	Trucks • use of heavy equipment and noise and vibration caused by medical equipment operation.
Employment	Civil engineering, and research facilities,

Source: JICA Survey Team

Regarding the “Japan International Cooperation Agency (JICA) Guidelines for Environmental and Social Considerations (April, 2010)” (hereafter ‘JICA Environmental Guidelines’), this proposed project is classified as ‘Category B’ which does not have significant adverse impacts on the on the environment and society. Generally, they are site-specific; few if any are irreversible; and in most cases, normal mitigation measures can be designed more readily.

1-3-1-2 Current Basic Environment and Social Situation

(1) Natural Conditions

1) Climate

Refer to 1-2.

2) Geology

Refer to 2-2-2-1(3)1).

3) Vegetation

Project site is urbanized area and the vegetation is in decline.

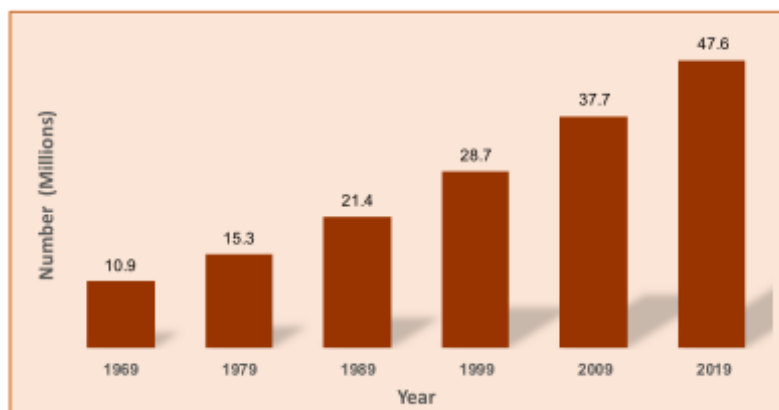
4) Protected Area

The Republic of Kenya has 23 national parks and 28 national protected areas. The closest protected area to the project site is the Nairobi National Park (117 km²), the first national park established in Kenya in 1946. Despite its proximity to the city, the park is home to more than 100 species of mammals and 300 species of birds, making it an important protected area in the project country. The location of the project site and the Nairobi National Park is shown below.



Source: Google

Figure 1-1 Location of the Nairobi National Park



Source: 2019 Kenya National Bureau of Statistics

Figure 1-3 Population Change in Kenya from 1969 to 2019

3) Ethnic Groups

There are an estimated 42 ethnic groups living in Kenya. The most populous ethnic groups are the Kikuyu, Ruhiya, Kalenjin, Kamba, Kisii, Meru, and others (see table below).

Table 1-3 Ethnic Groups

Ethnic Group	Population
Kikuyu	6,622,576
Luhya	5,338,666
Kalenjin	4,967,328
Luo	4,044,440
Kamba	3,893,157
Somalis	2,385,572
Kisii	2,205,669
Mijikenda	1,960,574
Meru	1,658,108
Turkana	988,592
Maasai	841,622
Teso	338,833

Source: 2009 Kenya National Bureau of Statistics

There are also other African ethnic groups, a small but economically influential number of British and Indian ethnic groups. The capital city of Nairobi, where the project site is located, is home to a diverse mix of ethnic groups.

4) Religion

Christians are the majority, followed by Muslims, traditional religions, and a small number of Hindus. The table below summarizes the population and percentages.

Table 1-4 Religions

Religion	Population	Percentage (%)
Protestant	18,307,466	47.7
Catholic	9,010,684	23.5
Other Christian	4,559,584	11.9
Muslim	4,304,798	11.2
Traditional Religions	635,352	1.7

Religion	Population	Percentage (%)
Hindu	53,393	0.1
Other Religions	557,450	1.5
No Religion	922,128	2.4
Unclear	61,233	0.2

Source: 2009 Kenya National Bureau of Statistics

5) Literacy

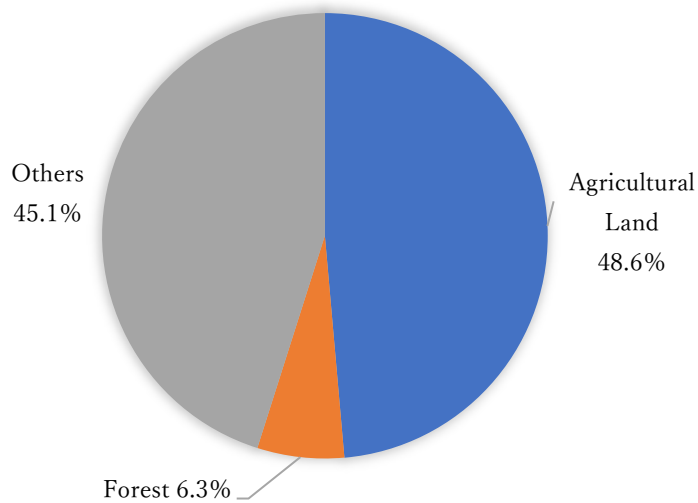
Kenya's literacy rate is 81.54%. The official languages are English and Swahili.

6) Industries

Major industries include the primary industry (agriculture) such as coffee, tea, horticultural crops, sisal, cotton, corn, pyrethrum, etc., and the secondary industry (industry and manufacturing) such as processed foods, beer, tobacco, cement, petroleum products, sugar, (mineral) soda ash and fluorspar.

7) Land Use

Land use across Kenya is 48.6% agricultural land, 6.3% forest, and 45.1% other, according to the 2019 census results.



Source: <https://www.statista.com/statistics/1205731/distribution-of-land-use-in-kenya/>

Figure 1-4 Land Use in Kenya (2019)

The land use in Nairobi County, the project site, is summarized in Table 1-5. The percentage of forests and green areas has decreased from more than 50% of the total in 2000 to about 40% in 2015. It can also be seen that urbanization is progressing and the number of developed areas is increasing year by year.

Table 1-5 Land Use Change from 1988 to 2015 (%)

Land Use and Land Cover Classes		Years											
		1988		1995		2000		2005		2010		2015	
		Area (Km ²)	Percent age	Area (Km ²)	Percent age	Area (Km ²)	Percent age	Area (Km ²)	Percent age	Area (Km ²)	Percent age	Area (Km ²)	Percent age
i.	Agriculture/Grass/Secondary Growth/Riparian Vegetation	126.82	17.71	101.12	14.12	176.76	24.68	143.03	19.97	190.75	26.63	189.73	26.49
ii.	Water Bodies	2.70	0.38	4.72	0.66	4.84	0.68	3.62	0.51	3.04	0.42	4.09	0.57
iii.	Urban Built-Up/Open/Transitional Areas	73.08	10.20	124.36	17.36	155.20	21.67	175.19	24.46	183.97	25.69	228.65	31.93
iv.	Forests	59.63	8.33	122.41	17.09	63.63	8.88	79.14	11.05	83.19	11.62	93.44	13.05
v.	Rangeland and Shrubs	453.99	63.39	363.61	50.77	315.79	44.09	315.23	44.01	255.25	35.64	200.30	27.97
TOTAL		716.22	100.00	716.22	100.00	716.22	100.00	716.22	100.00	716.22	100.00	716.22	100.00

Source: Oyugi, M. O., Odenyo, V. A., & Karanja, F. N. (2017). The implications of land use and land cover dynamics on the environmental quality of Nairobi City, Kenya. *American Journal of Geographic Information System*, 6(3), 111-127.

8) Cultural Property

There are World Heritage sites in Kenya, as shown in the table below, but none of them are located in the vicinity of the project site.

Table 1-6 World Heritages in Kenya

World Heritage	Type	Registration Year
Mount Kenya National Park/Natural Forest	World Natural Heritage	1997
Lake Turkana National Parks	World Natural Heritage	1997
Lamu Old Town	World Cultural Heritage	2001
Sacred Mijikenda Kaya Forests	World Cultural Heritage	2008
Fort Jesus, Mombasa	World Cultural Heritage	2011
Kenya Lake System in the Great Rift Valley	World Natural Heritage	2011
Thimlich Ohinga Archaeological Sit	World Cultural Heritage	2018

Source: JICA Survey Team

1-3-1-3 Environmental and Social Consideration

(1) Environmental and Social Consideration related Acts and Regulations

There are regulations and plans related to the environment which play a major role for Kenyan environment management:

- National Environment Policy 2013
- Solid Waste Management Strategy 2014
- Green Economy Strategy and Implementation Plan 2016 – 2030

However, these higher-level policies and plans do not provide a framework or details for environmental and social considerations.

1) The Environmental Management and Co-ordination Act 1999

Environmental and social consideration condition in Kenya based on ‘The Environmental Management and Co-ordination Act: enforcement in 1999, amended in 2015 and 2019’. It stipulates the establishment of legal and regulatory enforcement agencies i.e., National Environmental Management Authority (NEMA), etc., these agencies are positioned to

enforce the environmental impact assessments and audits, regulations related to nature reserves and penalties for illegal acts.

The results of the amended act in April 2019, is classified in three environmental risk levels (High, Medium, and Low) in the second schedule. Each risk level stipulate 13, 14, and 15 categories of projects and its proportion.

2) The Environmental (Impact Assessment and Audit) Regulations, 2003

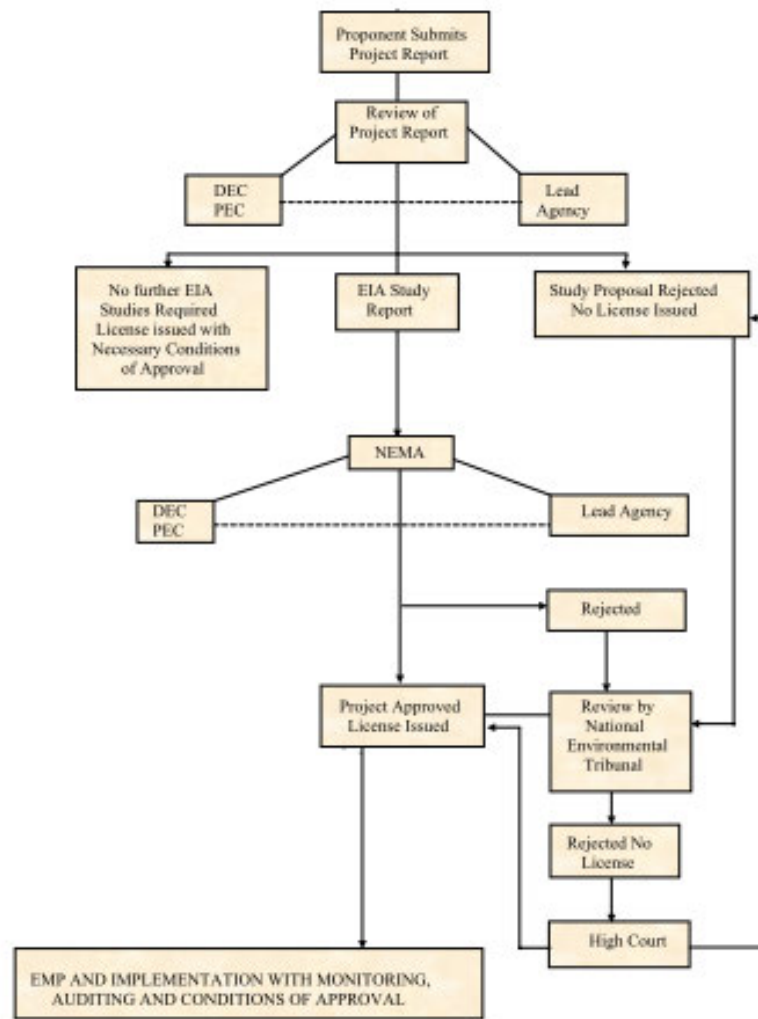
Based on the Environmental Management and Co-ordination Act 1999, a non-binding Environmental Impact Assessment (EIA) guideline was formulated in 2002. Additionally, development on these guidelines, the Environmental Impact Assessment and Audit Regulations were formulated in 2003 as supplementary to the Act (enforced in 2003, amended in 2013, 2019, and 2022).

These regulations stipulated that the procedure of examination registration and licensing for an EIA expert, the responsibilities of the implementer audits and monitoring after the project is implemented in the basis of regulation for EIA in Kenya. However, this regulation does not stipulate the baseline of the environment, emissions, etc. These baselines are required for the EIA and monitoring. There are legal systems to which relevant individual laws and regulations apply. (Individual law and regulations refer to the following 3)

Appropriate environmental and social considerations will be taken during and after the project is being implemented and in accordance with the JICA Environmental Guidelines (April, 2010). It is required to carry out the necessary procedures for environmental impact assessment and obtain relevant permits in accordance with the Kenyan law.

The key elements in the EIA process include: -

- Development and submission of a Project Report for projects or activities which are not likely to have significant environmental impacts or those for which no EIA study is required. However, if the Authority considers that an EIA study is required, then the ensuing EIA process is as follows:
 - Scoping and drawing-up of Terms of Reference (TOR) for the study for approval by the Authority.
 - Gathering of baseline information through investigation/ research and subsequent submission of EIA Study Report to the Authority.
 - Review of EIA Study Report by the Authority and relevant lead agencies.
- Decision on EIA Study Report includes approval, approval with conditions or rejection.
- Appeals
- Implementation of project.
- Monitoring the project
- Auditing the project

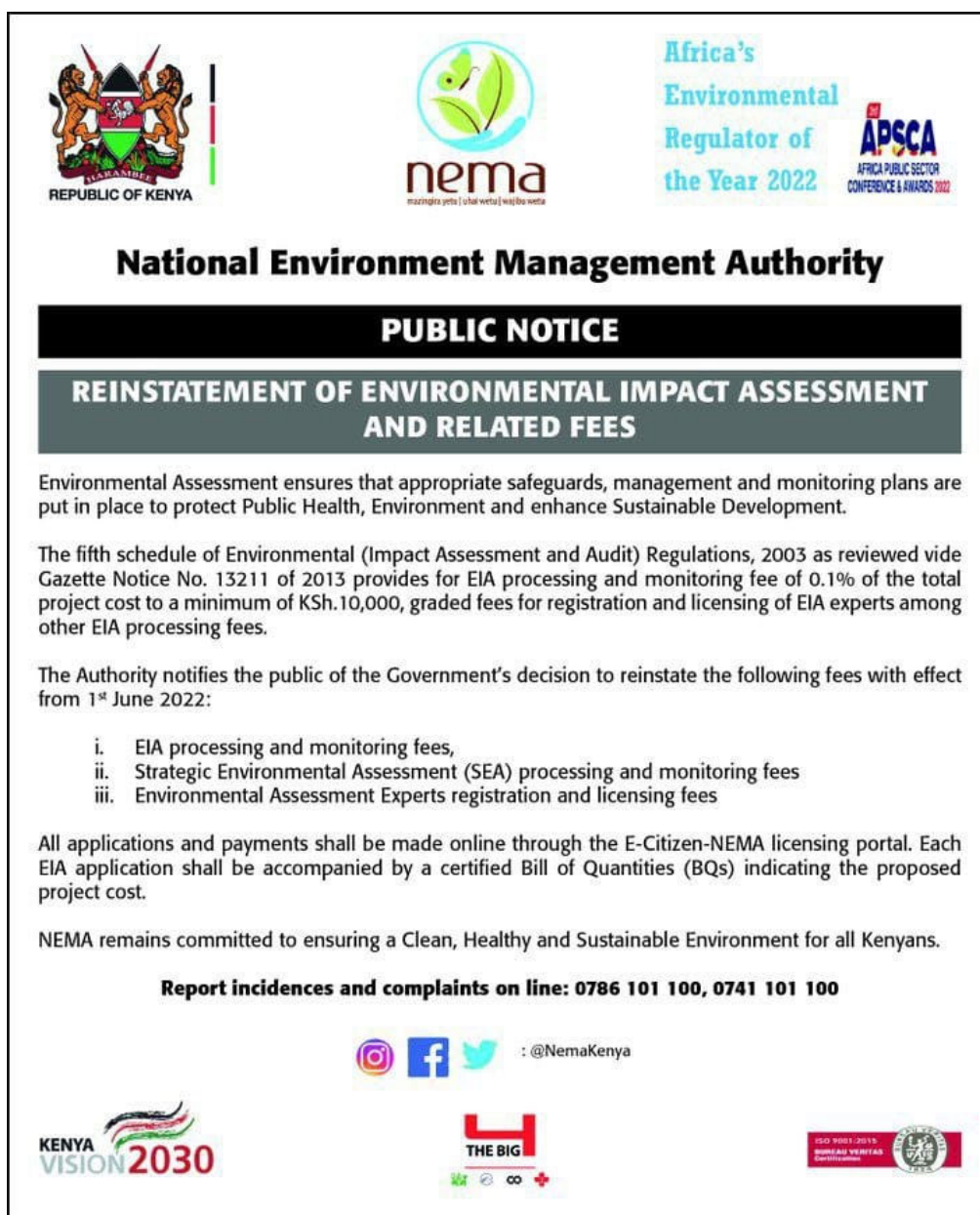


Source: Environmental Management and Coordination Act (No. 8 of 1999)

Figure 1-5 EIA Process by Kenyan Law

In addition to EIA, a license for effluent treatment facility is required for the project as environmental and social considerations during and after construction of the facility.

The significant point under this regulation in this project is reintroduction of environmental license costs based on the total project cost. This significant cost was introduced in September 2013, a condition for issuing an environmental license to pay 0.1% of the total project cost to NEMA. Subsequently the application of the cost was suspended in October 2016. End of May in 2022, NEMA announced to public that environmental impact assessment related fee is reinstatement applicable from 1st June in 2022. When submitting the environmental and social impact assessment report, it is required to submit the project cost estimation document and pay environmental impact assessment processing and monitoring fee of 0.1% of the total project cost at this point.



Source: National Environment Management Authority

Figure 1-6 Public Notice on Environmental Assessment Expert Registration and Licensing

Regarding the calculation method of the environmental license fee (hereinafter referred to as "review fee"), we interviewed two mid-level officials of NEMA, and three environmental and social impact assessors (class A certified by the authority) for the definition of the total project cost mentioned above. However, we could not obtain a uniform answer. Therefore, we contacted four high-ranking officials of the relevant departments through multiple interviews. The results are presented below in chronological order.

- Manager: The total project cost is the construction cost only (or construction cost and installation cost). The reason for not including the cost of equipment is that the

registered quantity surveyor who prepares the certified bill of quantity does not have the expertise to survey the cost of equipment.

- General Manager: Total project cost includes not only construction cost but also installation cost and equipment cost, and there is an official document that defines them (however, it is highly possible that this document does not exist, as we have not been provided with the document despite repeated requests for its disclosure for over a month).
- Director in Charge: The total project cost is only the construction cost. The reason for this is that if the cost of equipment were included, the cost of examination would be too high for a large project.
- Director: Which expenses are included in the total project cost varies from project to project. In some projects, only the construction cost is included in the total project cost, while in other projects, installation and equipment costs may also be included.

As a result, it was revealed that there was no common understanding among the four high-ranking officials in charge in NEMA. The results of our inquiries to several qualified Class-A environmental impact assessors about the operation of the system from its introduction in 2013 until it was suspended in 2016 indicate that it is highly likely that each project differed in terms of which expenses were included in the total project cost, and that NEMA and certified cost estimators selected expenses that did not exceed 1 million Kenyan shillings as the eligible expenses. In an e-mail received from the project manager of KEMRI on July 11, 2022, KEMRI responded that it could bear the cost of review fees up to twice this level on its own.

The approval procedure and estimated time required are described below.

- i Prepare a project cost estimation document by a certified quantity surveyor (3-4 weeks)
- ii Submit an EIA report and a project cost estimation document (1 week)
- iii Receive an invoice from EIA license fees from NEMA (2 weeks)
- iv Make a payment for EIA license fees (2-3 weeks)
- v Start examining the project
- vi Receive a result (6 weeks)

3) Individual Laws and Regulations related to Baseline of Environment and Emission.

Based on the Environmental Management and Co-ordination Act 1999, individual laws and regulations related to baseline of environment, emission, etc., for environmental and social impact assessment are described below.

- Environmental Management and Co-ordination (Air Quality) Regulations, 2014
- Environmental Management and Co-ordination (Water Quality) Regulations, 2006
- Environmental Management and Co-ordination (Waste Management) Regulations, 2006

- Environmental Management and Co-ordination (Fossil Fuel Emission Control) Regulations, 2006
- Environmental Management and Co-ordination (Conservation of Biological Diversity and Resources, Access to Genetic Resources and Benefit Sharing) Regulations, 2006
- Environmental Management and Co-ordination (Controlled Substances) Regulations, 2007
- Environmental Management and Co-ordination (Wetlands, Riverbanks, Lake Shores and Sea Shore Management) Regulations, 2009
- Environmental Management and Co-ordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009
- Environmental Management and Coordination (Public Complaints Committee) Regulations, 2012

The appropriateness of the Kenyan standard will be examined by comparing the Kenyan national standard value and the international standard value based on the above regulations as explained in more depth below.

a) Standard Value of Air Quality

The following table below shows the comparison of the Kenyan air quality standards stipulated by Environmental Management and Co-ordination (Air Quality) Regulations, 2014 with the World Health Organization (WHO) standards applied by the International Finance Corporation (IFC) which shows that there is no significant discrepancy, however Kenyan national standards except for CO are relatively lax enforcement compared with international standards.

Table 1-7 Comparison of Standard Value of Air Quality

Item	Kenyan standard	WHO standard
SO ₂	80µg/m ³ (average of per 24hrs)	40µg/m ³ (average of per 24hrs)
NO ₂	800µg/m ³ (average of per 24hrs)	25µg/m ³ (average of per 24hrs)
CO	4mg/m ³ (average of per 1hrs)	4mg/m ³ (average of per 1hrs)
PM _{2.5}	75µg/m ³ (average of per 24hrs)	15µg/m ³ (average of per 24hrs)
PM ₁₀	100µg/m ³ (average of per 24hrs)	45µg/m ³ (average of per 24hrs)

Source: JICA Survey Team

b) Standard Value of Water Quality

The following table shows the comparison of the Kenyan air quality standards stipulated by Environmental Management and Co-ordination (Water Quality) Regulations, 2006 with the International Finance Corporation (IFC) which shows Kenyan national standards are generally stringent in enforcement compared with international standards.

Table 1-8 Comparison of Standard Value of Water Quality

Item	Kenyan standard	IFC standard
pH	6.5 – 8.5	6 - 9
BOD (mg/l)	30	30
COD (mg/l)	50	125
Oil and grease (mg/l)	Nil	10
Total suspended solids (mg/l)	30	50
Total coliform bacteria (MPN/100ml)*	30	400

*: MPN = most probable number

Source: JICA Survey Team

c) Standard Value of Noise and Excessive Vibration

The following table shows the comparison of the Kenyan air quality standards stipulated by Environmental Management and Co-ordination (Noise and Excessive Vibration Pollution) Regulations, with the World Health Organization (WHO) standards applied by the International Finance Corporation (IFC) which shows that there is no significant discrepancy, however Kenyan national standards are equally or more stringent in enforcement compared to international standards.

Table 1-9 Comparison of Standard Value of Noise and Vibration

Land use	Kenyan standard (dBA)		WHO standard (dBA)	
	Day (6am-8pm)	Night (8pm-6am)	Day (7am-10pm)	Night (10pm-7am)
Commercial and residential area*	55	35	55	45
Commercial area**	60	35	70	70

*: IFC standard is subject to residential area and educational facility.

** : IFC standard is subject to commercial and industrial facility.

Source: JICA Survey Team

In addition to the standard values mentioned above, the Environmental Management and Co-ordination (Waste Management) Regulations 2006 are other laws that need to be considered in this project. According to the Attachment 1 Form 3 (Tracking Document) of the Regulations, it is required to prepare and properly store records of the transportation of waste from the source to the licensed final disposal site.

(2) The Role of related Agencies

Environmental and social consideration jurisdiction and other related authorities

- Environmental and social consideration supervisory authority : Department of Compliance and Enforcement in NEMA.
- Function of NEMA : The institution accepts the application for registration of an EIA expert, and if the examination determines that it is appropriate, it issues a permit and registers it. In addition, after receiving the brief report on environmental impact (Project Report), the examination will be conducted within 45 days, and if there are no problems, an environmental permit (EIA License) will be issued.

- Other Agencies : NGOs can be stakeholders in environmental and social considerations, however they are not given a particular procedural role in environmental and social considerations. Important related individuals and agencies, except NEMA which is an EIA expert, who are registered in NEMA. In Kenya about 2000 individuals or agencies are registered as EIA experts with their name, registration number, contact address, email address, telephone number, categories of registration and profession. These experts prepare brief reports (project report) of environmental impact in the procedure of environmental and social consideration. If the adverse impact is large, EIA will be conducted.

(3) Discrepancy with JICA Environmental Guidelines

Comparison with Japan International Cooperation Agency Guidelines for Environmental and Social Consideration April 2010 and the system in the host country. Confirmation of the presence or absence of discrepancy and elimination in this project is shown in Table 1-10.

Table 1-10 Comparison with JICA Environmental Guidelines and System

Item	JICA Environmental Guideline	System in Kenya	Discrepancy and elimination
Underlying Principles	1. Environmental impacts that may be caused by projects must be assessed and examined in the earliest possible planning stage. Alternatives or mitigation measures to avoid or minimize adverse impacts must be examined and incorporated into the project plan. 2. Such examinations must be endeavoured to include an analysis of environmental and social costs and benefits in the most quantitative terms possible, as well as a qualitative analysis; these must be conducted in close harmony with the economic, financial, institutional, social, and technical analyses of projects.	Survey the environmental and social impacts of the project and propose mitigation measures as necessary. (The Environmental (Impact Assessment and Audit) Regulations, 2003, part 2)	Compared to the JICA Environmental Guidelines, the host country's system does not require early investigation / examination, but in this project, there will be consultation with competent authorities at an early stage, and risk assessment of this project based on environmental impact assessment / audit regulations.
Information disclosure	Projects must be adequately coordinated so that they are accepted in a manner that is socially appropriate to the country and locality in which they are planned. For projects with a potentially large environmental impact, sufficient consultations with local stakeholders, such as local residents, must be conducted via disclosure of information at an early stage, at which time alternatives for project plans may be examined. The outcome of such consultations must be incorporated into the contents of project plans. The project report should be written in a common language.	1. The environmental impact assessment report is written in English which is common language in project country, 2. Regarding the Environmental (Impact Assessment and Audit) regulations, 2003, stakeholders and local people can view the report at any time in the project country.	No significant discrepancy. Subcontractors prepare the Environmental and Social Impact Assessment report in English. The report is disclosed to stakeholders. In addition, after submitting the Environmental and Social Impact Assessment report to the competent authority, it is planned to continue disclosing information to stakeholders based on the instructions of the agency.
Resident agreement	- Preparing the environmental assessment report, sufficient information must be disclosed, discussions must be held with local stakeholders such as local	1. Proposed projects are classified as middle risk projects by NEMA. Potential adverse impacts on the	No significant discrepancy. After consulting with the competent authorities, we are discussing with residents and various groups in the

Item	JICA Environmental Guideline	System in Kenya	Discrepancy and elimination
	residents, and consultation records, etc.	environment and society are less adverse impacts in these projects. 2. Regarding the Environmental Impact Assessment and Audit regulations, 2003, it is required to agree with stakeholders and local people.	surrounding area as part of public involvement and participation.
Impact assessment items	1. The impacts to be assessed with regard to environmental and social considerations include impacts on human health and safety, as well as on the natural environment, that are transmitted through air, water, soil, waste, accidents, water usage, climate change, ecosystems, fauna and flora, including trans-boundary or global scale impacts. These also include social impacts, including migration of population and involuntary resettlement, local economy such as employment and livelihood, utilization of land and local resources, social institutions such as social capital and local decision-making institutions, existing social infrastructures and services, vulnerable social groups such as poor and indigenous peoples, equality of benefits and losses and equality in the development process, gender, children's rights, cultural heritage, local conflicts of interest, infectious diseases such as HIV/AIDS, and working conditions including occupational safety. 2. In addition to the direct and immediate impacts of projects, their derivative, secondary, and cumulative impacts as well as the impacts of projects that are indivisible from the project are also to be examined and assessed to a reasonable extent. It is also desirable that the impacts that can occur at any time throughout the project cycle should be considered throughout the life cycle of the project.	1. Regarding the Environmental Impact Assessment and Audit regulations, 2003 (amended in 2019), the project is classified as a middle risk project. Scope of survey is environmental Physical factors: Air quality, water quality, climate, noise, vibration, odour, and land. Biological factors: fauna and flora. Social factors, socioeconomic, potential environmental impact, mitigation measures during the construction. NEMA points out to add some more survey items such as raw materials, products, by-products and waste generated in the business and their treatment methods. Accident preventive measures and countermeasures in the event of an accident, health and safety plans for workers and neighbouring residents, environmental management plans, climate change vulnerability assessment and adaptation etc. 2. Required alternative plan for the project site, design, technologies, and procedures.	Compared with JICA environmental guidelines, the impact report of the middle risk project regarding the system related to the environment in the host country is vulnerable in survey items. We will consult with NEMA and add survey items accordingly.

Item	JICA Environmental Guideline	System in Kenya	Discrepancy and elimination
Monitoring and complaint management	- Efforts should be made to disclose the monitoring results to the local stakeholders involved in the project. - When third parties point out in concrete terms that environmental and social considerations are not being fully undertaken, forums for discussion and examination of countermeasures are established based on sufficient information disclosure, including stakeholders' participation in relevant projects, project proponents, etc., should make efforts to reach an agreement on procedures to be adopted with a view to resolving problems.	The Environmental Impact Assessment and Audit Regulations, 2003 stipulate environmental monitoring and audits but information disclosure and complaint management are not included.	Compared with the JICA environmental guideline, the host country system does not require information disclosure and complaint management. However, it should consult with NEMA, and consider correspondence.
Fauna and flora	Projects must not involve significant conversion or significant degradation of critical natural habitats and critical forests.	Fauna and flora conserved by Wildlife Management Act 1985. Management and Co-ordination Conservation of Biological. Diversity and Resources, Access to Genetic Resources and Benefit Sharing Regulations, 2006 and Environmental Management and Co-ordination (Wetlands, River Banks, Lake Shores and Sea Shore Management) Regulation, 2009 are related to The Environmental (Impact Assessment and Audit) Regulations, 2003.	Discrepancy is not large.
Indigenous people	Any adverse impacts that a project may have on indigenous peoples are to be avoided when feasible by exploring all viable alternatives. When, after such an examination, avoidance is proved unfeasible, effective measures must be taken to minimize impacts and to compensate indigenous peoples for their losses.	The Environmental (Impact Assessment and Audit) Regulations, 2003 is not clarified about indigenous people.	Discrepancy between global and Kenyan standard, although the project will be implemented within the public site and will have no adverse impact to indigenous people.

Source: JICA Survey Team

1-3-1-4 Examination and Comparison of Alternatives (Including Zero Option)

We examined alternatives for multiple cases, one for not implementing the project and the other for implementing the project as shown in the table below.

Table 1-11 Examination and Comparison of Alternatives

Alternative		Evaluation	
1	Not to Implement the Project	The expanded scope and increased importance of the medical research field involved in experiments in Kenya has made it a top priority for KEMRI to ensure that it has adequate facilities and equipment for future research activities. The option of not implementing the project is a concern for the negative impact it would have on the development of medical technology in Kenya. It would also not improve the situation where there is sufficient space available on the existing site but the land is not being used effectively.	-

Alternative		Evaluation	
2	To develop and expand the project within the existing research facilities at the KEMRI headquarters site.	This alternative would provide the space needed for additional research within the existing facility without building the new laboratory that KEMRI is proposing. This alternative is not suitable because KEMRI's proposal would significantly expand the current scope of research activities, which would not provide sufficient space in the existing facility and would result in a chaotic institutional environment. In addition, adoption of this alternative would require reconfiguration of the existing facility design, which could be costly and time-consuming. Even if the project is temporarily successful in improving and expanding the existing research facilities, new research issues will continue to pile up over time, and this alternative will not solve the existing problems because the project was proposed to solve those piling up issues.	3
3	To establish a new research facility at the existing KEMRI headquarters site	The proposed project will construct a new research facility on the site of the existing KEMRI headquarters, which is considered to be the most economically and environmentally optimal project proposal because it will have minimal impact on neighbouring residents and the ecosystem, will not require the acquisition of new land, will not cause problems such as resettlement, and will have a smaller budget.	1
4	to implement the project on land adjacent to KEMRI headquarters	There is a proposal to acquire adjacent land to implement the project in order to link and interlock with the existing facilities at the KEMRI headquarters, but this is difficult to implement mainly from an economic aspect, such as procuring the necessary costs to acquire the land. In addition, this alternative is likely to result in conflicts with local residents due to concerns about negative impacts on the management and operation of nearby commercial and medical facilities. Various negative impacts, such as compensation costs for resettlement, etc., are also possible.	2
5	to implement the project at other project sites	The alternative of finding other land would require finding a parcel of land that complies with the functional requirements of KEMRI's LB3-level research facility. However, finding such land would be extremely difficult and would require significant funding to secure the land. In addition, the waste, exhaust, and wastewater generated by the institute would likely be opposed by local residents, and compared to Proposal 3, there would be no economic or environmental advantage due to the cost of constructing a new incinerator for existing medical waste, etc. or transporting such waste to the KEMRI headquarters. In addition, compared to Proposal 4, this proposal also entails difficulties in terms of coordination and linkage with existing facilities at KEMRI headquarters.	4

Source: JICA Survey Team

In light of the above, although the proposal to establish a new research facility at the existing KEMRI headquarters site is expected to have environmental and social impacts, it is desirable to implement the project while minimizing the impacts through appropriate environmental mitigation measures, considering the effects on the development of medical technology, which is a pressing issue in the country.

1-3-1-5 Scoping

The scoping results for the proposal to establish a new research facility on the existing KEMRI headquarters site are shown in the table below.

Table 1-12 Expected Environmental and Social Impact (Scoping Matrix)

Area	No.	Impact Item	Rating		Reason of Rating
			Pre/During Construction	Operation Phase	
Pollution	1	Air Pollution	B-	C	Construction Phase: Temporary negative impacts are expected from dust. Operation Phase: Deterioration in air quality due to medical exhaust needs to be monitored.
	2	Water Pollution	B-	C	Construction Phase: Excavation work at construction sites may cause water pollution of nearby rivers. Operation Phase: The impact of medical drainage in the operation phase needs to be monitored.
	3	Waste	C	C	Construction Phase: The expected generation of construction debris and waste materials needs to be monitored. Operation Phase: Waste including medical and infectious waste will be generated from new research facilities during operation phase, so the management system needs to be confirmed.
	4	Soil Contamination	C	C	Construction Phase: The possibility of soil contamination from oil leaking from heavy machinery, etc. needs to be monitored. Operation Phase: Solid waste and liquid waste can contaminate soil.
	5	Noise and Vibration	B-	D	Construction Phase: Noise and vibration due to operation of heavy equipment and vehicles is expected. Operation Phase: No noise or vibration is expected.
	6	Ground Subsidence	D	D	Construction Phase/Operation Phase: The project does not anticipate any work or use that would cause subsidence.
	7	Odor	D	D	Construction Phase/Operation Phase: The project does not anticipate any operations or uses that would generate odours.
	8	Sediment Quality	D	D	Construction Phase/Operation Phase: No work that will affect bottom sediments is anticipated in this project.
Natural Environment	9	Protected area	D	D	Construction Phase/Operation Phase: The proposed project site is on the site of an existing research facility, and there are no protected areas in or around the proposed site, and no impact on protected areas is anticipated.
	10	Ecosystem	C	D	Construction Phase: The impact of tree and shrub cutting on the construction of the research facility needs to be considered. Operation Phase: No impact is anticipated.
	11	Hydrology	D	D	Construction Phase/Operation Phase: It is not anticipated that the project will have any impact on the project area that will cause changes in the water flow or bed of rivers or other water bodies.
	12	Topography and geology	D	D	Construction Phase/Operation Phase: No topographical or geological impacts are anticipated for this project because the project area is within the existing research facility site.

Area	No.	Impact Item	Rating		Reason of Rating
			Pre/During Construction	Operation Phase	
Social Environment	13	Involuntary resettlement	D	D	Construction Phase/Operation Phase: In this project, the project area is within the existing research facility site, and land acquisition and resettlement will not occur.
	14	The poor	B+	C	Construction Phase: Increased employment opportunities for civil engineering workers, etc. can be expected. Operation Phase: The possibility that the poor may benefit from the new technology of institute needs to be monitored.
	15	Indigenous and ethnic people	D	D	Construction Phase/Operation Phase: There are no ethnic or indigenous minorities in or near the subject area, and no impacts are anticipated.
	16	Local economy such as employment and livelihood	B+	C	Construction Phase: Increased employment opportunities for civil workers, engineers, etc. are expected. Operation Phase: It is envisioned that employment will be promoted by increasing the number of institute staff.
	17	Land use and utilization of local resources	D	D	Construction Phase/Operation Phase: Since the project will construct the facility on the site of an existing research facility, no impact on land use and local resource use is anticipated.
	18	Water usage	D	D	Construction Phase/Operation Phase: No use of water from surrounding rivers or other sources is anticipated.
	19	Existing social infrastructures and services	B-	B+	Construction Phase: Traffic congestion is expected. Operation Phase: Improvements in medical research, technology, and services are expected.
	20	Social institutions such as local decision making institutions	D	D	Construction Phase/Operation Phase: The project is the construction of a new research facility on the site of an existing research facility and is not expected to impact social capital or local decision-making bodies.
	21	Misdistribution of benefit and damage	D	D	Construction Phase/Operation Phase: This project is the construction of a new research facility on the site of an existing research facility, and is not expected to cause damage or benefit unevenly in the surrounding area.
	22	Local conflict of interests	D	D	Construction Phase/Operation Phase: This project is the construction of a new research facility on the site of an existing research facility and is not expected to cause any conflicts of interest within the region.
	23	Cultural heritage	D	D	Construction Phase/Operation Phase: Since there are no cultural heritage sites in and around the project area, no impact on cultural heritage is anticipated.
	24	Landscape	C	D	Construction Phase: This project may cause damage to the landscape as trees and shrubs on the site will be cut down. Operation Phase: This research institute is a two-story building and is not expected to damage the landscape of the surrounding area along with the existing research facilities.
	25	Gender	C	C	Construction Phase/Operation Phase: Consideration should be given to ensure sufficient participation of men and women in business.

Area	No.	Impact Item	Rating		Reason of Rating
			Pre/During Construction	Operation Phase	
	26	Right of children	C	D	Construction Phase: The possibility of child labour by this project needs to be monitored. Operation Phase: No particular impact on children's rights is expected from this project.
	27	Infectious diseases such as HIV/AIDS	C	C	Construction Phase: There is a possibility of the spread of infectious disease by construction workers. Operation Phase: The possibility of infection from research activities needs to be monitored.
	28	Labour environment	C	D	Construction Phase: The construction work must be carried out in line with Kenyan occupational safety standards. Operation Phase: No specific problems were identified from the working environment at the existing research facility, so it is not expected that the situation will change significantly during the operation phase.
Others	29	Accidents	B-	C	Construction Phase: Accidents in the Construction Phase are expected. Operation Phase: Accidents are expected to occur while using the research facilities.
	30	Cross boundary impacts and climate change	D	D	Construction Phase: The project is the construction of a new research facility on the site of an existing research facility, and no transboundary impacts or special climate change impacts are anticipated. Operation Phase: Although greenhouse gas emissions from new research facilities are possible, transboundary impacts and special climate change impacts are not anticipated.

A+/-: Significant positive/negative impacts are anticipated.

B+/-: Some degree of positive/negative impact is expected.

C: The existence, extent, and scope of the impact is unknown and requires further investigation.

D: No or minor impact and no further investigation is required

*The impact items in this scoping proposal were selected with reference to the JICA Guidelines for Environmental and Social Considerations, etc.

Source: JICA Survey Team

1-3-1-6 TOR for Environmental and Social Consideration Survey

(1) Scope of the Survey

The scope of the survey is expected to include the project site and the area surrounding the site. Particularly regarding public participation, consultation with the department which is in charge of environmental and social consideration in KEMRI and NEMA, while the scope of consideration outside the research institute's premises was broadly targeted.

(2) Survey Items and Methods

The following is a description of the survey and its methodology for the impact items narrowed down by scoping. In accordance with the Environmental Impact Assessment Law of the country, the actual survey was conducted locally through a subcontractor qualified as an environmental impact assessor.

Table 1-13 Survey Item and Methodologies for EIA (TOR)

Category	Impact Item	Survey Item	Methodology
Pollution	Air Pollution	1. Measurement of air quality at the proposed project site 2. Standard values for air quality	1. Measurements of sulfur dioxide (SO ₂), nitrogen dioxide (NO ₂), carbon monoxide (CO), and inhalable and respirable particulate matter (PM ₁₀ and PM _{2.5}) at a total of five points in the centre of the proposed project site and at four corners of the proposed site boundary 2. Survey of existing data
	Water Quality	1. Analysis of water quality in and around the proposed project site 2. Water quality standard values	1. Three samples were collected from the groundwater on the KEMRI headquarters site, the municipal water supply pipe on the same site, and a nearby river (Nairobi side), and analysed by a certified laboratory for the following analytical parameters: pH, Turbidity, Total Suspended Solids, Total Dissolved Solids, Fluoride, Nitrate, Ammonia, Copper, Zinc, Nitrite, Lead, Cadmium, Arsenic, Selenium, Phenols, Permanganate Value and E. Coli. 2. Survey of existing data
	Waste	Disposal plans for waste materials such as construction debris and waste materials, as well as specifications and utilization of onsite incinerators	Review of KEMRI's waste management and incinerator-related materials, interviews with KEMRI's Environmental and Social Considerations Officer, site inspections (visual inspection of the medical waste incinerator at the facility, etc.)
	Soil Contamination and Sediment	1. analysis of soil at the proposed project site 2. Environmental and regulatory standards for soil	1. Soil samples are collected from a depth of 0 to 1.5 m below the surface using a manual soil sampling auger in accordance with USEPASOP soil sampling methods and analysed by a certified laboratory for the following: heavy metals (arsenic, cadmium, cobalt, chromium, copper, molybdenum, lead, Nickel, zinc and mercury), etc. 2. Survey of existing data (However, as Kenya has no laws and regulations regarding soil contamination limits and environmental standards, the Dutch standard, which has become an international benchmark, was adopted.)
	Noise and Vibration	1. Measurement of noise and vibration at the proposed project site 2. Standard values for noise and vibration	1. At a total of five points in the centre of the proposed project site and at four corners of the proposed site boundary, Type 1 noise and vibration measuring instruments were used in accordance with international standards for noise and vibration measuring instruments (IEC 61672:1999, etc.) and international standards for noise and vibration measurement and assessment (ISO 19961:2003 and ISO 3095: 2001): (ISO 19961:2003 and ISO 3095:2001). 2. Survey of existing data
Natural Environment	Ecosystem	Survey and confirmation of animals, plants, and ecosystems in the proposed project site	Survey of existing data, field survey (identification of trees (including shrubs) to be harvested), Red List reference, mapping, and interviews with relevant agencies as necessary
Social Environment	The poor	Poverty status among affected households	Survey of existing data and interviews with neighbourhood residents and related agencies about public involvement
	Local economy, including employment and means of livelihood	Survey on employment and comparison with JICA guidelines, etc.	Research of relevant laws and guidelines, and scrutiny of existing materials related to employment and occupational health and safety

Category	Impact Item	Survey Item	Methodology
	Existing social infrastructure and social services	Distribution and use of roads, water, electricity and utilities	Field survey and Interviews with neighbourhood residents and related organizations about public involvement
	Landscape	Confirmation of current landscape	Survey of existing data, field survey and Interviews with neighbourhood residents and related organizations about public involvement
	Gender	Gender equality and role-sharing	Survey of existing data and Interviews with neighbourhood residents and related organizations about public involvement
	Right of Children	Survey on Children's Rights and Child Labour	Survey of existing data
	Infectious Diseases including STD such as HIV/AIDS	Surveys related to HIV/AIDS and other infectious diseases	Survey of existing data
	Labour Environment	Survey on policies and laws related to occupational safety, comparison with international guidelines and improvement of working environment	Survey of existing data and Interviews with neighbourhood residents and related organizations about public involvement
Others	Accident	Safety measures for workers during construction	Survey of existing documents (Kenyan laws and regulations, WHO guidelines, etc.)

Source: JICA Survey Team

1-3-1-7 Result of Environmental and Social Consideration Survey (including Predicted Result)

The summary of the survey results is shown below.

Table 1-14 Pollution Control Measures and Natural Environment Survey Results

Area	Impact Item	Survey Result	Analysis of Survey Result
Pollution Control Measures	Air Pollution	Baseline surveys were conducted at a total of five points in the centre of the proposed project site and at four corners of the proposed site boundary. The results of the measurements and analysis are summarized below. - SO₂: 27-72 µg/m³ - NO₂: 25-44 µg/m³ - CO: 0.1-1.3 mg/m³ - PM_{2.5}: 0-14 µg/m³ - PM₁₀: 7-21 µg/m³	The measurement results were below the standard values of the following Kenyan regulations (EMCA, Air Quality Regulations 2014) for all measured items and locations. - SO₂: 80 µg/m³ (24-hour average) - NO₂: 80 µg/m³ (24-hour average) - CO: 4.0 mg/m³ (1-hour average) - PM_{2.5}: 75 µg/m³ (24-hour average) - PM₁₀: 100 µg/m³ (24-hour average) As a reference, compared to the following World Health Organization guidelines, CO, PM_{2.5}, and PM₁₀ were below the standard values at all locations, but SO₂ and NO₂ exceeded the standard values - SO₂: 40 µg/m³ (24-hour average) - NO₂: 25 µg/m³ (24-hour average) - CO: 4.0 mg/m³ (1-hour average) - PM_{2.5}: 15 µg/m³ (24-hour average) - PM₁₀: 45 µg/m³ (24-hour average)

Area	Impact Item	Survey Result	Analysis of Survey Result
	Water Pollution	A total of three samples were collected at three locations: groundwater on the KEMRI headquarters grounds, a municipal water supply pipe on the grounds, and a nearby river (on the Nairobi side), and 17 analytes (pH, Turbidity, Total Suspended Solids, Total Dissolved Solids, Fluoride, Nitrate, Ammonia, Copper, Zinc, Nitrite, Lead, Selenium, Phenols, Permanganate Value, and Permanganate Value) were collected at a certified laboratory. Solids, Fluoride, Nitrate, Ammonia, Copper, Zinc, Nitrite, Lead, Cadmium, Arsenic, Selenium, Phenols, Permanganate Value and E. Coli). In the groundwater, pH 9.2, turbidity 6.7 NTU, fluorine 10.4 TCU, and permanganate value 0.9 were below the standard values. In the municipal water supply pipes, coliform group counts of 2 coliforms/100ml and permanganate value 0.2 were below the standard values. No exceedances of the standard values were observed in neighbouring rivers.	The following exceedances of Kenyan regulatory (EMCA, Water Quality Regulations 2006) standards were found in the measurement and analysis results. - pH: 6.5-8.5 - Turbidity: 5NTU - Fluorine: 1.5TCU - Coliform count: 0.1/100ml and above - Permanganate: less than detection limit
	Waste	Based on the results of interviews with KEMRI, it can be assumed that construction waste materials generated during construction will be properly collected, transported, and disposed of by a licensed industrial waste transporter. As for medical waste generated during the construction period, a Western-made medical waste incinerator with a processing capacity of several hundred kilograms per day has been installed at the proposed project site since around 2020, and although there are facilities for appropriate treatment, it is not clear whether the waste will actually be used appropriately, as it was still under maintenance when the inspection was made.	No issues were identified with respect to waste management from the results of the interviews with KEMRI. When outsourcing the collection, transportation, and disposal of industrial waste, it is necessary to prepare and properly store records of transportation from the source to the licensed final disposal site, in accordance with Appendix 1 Form 3 (Tracking Document) of the Kenyan Waste Management Act. In addition, it is necessary to periodically check that the medical waste generated is actually properly incinerated in the on-site medical waste incinerator, as well as the results of analysis of the concentration of contaminants in the flue gas and the management status of the incinerated ash.
	Soil Pollution	A total of three samples were collected at a total of three sites in the proposed project area, one sample each, and analysed for ten analytes (arsenic, cadmium, cobalt, chromium, copper, molybdenum, lead, nickel, zinc, and mercury) by a certified laboratory. Samples from all sampling sites showed exceedances of zinc and molybdenum standards. Zinc concentrations ranged from 127-145 mg/kg and molybdenum concentrations ranged from 4.8-6.1 mg/kg.	Since there are no environmental standards or regulations for soil contamination in Kenya, the results were compared to the Dutch standards, which are international standards. As a result, the following exceedances were found for molybdenum and zinc -Zinc: 20 mg/kg - Molybdenum: 1.0 mg/kg
	Noise and Vibration	Baseline surveys were conducted at a total of five points in the centre of the proposed project site and at four corners of the proposed site boundary. The results of the measurement analysis are summarized below. - Noise: Less than 52.1 dBA - Vibration: less than 5 mm/s	The measurement results were below the following Kenyan regulation (EMCA, (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009) standards at all measurement points. - Noise: 55 dBA - Vibration: 5mm/s

Source: JICA Survey Team

Table 1-15 Social Environment Survey Results

Area	Impact Item	Survey Result
Social Environment	The poor	The definition of the poor in Kenya (Poverty Line) is defined as people living on less than \$1.9 per day as international standards, and a 2015 Kenya National Bureau of Statistics survey found that 36% of the total population was poor (Kenya National Bureau of Statistics 2015). World Bank project survey estimated 33% of the population to be poor due to Covid-19, with a projected recovery to around 31.6% in 2024 (2022 World Bank Report). Since there are no affected households for land acquisition and resettlement in the first place, there are no poor affected by the project. Although it is possible to assume that the local residents will be employed as civil workers during the construction period through public involvement, the benefits to the poor are limited.
	Local economy, including employment and means of livelihood	In 2020, the number of employments in Kenya will be about 17.4 million people (2.9 million in formal employment and 14.5 million under informal conditions), decreased from 18.1 million in the previous year due to Covid-19. The unemployment rate for 2021 was 5.7% (International Labour Organization, ILOSTAT database 2022). Positive impacts are expected during both the construction and operation periods, since employment of civil workers, etc. can be expected, and employment of researchers, technical staff, etc. can be expected to be created.
	Existing social infrastructure and social services	Although traffic congestion in the neighbourhood during the construction period is difficult to avoid and negative impacts are unavoidable, the project is expected to have a positive impact on social infrastructure and social services by improving medical research, technology, and services when it is in service.
	Landscape	The cutting of trees and shrubs during construction will be limited to a very small portion of the existing research facility site and will not have a significant impact on the landscape. In addition, it is not anticipated that new facility along with the existing research facilities will damage the landscape of the surrounding area during the operation since the new facility will be a two-story building.
	Gender	Article 27(8) of the 2010 Constitution of Kenya provides that the State shall take steps to ensure that not less than two-thirds of the members of all elective and appointive positions are of the same sex. However, more than 10 years after the 2010 Constitution of Kenya was promulgated, no specific legislation has been enacted to operationalize this constitutional provision on gender equality. When residents were interviewed, they voiced concerns about gender disparity with regard to employment of neighbourhood residents during the construction period, and therefore, construction contractors need to be encouraged to take this into consideration. As for the gender bias in employment during the construction period, we have heard from KEMRI that it will make efforts to eliminate the bias, and we judge that the impact will be limited.
	Right of Children	The Government of Kenya has established a strong legal and policy framework for the protection of children (Article 53 of the Constitution of Kenya 2010). The Constitution recognizes the right of all children to be protected from abuse, neglect, harmful cultural practices, all forms of violence, inhumane treatment and punishment, and unsafe or exploitative labour. The Kenyan Ministry of Labour and Social Protection released the Violence Against Children Investigation Report in 2019 and the National Prevention and Response Plan on Violence Against Children 2019-2023 in the same year. In 2020, 8.5% of children have worked (Kenya National Bureau of Statistics 2022), and about 3 in 5 boys and 1 in 3 girls have worked for money (2020 UNICEF report). Although there are concerns about the possibility of child labour during the construction period, no specific impact on children's rights is expected from the Project during the operation.
	HIV/AIDS and other infectious diseases	Kenya's HIV/AIDS rate among people aged 15-49 years has dropped from a peak of 10% in 1997 to 4% in 2020. However, the situation is still higher than the regional average, given that the average rate in Sub-Saharan Africa in 2020 is 3.6%. (2020 USAID Report). In addition, the number of children living with HIV decreased from 180,000 in 2010 to 110,000 in 2020. This is attributed to improved access to services for pregnant women. However, the rate of infection among young people (aged 15-24) remains a concern. Young people accounted for 35% of new infections in 2020, particularly young women, who accounted for two-thirds of cases. Gender inequality, difficulties in accessing health services, and poverty contribute to higher rates of unintended pregnancy and HIV (UNICEF report for 2020). Although there is concern about the potential for the spread of infections by site workers during the construction period, no specific potential for transmission due to research activities was identified during the operation.

Area	Impact Item	Survey Result
	Work environment	Occupational health and safety and working conditions in Kenya are regulated by the Occupational Health and Safety Act of 2007, with the Department of Occupational Safety and Health (DOSH) as the supervising authority. It aims to promote safe and healthy workplaces, reduce production costs, and increase productivity in all sectors of the economy by implementing effective systems to prevent occupational diseases, health hazards, and damage to property. During the construction period, construction work must be carried out in line with Kenyan occupational safety standards, and the working environment for site workers must be taken into consideration. No specific concerns about the working environment during the in-service period exist at this time, as no problems were identified with the working environment at the existing research facility.
	Accident	The rate of accidents and deaths among young male workers at construction sites in Nairobi is high: 237 accidents occurred in the four years from 2014 to 2017, killing 32 people in Nairobi County alone. Furthermore, about 115 men between the ages of 21 and 40 were seriously injured, some of them suffering permanent injuries as a result of the accidents. More than 70% of workers injured or killed in accidents at construction sites in Nairobi were under the age of 40 (2017 Department of Occupational Safety and Health (DOSH) Report). These statistics indicate that accidents during construction require advance preparation and implementation of countermeasures during the construction period. With regard to in-service, no specific concerns regarding accidents were identified based on the measures taken at the existing research facility.

Source: JICA Survey Team

1-3-1-8 Impact Assessment

The results of the assessment of possible environmental and social impacts if the project were to be implemented are shown below.

Table 1-16 Evaluation of Environmental and Social Impact

Area	No	Impact	Rating At Scoping Stage		Rating Based on the survey Result		Reason of Rating
			Pre/During Construction	Operation Phase	Pre/During Construction	Operation Phase	
Pollution	1	Air Pollution	B-	C	B-	D	Construction Phase: Air pollution are expected from dust. Operation Phase: Negative impact can be avoided by installing equipment such as filters for medical exhaust.
	2	Water Pollution	B-	C	B-	D	Construction Phase: Excavation work at construction sites may cause water pollution of nearby rivers. Operation Phase: Medical wastewater is expected to be handled by appropriate wastewater treatment equivalent to that at existing facilities.
	3	Waste	C	C	D	B-	Construction Phase: Construction waste materials generated during construction will be properly collected, transported, and disposed of by an industrial waste transporter approved by the competent authorities. Operation Phase: It is necessary to periodically check whether the medical waste is properly incinerated in the on-site waste incinerator, as well as the results of analysis of the concentration of contaminants in the flue gas and the management status of the incinerated ash.

Area	No	Impact	Rating At Scoping Stage		Rating Based on the survey Result		Reason of Rating
			Pre/During Construction	Operation Phase	Pre/During Construction	Operation Phase	
	4	Soil Contamination	C	C	D	D	Construction Phase: Any work that would cause soil contamination will not occur in this project. Operation Phase: No further soil contamination impacts from the current situation are anticipated.
	5	Noise and Vibration	B-	D	B-	D	Construction Phase: Noise and vibration due to operation of heavy equipment and vehicles is expected. Operation Phase: No noise or vibration is expected.
	6	Ground Subsidence	D	D	D	D	Construction Phase/Operation Phase: The project does not anticipate any work or use that would cause subsidence.
	7	Odor	D	D	D	D	Construction Phase/Operation Phase: The project does not anticipate any operations or uses that would generate odours.
	8	Sediment Quality	D	D	D	D	Construction Phase/Operation Phase: No work that will affect bottom sediments is anticipated in this project.
Natural Environment	9	Protected area	D	D	D	D	Construction Phase/Operation Phase: The proposed project site is on the site of an existing research facility, and there are no protected areas in or around the proposed site, and no impact on protected areas is anticipated.
	10	Ecosystem	C	D	D	D	Construction Phase: The proposed project site is mainly lawn, with a few flower beds and a few trees, including shrubs, that have been identified, but these are not on the IUCN Red List, etc., and the clearing will not involve significant vegetation or animal habitat degradation or other impacts on the natural environment. Operation Phase: No impact is anticipated.
	11	Hydrology	D	D	D	D	Construction Phase/Operation Phase: It is not anticipated that the project will have any impact on the project area that will cause changes in the water flow or bed of rivers or other water bodies.
	12	Topography and geology	D	D	D	D	Construction Phase/Operation Phase: No topographical or geological impacts are anticipated for this project because the project area is within the existing research facility site.
Social Environment	13	Involuntary resettlement	D	D	D	D	Construction Phase/Operation Phase: In this project, the project area is within the existing research facility site, and land acquisition and resettlement will not occur.
	14	The poor	B+	C	B+	D	Construction Phase: Increased employment opportunities for civil engineering workers, etc. can be expected. Operation Phase: The benefits to the poor at the time of service through public involvement, etc. were judged to be limited.

Area	No	Impact	Rating At Scoping Stage		Rating Based on the survey Result		Reason of Rating
			Pre/During Construction	Operation Phase	Pre/During Construction	Operation Phase	
	15	Indigenous and ethnic people	D	D	D	D	Construction Phase/Operation Phase: There are no ethnic or indigenous minorities in or near the subject area, and no impacts are anticipated.
	16	Local economy such as employment and livelihood	B+	C	B+	B+	Construction Phase: Increased employment opportunities for civil workers, engineers, etc. are expected. Operation Phase: It is envisioned that employment will be promoted by increasing the number of institute staff.
	17	Land use and utilization of local resources	D	D	D	D	Construction Phase/Operation Phase: Since the project will construct the facility on the site of an existing research facility, no impact on land use and local resource use is anticipated.
	18	Water usage	D	D	D	D	Construction Phase/Operation Phase: No use of water from surrounding rivers or other sources is anticipated.
	19	Existing social infrastructures and services	B-	B+	B-	B+	Construction Phase: Traffic congestion is expected. Operation Phase: Improvements in medical research, technology, and services are expected.
	20	Social institutions such as local decision making institutions	D	D	D	D	Construction Phase/Operation Phase: The project is the construction of a new research facility on the site of an existing research facility and is not expected to impact social capital or local decision-making bodies.
	21	Misdistribution of benefit and damage	D	D	D	D	Construction Phase/Operation Phase: This project is the construction of a new research facility on the site of an existing research facility, and is not expected to cause damage or benefit unevenly in the surrounding area.
	22	Local conflict of interests	D	D	D	D	Construction Phase/Operation Phase: This project is the construction of a new research facility on the site of an existing research facility and is not expected to cause any conflicts of interest within the region.
	23	Cultural heritage	D	D	D	D	Construction Phase/Operation Phase: Since there are no cultural heritage sites in and around the project area, no impact on cultural heritage is anticipated.
	24	Landscape	C	D	D	D	Construction Phase: The tree and shrub removal will be limited to a very small portion of the existing study site and will not have a significant impact on the landscape. Operation Phase: This research institute is a two-story building and is not expected to damage the landscape of the surrounding area along with the existing research facilities.

Area	No	Impact	Rating At Scoping Stage		Rating Based on the survey Result		Reason of Rating
			Pre/During Construction	Operation Phase	Pre/During Construction	Operation Phase	
	25	Gender	C	C	B-	D	Construction Phase: Concerns were voiced regarding gender disparity with respect to employment of neighbourhood residents during the construction period. Operation Phase: With regard to the gender bias in employment during the operation, we have heard from KEMRI that it will make efforts to eliminate the bias, and we judge that the impact will be limited.
	26	Right of children	C	D	B-	D	Construction Phase: There is concern about the possibility of child labour during the construction period. Operation Phase: No particular impact on children's rights is expected from this project.
	27	Infectious diseases such as HIV/AIDS	C	C	B-	D	Construction Phase: There is a possibility of the spread of infectious disease by construction workers. Operation Phase: No specific potential for HIV/AIDS transmission from research activities was identified during operation.
	28	Labour environment	C	D	B-	D	Construction Phase: During the construction period, work must be carried out in line with Kenyan occupational safety standards, and the working environment for site workers must be taken into consideration. Operation Phase: Since no problems were identified with the working environment at the existing research facility, no specific concerns about the working environment during operation.
Others	29	Accidents	B-	C	B-	D	Construction Phase: Accidents in the Construction Phase are expected. Operation Phase: Based on accident countermeasures at existing research facilities, specific concerns regarding in-service accidents have not been identified at this time.
	30	Cross boundary impacts and climate change	D	D	D	D	Construction Phase: The project is the construction of a new research facility on the site of an existing research facility, and no transboundary impacts or special climate change impacts are anticipated. Operation Phase: Although greenhouse gas emissions from new research facilities are possible, transboundary impacts and special climate change impacts are not anticipated.

A+/-: Significant positive/negative impacts are anticipated.

B+/-: Some degree of positive/negative impact is expected.

C: The existence, extent, and scope of the impact is unknown and requires further investigation.

D: No or minor impact and no further investigation is required

*The impact items in this scoping proposal were selected with reference to the JICA Guidelines for Environmental and Social Considerations, etc.

Source: JICA Survey Team

1-3-1-9 Cost for Mitigation Measure and Implementation

Mitigation measures and the costs of implementing mitigation measures are described below.

Table 1-17 Mitigation Measures and its Cost (Construction Phase)

Area	No	Impact Item	Draft Mitigation Measures	Cost	Agencies	
				KES	Implementing	Responsible
Pollution	1	Air Pollution	Provide appropriate training to project personnel to minimize air pollution impacts before construction begins*.	300,000	Contractor	KEMRI
			Heavy equipment operators are encouraged to operate the equipment properly and avoid unnecessary travel in order to minimize exhaust emissions.	-	Contractor	KEMRI
			Install dust control fencing (if necessary) *.	250,000	Contractor	KEMRI
			Construction equipment should always be maintained and kept in good condition to prevent emissions.	-	Contractor	KEMRI
			Water sprinkling to prevent dust	1,500,000	Contractor	KEMRI
	2	Water Pollution	Reduces river pollution by reducing dust	Included in 1	Contractor	KEMRI
			Installation of portable toilets and collection of waste	1,800,000	Contractor	KEMRI
			Installation of temporary drainage channels*.	450,000	Contractor	KEMRI
	3	Waste	Waste generated during construction is outsourced to industrial waste collection, transportation, and disposal companies licensed by the competent authorities.	3,600,000	Contractor	KEMRI
			Receive and keep records of transportation from the source to the final disposal site based on Appendix 1 Form 3 of the Waste Management Act.	-	Contractor	KEMRI
	5	Noise and Vibration	Install soundproof walls (if necessary) *.	300,000	Contractor	KEMRI
			Avoid construction at night	-	Contractor	KEMRI
			Use of low-noise vehicles	-	Contractor and Transportation Company	KEMRI
			Minimized engine idling	-		KEMRI
			Large trucks avoid driving in noise sensitive areas	-		KEMRI
			Distribute earplugs to workers during noisy operations	-	Contractor	KEMRI
Social Environment	19	Existing social infrastructures and services	Develop a traffic management plan to avoid traffic congestion caused by construction vehicles*	100,000	Contractor	KEMRI
			Installation of detour routes and other information signs*	300,000	Contractor	KEMRI
			Deployment of traffic control staff	600,000	Contractor	KEMRI
	25	Gender	Minimizing gender disparities in employment during construction	-	Contractor	KEMRI
			Women's restrooms and changing rooms*	200,000	Contractor	KEMRI
	26	Right of children	KEMRI to inform and supervise construction companies on the prohibition of child labour	-	Contractor	KEMRI
	27	Infectious diseases such as HIV/AIDS	Installation of portable toilets and collection of waste*	Included in 2	Contractor	KEMRI
			Periodic health checkups	600,000	Contractor	KEMRI
			Conducting awareness and training on prevention of HIV/AIDS and other infectious diseases	300,000	Contractor	KEMRI

Area	No	Impact Item	Draft Mitigation Measures	Cost	Agencies	
				KES	Implementing	Responsible
	28	Labour environment	Provide personal protective equipment and training to workers*	750,000	Contractor	KEMRI
			Installation of signs warning of danger*	100,000	Contractor	KEMRI
			Compliance with working hours in accordance with labour laws	-	Contractor	KEMRI
			Ensuring a good working environment	-	Contractor	KEMRI
Others	29	Accidents	Develop and disseminate an emergency response plan and safety handbook and conduct training*.	200,000	Contractor	KEMRI
			Traffic management, including installation of speed limit signs and deployment of monitors	Included in 19	Contractor	KEMRI
			Installation of safety signs*	100,000	Contractor	KEMRI
			Restrict entry to unauthorized persons using fences and signs*	100,000	Contractor	KEMRI
			Installation of night lighting at construction sites*	300,000	Contractor	KEMRI
			Setting up parking for construction vehicles	-	Contractor	KEMRI

Note: Items with a * at the end of the mitigation measure are one-time costs during the period; all other items are annual costs.

Source: JICA Survey Team

Table 1-18 Mitigation Measures and its Cost (Operation Phase)

Area	No	Impact Item	Draft Mitigation Measures	Cost	Agencies	
				KES	Implementing	Responsible
Pollution	1	Air Pollution	Purification of exhaust gas using HEPA filters to be installed at the new facility	200,000	KEMRI	KEMRI
			Absorption of flue gas using APCD (Air Pollution Control Device) installed in the chimney of an existing incinerator	Running Cost for Existing Incinerator	KEMRI	KEMRI
			Conduct flue gas monitoring from existing incinerators (Sulphur Dioxide, Nitrogen Dioxide, Nitrogen Oxide, Carbon Monoxide, Carbon Dioxide, Oxygen, Ozone, Methane and Hydrocarbon) and confirm compliance with the analysis results	Running Cost for Existing Incinerator	KEMRI	KEMRI
	2	Water Pollution	Operation and maintenance of onsite wastewater treatment facilities with appropriate approvals from the competent authorities	600,000	KEMRI	KEMRI
	3	Waste	Except for medical waste, outsource collection, transportation, and disposal of industrial waste to a company licensed by the competent authorities.	400,000	KEMRI	KEMRI
			Infectious and other medical wastes are incinerated in an onsite incinerator, and ashes are properly stored and managed in designated pits.	900,000	KEMRI	KEMRI

Source: JICA Survey Team

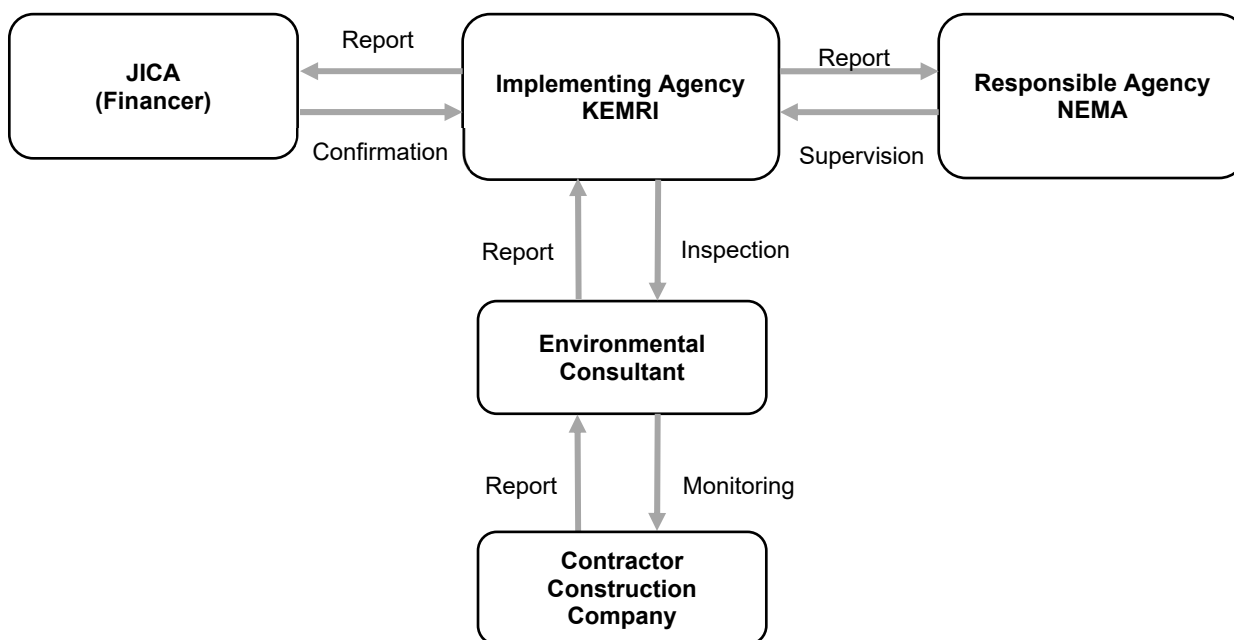
1-3-1-10 Environmental Management and Monitoring Plan

The following table proposes an implementation structure for the environmental and social management plan and monitoring.

Table 1-19 Environmental and Social Considerations Monitoring Organization (Draft)

No	Category of Implementing Agency	Organization/Department
1	Implementing Agency	KEMRI
2	Implementing Organization (Environment Section)	Environment and Social Safety Department
3	Contractor	Construction Company (To be selected after tender)
4	Construction Supervision	Consultant (To be selected after tender)
4.1	Construction Management	Consultant (To be selected after tender)
4.2	Environmental Management	Environmental Consultant (To be selected after tender)
5	Responsible Authority	NEMA: National Environmental Management Authority

Source: JICA Survey Team



Source: JICA Survey Team

Figure 1-7 Environmental and Social Management and Monitoring Organization (Draft)

The following table summarizes the monitoring plan during the project implementation period (before and during construction) and after the completion of the project (during operation).

Table 1-20 Monitoring Plan

Environmental Items	Monitoring Items	Location	Frequency	Yearly Cost (KES)
During Construction (Note: no pre-construction monitoring items)				
Air Pollution	Baseline survey items: NO ₂ , SO ₂ , CO, PM _{2.5} and PM ₁₀	One point at each of the four corners of the site boundary of the proposed project site where the baseline survey was conducted, for a total of four points.	Once per quarter	600,000
Water Pollution	Baseline survey items: pH, Turbidity, Total Suspended Solids, Total Dissolved Solids, Fluoride, Nitrate, Ammonia, Copper, Zinc, Nitrite, Lead, Cadmium, Arsenic, Selenium, Phenols, Permanganate Value and <i>E. Coli</i>	Three sites where baseline surveys were conducted	Once per quarter	600,000

Environmental Items	Monitoring Items	Location	Frequency	Yearly Cost (KES)
Waste	Confirmation of the consignment agreement between KEMRI and the industrial waste collector Confirmation of records of transportation, disposal, etc. that serve as evidence of waste collection and proper disposal	KEMRI Environmental Safety and Health Department	Once a month	200,000
Noise and Vibration	Baseline survey items: Noise and vibration	One point at each of the four corners and a total of four points at the site boundary of the proposed project site where the baseline survey was conducted.	Once per quarter	600,000
Right of children	Investigation into the actual situation of child labour (checking IDs at the work site, checking against employer lists, etc.)	2 locations (construction site and yard)	Daily (report once a month)	200,000
Labour environment	Personal Protective Equipment Wearing Survey Confirmation of the installation status of hazardous material signs, etc. at the site Confirmation of work schedule and hours record	2 locations (construction site and yard)	Daily (report once a month)	350,000
Accidents	Confirmation of accident record documents Prepare emergency response plans and safety handbooks, utilize them, and review training records Check the installation status of speed limit signs, hazardous material signs, etc. Check fences and signs in restricted areas Confirmation of nighttime lighting installation at construction sites Confirmation of parking lot installation for construction equipment and heavy machinery	2 locations (construction site and yard)	Daily (report once a month)	350,000
During Operation				
Air Pollution	Baseline survey items: NO ₂ , SO ₂ , CO, PM _{2.5} and PM ₁₀	A total of five points: one point at each of the four corners of the site boundary of the proposed project site where the baseline survey was conducted, and one point at which exhaust gas is emitted from the BSL2&3 laboratory in the research building.	Once per quarter (continuous during operation)	600,000
	Confirm results of flue gas monitoring (Sulphur Dioxide, Nitrogen Dioxide, Nitrogen Oxide, Carbon Monoxide, Carbon Dioxide, Oxygen, Ozone, Methane and Hydrocarbon) from existing incinerators	Environment, Safety and Health Department (monitoring points are at one existing incinerator)	Once a month (continuous during operation)	Running Cost for Existing Incinerator
	Confirmation of the results of periodic inspections of the HEPA filters to be installed in the project facility and the APCD (Air Pollution Control Device) installed in the chimney of the existing incinerator.	KEMRI Environmental Safety and Health Department	Once per quarter (continuous during operation)	Running Cost for Existing Incinerator

Environmental Items	Monitoring Items	Location	Frequency	Yearly Cost (KES)
Water Pollution	Baseline survey items: pH, Turbidity, Total Suspended Solids, Total Dissolved Solids, Fluoride, Nitrate, Ammonia, Copper, Zinc, Nitrite, Lead, Cadmium, Arsenic, Selenium, Phenols, Permanganate Value and <i>E. Coli</i>	Three sites where baseline surveys were conducted and one site immediately after the effluent from the BSL2&3 labs was treated by the existing onsite wastewater treatment system, for a total of four sites.	Once per quarter (continuous during operation)	700,000
Waste	Confirmation of the status of proper waste separation within the project site Check the status of incineration of medical and industrial waste on site (or outsourced to a licensed industrial waste collector). Check records related to proper storage, management, and disposal of incinerated ash.	2 locations (incinerator on site and Environment, Safety & Health Department)	Once per quarter (Two years)	200,000

Source: JICA Survey Team

1-3-1-11 Stakeholder Consultation

Stakeholder consultations were held from March 17 to April 6, 2022. The types of stakeholders, attributes and number of participants are summarized in the table below.

Table 1-21 Overview of the Stakeholder Consultation

Type of Stakeholders	Participants	Number
Government	Chief- Golf Course Location, National Police Service, Ministry of Health (Public Health Department at Mbagathi County Hospital)	3
Community Leader	Estate Management Committees, MCA representative, Business Associations, Youth Representative, Heads of Neighbouring Schools	6
Local Government	Department of Environment, Public Health Department-Head of Environmental Health Division, Ward Administrator)	3
KEMRI Researcher	Staff (Biotechnology-4; Microbiology- 3; Traditional Medicine-3; & Virus-8)	18
KEMRI Others	Environment & Safety – 5; Engineering - 2	7
Total		37

Source: JICA Survey Team

The stakeholder consultations were generally positive, and it was confirmed that there was no opposition to the implementation of the project. The following is a summary of the main opinions expressed by the participants in the stakeholder consultations.

Anticipated Positive Impacts

- Project will create employment opportunities during construction and its service phase
- National and county governments can generate income through licensing
- Potential employment opportunities will be created for vulnerable groups such as youth and the unemployed.

Possible Negative Impacts

- Air pollution and noise during construction
- Possible water pollution
- Occupational hazards such as fire hazards and physical injury
- Traffic congestion during construction and service phases

The following is a summary of the responses to the participants from the project implementing agencies to the above four possible negative impacts.

- Responses regarding air pollution and noise during construction
- Installation of dust control fencing if necessary
- Water spraying to prevent dust
- Installation of sound barriers if necessary
- Avoid nighttime construction and use of low-noise vehicles
- Avoid driving heavy trucks in noise sensitive areas

Response to possible water pollution

- Reduce dust by sprinkling water, etc. to reduce inflow into rivers and river pollution
- Installation of simple toilets and collection of waste
- Installation of temporary drainage channels during construction

Response to occupational hazards such as fire hazards and physical injury

- Restrictions on entry of unauthorized persons using fences and signs and installation of signs to alert the public of hazards
- Installation of night lighting at construction sites
- Provide personal protective equipment and training for workers
- Develop and disseminate an emergency response plan and safety handbook, and provide training

Traffic congestion during construction and service phases

- Develop a traffic management plan and install detour routes and other information signs
- Deployment of traffic control staff as necessary
- Establishment of parking lots for construction vehicles

The Environmental Impact Assessor for the project proponent has agreed to include the aforementioned measures as mitigation measures in the Environmental and Social Impact Assessment Report, and the project proponent has agreed to assume the obligation to implement said mitigation measures.

It is also recommended that KEMRI establish a system of coordination with the community that will function throughout the Project for the purpose of effectively managing the anticipated problems during construction and operation.

1-3-1-12 Project Site Acquisition Resettlement

Not applicable in this project.

1-3-2 Others

1-3-2-1 Proposed Monitoring Form

1. Responses/Actions to Comments and Guidance from Government Authorities and the Public

Monitoring Item	Monitoring Results during Report Period
ex.) Responses/Actions to Comments and Guidance from Government Authorities will be filled here at the time of monitoring.	Monitoring results will be filled here at the time of monitoring.

2. Pollution Control

- Air Quality (Emission Gas / Ambient Air Quality)

Item	Unit	Measured Value (Mean)	Measured Value (Max.)	Country's Standards	Referred International Standards (WHO)	Remarks (Measurement Point, Frequency, Method, etc.)
SO ₂	µg/m ³	To be filled	To be filled	80	40	4 locations (corners of the project site boundary) and quarterly based on the method of the baseline survey. All the standards are for measurement of 24 hours except for CO for one-hour measurement.
NO ₂	µg/m ³	To be filled	To be filled	80	25	
CO	mg/m ³	To be filled	To be filled	4	4	
PM _{2.5}	µg/m ³	To be filled	To be filled	75	15	
PM ₁₀	µg/m ³	To be filled	To be filled	100	45	

Remark: Exhaust gas measurement results from the existing onsite medical waste incinerator for Sulphur Dioxide, Nitrogen Dioxide, Nitrogen Oxide, Carbon Monoxide, Carbon Dioxide, Oxygen, Ozone, Methane and Hydrocarbon should be also monitored on a monthly-basis.

- Water Quality (Effluent/Wastewater/Ambient Water Quality)

Item	Unit	Measured Value (Mean)	Measured Value (Max.)	Country's Standards	Referred International Standards	Remarks (Measurement Point, Frequency, Method, etc.)
pH	-	To be filled	To be filled	6.5-8.5	6-9	3 locations like baseline survey and quarterly based on the method of the baseline survey.
Turbidity	NTU	To be filled	To be filled	<5.0	-	
Total Suspended Solids (TSS)	mg/l	To be filled	To be filled	-	50	
Total Dissolved Solids (TDS)	mg/l	To be filled	To be filled	1,000	-	
Fluoride (F)	TCU	To be filled	To be filled	1.5	-	
Nitrate (NO ₃)	mg/l	To be filled	To be filled	45	-	
Ammonia (NH ₃)	mg/l	To be filled	To be filled	0.5	-	
Copper (Cu)	mg/l	To be filled	To be filled	102	-	
Zinc (Zn)	mg/l	To be filled	To be filled	5	-	
Nitrite (NO ₂)	mg/l	To be filled	To be filled	-	-	
Lead (Pb)	mg/l	To be filled	To be filled	0.5	-	
Cadmium (Cd)	mg/l	To be filled	To be filled	3	-	
Arsenic (As)	mg/l	To be filled	To be filled	1,200	-	
Selenium (Se)	mg/l	To be filled	To be filled	Absent	-	
Phenol	mg/l	To be filled	To be filled	1.5	-	
Permanganate Value (PV)	mg/l	To be filled	To be filled	Absent	-	
e. coli	mpn/100ml	To be filled	To be filled	30	400	

Note: MPN stands for most probable number.

- Waste

Monitoring Item	Monitoring Results during Report Period
• Inspection of the waste collection contract between KEMRI and its licensed waste handler. • Inspection of the waste collection records. • Monitoring of proper use of onsite medical waste incinerator based on the environmental audit report. • Adequately managed storage of bottom and fly ash in the controlled ash pit of the incinerator and inspection of the external disposal record of the ash.	To be filled during the monitoring.

- Noise / Vibration

Item	Unit	Measured Value (Mean)	Measured Value (Max.)	Country's Standards	Referred International Standards	Remarks (Measurement Point, Frequency, Method, etc.)
Noise level	dBA	To be filled	To be filled	55	55	4 locations (corners of the project site boundary) and quarterly based on the method of the baseline survey.
Vibration level	mm/s	To be filled	To be filled	5	-	

3. Natural Environment

No monitoring was programmed.

4. Social Environment

- Children's Rights

Monitoring Item	Monitoring Results during Report Period
• Child used as labour for construction (i.e. checking the ID and staff record of the construction firm).	

- Working Conditions

Monitoring Item	Monitoring Results during Report Period
• Number of personal protective equipment (PPE) availed and used. • On-site hazard signs / signals • Inspection of the working records	

- Accident

Monitoring Item	Monitoring Results during Report Period
• Accident records • Inspection of emergency response plan, safety handbook; and safety training record • Signs / signals for speed limit, safety and hazard • Fence and/or signs boards for access control to the construction area. • Security light for night • Parking arrangement for construction vehicles	

1-3-2-2 Environmental Check List

Environmental check list is as shown in the following table.

Table 1-22 Environmental Check List

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
1 Permits and Explanation	(1) EIA and Environmental Permits	(a) Have EIA reports been already prepared in official process? (b) Have EIA reports been approved by authorities of the host country's government? (c) Have EIA reports been unconditionally approved? If conditions are imposed on the approval of EIA reports, are the conditions satisfied? (d) In addition to the above approvals, have other required environmental permits been obtained from the appropriate regulatory authorities of the host country's government?	(a) N (b) N (c) N (d) N	(a) Not completed as of July 3, 2022. Scheduled to be completed around July 15. (b) After submitting the EIA report and project cost estimation documents to NEMA and paying a fee of 0.1% of the project cost, the approval procedure will be carried out. About 6 weeks is a guideline for approval procedures. (c) At present, there are no incidental conditions that are clearly granted, and will become clear after the review of the Environmental and Social Impact Assessment Report (d) A license is required for wastewater treatment equipment, however other environmental and social considerations are not required.
	(2) Explanation to the Local Stakeholders	(a) Have contents of the project and the potential impacts been adequately explained to the Local stakeholders based on appropriate procedures, including information disclosure? Is understanding obtained from the Local stakeholders? (b) Have the comment from the stakeholders (such as local residents) been reflected to the project design?	(a) Y (b) Y	(a) In Kenya, a qualified environmental and social consideration consultant (certified by Nema) commissioned by the project implementation organization holds a stakeholder meeting, and it is reported that the participants have obtained the understanding of this project. (b) There were no significant comments on the t environmental and social impacts that would require changes to the project. Other comments will be reflected in the environmental and social considerations of the project after the finalization of the environmental and social impact assessment report.
	(3) Examination of Alternatives	(a) Have alternative plans of the project been examined with social and environmental considerations?	(a) Y	(a) Considered multiple alternatives including zero option.
2 Pollution Control	(1) Air Quality	(a) Do air pollutants, (such as sulfur oxides (SOx), nitrogen oxides (NOx), and soot and dust) emitted from the proposed infrastructure facilities and ancillary facilities comply with the country's	(a) Y (b) N	(a) Air pollutants will be emitted from the research facility is not large amount. Examined measures against dust during the construction. During the operation, laboratory exhaust the

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
		emission standards and ambient air quality standards? Are any mitigating measures taken? (b) Are electric and heat source at accommodation used fuel which emission factor is low?		medical air pollution and drug contamination, those laboratory exhaust is filtered with HEPA filter. (b) Public power is used as the power source and heat source, and no separate power generation is no used at laboratory facilities.
	(2) Water Quality	(a) Do effluents or leachates from various facilities, such as infrastructure facilities and the ancillary facilities comply with the country's effluent standards and ambient water quality standards?	(a) Y	(a) Wastewater from the research facility is sterilized under high pressure and discharged into public sewage. EA will be conducted by NEMA every year. General miscellaneous wastewater is discharged directly into public sewage.
	(3) Wastes	(a) Are wastes from the infrastructure facilities and ancillary facilities properly treated and disposed of in accordance with the country's regulations?	(a) Y	(a) Waste from the research facility is treated at the incinerator in the laboratory. EA will be conducted by NEMA every year. Audit items include analysis of incinerator ash and flue gas.
	(4) Soil Contamination	(a) Are adequate measures taken to prevent contamination of soil and groundwater by the effluents or leachates from the infrastructure facilities and the ancillary facilities?	(a) Y	(a) Wastewater from the research facility is sterilized under high pressure and discharged into public sewage. EA will be conducted by NEMA every year.
	(5) Noise and Vibration	(a) Do noise and vibrations comply with the country's standards?	(a) Y	(a) During the construction, the noise and vibration is not serious level. Examined measures against noise and vibration. No noise or vibration effects during operation are expected.
	(6) Subsidence	(a) In the case of extraction of a large volume of groundwater, is there a possibility that the extraction of groundwater will cause subsidence?	(a) N	(a) Under ground water is not applicable this project.
	(7) Odor	(a) Are there any odour sources? Are adequate odour control measures taken?	(a) N	(a) no odour resources
3 Natural Environment	(1) Protected Areas	(a) Is the project site or discharge area located in protected areas designated by the country's laws or international treaties and conventions? Is there a possibility that the project will affect the protected areas?	(a) N	(a) The construction site is area of existence the same research institution research facility. It is not unprotected area.
	(2) Ecosystem	(a) Does the project site encompass primeval forests, tropical rain forests, ecologically valuable habitats (e.g., coral reefs, mangroves, or tidal flats)?	(a) N (b) N (c) N (d) N	(a) (b) (c) (d) The project site is in existence research facility. No significant

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
		(b) Does the project site encompass the protected habitats of endangered species designated by the country's laws or international treaties and conventions? (c) Is there a possibility that changes in localized micro-meteorological conditions, such as solar radiation, temperature, and humidity due to a large-scale timber harvesting will affect the surrounding vegetation? (d) Is there a possibility that the amount of water (e.g., surface water, groundwater) used by the project will adversely affect aquatic environments, such as rivers? Are adequate measures taken to reduce the impacts on aquatic environments, such as aquatic organisms?		negative impact in biodiversity.
	(3) Hydrology	(a) Is there a possibility that hydrologic changes due to the project will adversely affect surface water and groundwater flows?	(a) N	(a) This project will not bring about changes in the water system at the site.
	(4) Topography and Geology	(a) Is there a possibility the project will cause large-scale alteration of the topographic features and geologic structures in the project site and surrounding areas?	(a) N	(a) The topography and geological structure will not be significantly altered by this project.
4 Social Environment	(1) Resettlement	(a) Is involuntary resettlement caused by project implementation? If involuntary resettlement is caused, are efforts made to minimize the impacts caused by the resettlement? (b) Is adequate explanation on compensation and resettlement assistance given to affected people prior to resettlement? (c) Is the resettlement plan, including compensation with full replacement costs, restoration of livelihoods and living standards developed based on socioeconomic studies on resettlement? (d) Is the compensations going to be paid prior to the resettlement? (e) Is the compensation policies prepared in document? (f) Does the resettlement plan pay particular attention to	(a) N (b) N (c) N (d) N (e) N (f) N (g) N (h) N (i) N (j) N	(a) (b) (c) (d) (e) (f) (g) (h) (i) (j) This project will be held within existence research facility area because of this there is no resettlement.

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
		vulnerable groups or people, including women, children, the elderly, people below the poverty line, ethnic minorities, and indigenous peoples? (g) Are agreements with the affected people obtained prior to resettlement? (h) Is the organizational framework established to properly implement resettlement? Are the capacity and budget secured to implement the plan? (i) Are any plans developed to monitor the impacts of resettlement? (j) Is the grievance redress mechanism established?		
	(2) Living and Livelihood	(a) Is there a possibility that the project will adversely affect the living conditions of inhabitants? Are adequate measures considered to reduce the impacts, if necessary?	(a) N	(a) There is a no possibility that the project will adversely affect the living conditions of inhabitants.
	(3) Heritage	(a) Is there a possibility that the project will damage the local archaeological, historical, cultural, and religious heritage? Are adequate measures considered to protect these sites in accordance with the country's laws?	(a) N	(a) There is no possibility that the project will damage the local archaeological, historical, cultural, and religious heritage.
	(4) Landscape	(a) Is there a possibility that the project will adversely affect the local landscape? Are necessary measures taken? (b) Is there a possibility that landscape is spoiled by construction of high-rise buildings such as huge hotels?	(a) N (b) N	(a) There is no possibility that the project will adversely affect the local landscape. (b) The research facility in this project is two stories and that is not affect to the local landscape.
	(5) Ethnic Minorities and Indigenous Peoples	(a) Are considerations given to reduce impacts on the culture and lifestyle of ethnic minorities and indigenous peoples? (b) Are all of the rights of ethnic minorities and indigenous peoples in relation to land and resources respected?	(a) N (b) N	(a) (b) There is no negative impacts on the culture and lifestyle of ethnic minorities and indigenous peoples.
	(6) Working Conditions	(a) Is the project proponent not violating any laws and ordinances associated with the working conditions of the country which the project proponent should observe in the project? (b) Are tangible safety considerations in place for individuals involved in the project, such as the installation of safety equipment which prevents industrial accidents,	(a) Y (b) Y (c) Y (d) Y	(a) Project proponent is planed based on Kenyan law and interpretation. (b) Project proponent is planed safety of the workers during construction. (c)Project proponent is planed to have opportunities for safety training and education. (d) Project proponent is planed to conduct training session to security staff.

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
		and management of hazardous materials? (c) Are intangible measures being planned and implemented for individuals involved in the project, such as the establishment of a safety and health program, and safety training (including traffic safety and public health) for workers etc.? (d) Are appropriate measures taken to ensure that security guards involved in the project not to violate safety of other individuals involved, or local residents?		
5 Others	(1) Impacts during Construction	(a) Are adequate measures considered to reduce impacts during construction (e.g., noise, vibrations, turbid water, dust, exhaust gases, and wastes)? (b) If construction activities adversely affect the natural environment (ecosystem), are adequate measures considered to reduce impacts? (c) If construction activities adversely affect the social environment, are adequate measures considered to reduce impacts?	(a) Y (b) N (c) N	(a) During construction, discuss the mitigation of pollution and set EMP. (b) This project is not have negative impact to natural resource and ecosystem. (c) There is no possibility to get negative impact to Social environment.
	(2) Monitoring	(a) Does the proponent develop and implement monitoring program for the environmental items that are considered to have potential impacts? (b) What are the items, methods and frequencies of the monitoring program? (c) Does the proponent establish an adequate monitoring framework (organization, personnel, equipment, and adequate budget to sustain the monitoring framework)? (d) Are any regulatory requirements pertaining to the monitoring report system identified, such as the format and frequency of reports from the proponent to the regulatory authorities?	(a) Y (b) Y (c) Y (d) Y	(a) Operator monitoring (EMoP) will be implemented by EMP based on Kenya's environmental standards and JICA guidelines. (b) Monitoring items, methods, frequency, etc. will be determined based on the Kenyan environment-related standards and JICA guidelines. (c) MP based on Kenya's environmental standards and JICA guidelines will establish a monitoring system for businesses. (d) The EMP based on the Kenyan environment-related standards and JICA guidelines stipulates the method and frequency of reporting to the competent authorities.

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
6 Note	Reference to Checklist of Other Sectors	(a) Where necessary, pertinent items described in the Roads, Railways and Bridges checklist should also be checked (e.g., projects including access roads to the infrastructure facilities). (b) For projects, such as installation of telecommunication cables, power line towers, and submarine cables, where necessary, pertinent items described in the Power Transmission and Distribution Lines checklists should also be checked.	(a) N (b) N	(a) N/A (b) N/A
	Note on Using Environmental Checklist	(a) If necessary, the impacts to transboundary or global issues should be confirmed (e.g., the project includes factors that may cause problems, such as transboundary waste treatment, acid rain, destruction of the ozone layer, or global warming).	(a) N	(a) This project will not bring environmental issue both cross border and worldwide.

Source: JICA Survey Team

Chapter2 Contents of the Project

2-1 Basic Concept of the Project

Kenya Medical Research Institute (hereinafter referred to as "KEMRI") was established as a medical research institute in 1979, and Japan has been supporting the development of facilities such as research departments and laboratories and human resource development for about half a century. As a result, KEMRI has become a leading research institute for infectious disease control in East Africa, and has developed collaborative research with foreign research institutes using external funds and third-country training for neighbouring countries. In response to COVID-19, KEMRI has a key role in PCR testing in Kenya, and approximately 50% of the tests have been conducted at peak times by KEMRI. In addition, KEMRI has been nominated by the Africa Centers for Disease Control and Prevention (hereinafter referred to as "Africa CDC") as the Centre of excellence in evaluation of COVID-19 tests in the continent and has participated in the evaluation of COVID-19 test kits used in the African region.

"The Project for Strengthening the Research Capacity of Kenya Medical Research Institute" (hereinafter referred to as "the Project") will contribute to the strengthening of infectious disease research and early response to testing and diagnosis in the event of a global pandemic through the investment of research facilities and equipment in KEMRI. This will strengthen the capacity of Kenya and East Africa on health security including responding to emerging infectious diseases, and contribute to the realization of "Vision 2030."

The Project aims to strengthen research capacity of KEMRI for various infectious diseases including COVID-19 by the provision of facilities and equipment for research on infectious diseases and early response to testing and diagnosis, and thereby contribute to strengthening health security in Kenya and Africa (particularly in the East African region).

2-2 Outline Design of the Japanese Assistance

2-2-1 Design Policy

2-2-1-1 Consideration of Request Contents

The request from the Kenyan side is for the construction of an additional BSL3 laboratory for testing and diagnosis of emerging infectious diseases such as COVID-19 and high-risk pathogens at the premises of the Kenya Medical Research Institute (KEMRI), which plays a central role in the fight against infectious diseases in Kenya, and the replacement of aging equipment. The purpose of the project is to develop facilities and procure equipment that will enable cross-disciplinary research.

The table below shows the contents of the request letter and the request based on the results of the hearing.

Table 2-1 Contents of the Pre-survey Request and the Request at the Hearing of the Survey

	Contents of request letter	Requests made at hearings in the survey
Laboratory Area	BSL3 Laboratory (1 room)	BSL3 Laboratory (Animal Experiment) BSL3 Laboratory (Cell Culture)
	BSL2 Laboratory (Central)	BSL2 Laboratory (Central)
	BSL2 Laboratory (Molecular Biology)	BSL2 Laboratory (Molecular Biology)
	BSL2 Laboratory (Immunology)	BSL2 Laboratory (Immunology)
	BSL2 Laboratory (Clinical Research)	BSL2 Laboratory (Clinical Research)
	Cold room	Cold room
	Machine room	Sample Storage Room
	Bio Bank	Biobank (BSL2/BSL3)
General area	Office	Office
	Equipment Service Centre	Equipment Service Centre
	Warehouse	Warehouse
	Virtual Lab and Meeting Rooms	Virtual Lab and Meeting Rooms
	Data centre	Data centre
Others	-	EV
	-	Nursing room
	-	Hand washing corner

Source: JICA Survey Team

As a result of the January 2022 field survey, the following details of the facility request were confirmed and organized in a technical note to confirm the agreement of the other party.

- The laboratories will consist of two BSL3 laboratories (animal experiments and cell culture) and four BSL2 laboratories (central, molecular biology (including PCR laboratory), immunology and clinical research).
- Mice, rats, and guinea pigs were considered to be handled in the BSL3 laboratory (animal experiments), and the space for their rearing was confirmed by using the inside of the existing animal facility.
- It was confirmed that one biobank room is required for each BSL2 and BSL3. The biobank for BSL3 is planned to be equipped with a refrigerator instead of a refrigerating room, in consideration of space for infectious specimens of uncertain risk to be studied in the BSL3 laboratory.
- It was confirmed that the existing incinerator facility would be used.
- The data centre requested two rooms: a server room and a staff room. It was confirmed that the air conditioning and other facility work and architectural work for the server room would be done by the Japanese side, and racks, systems and software data would be done by KEMRI's side.
- The requested machine room is easily mistaken for the name of the equipment machine room, so we confirmed this by changing the name of the room to Sample storage.
- Assuming that a large number of trainees will come to the conference zone, a wheelchair-accessible WC will be installed and the difference in steps will be 2 cm or less. In addition, according to KEMRI's request, the research area on the first floor of the laboratory zone

will also be handicapped accessible, and a wheelchair-accessible EV (hydraulic type), wheelchair WC, etc., will be planned.

- Based on the standards of the Health Act (2017) of the Ministry of Health, nursing rooms and anti-corona washbasin corners will be planned.

2-2-1-2 Basic Policy

(1) Basic Policy for Facility Design

1) Layout and Flow Line

The project site (approximately 5,800 m²) will be located on a part of the combined site owned by KEMRI. The layout plan consists of two main zones (bio risk control zone and conference zone) that will serve as the core of the new facility, taking into consideration the flow line with the inspection and research departments located in the existing training building adjacent to the west side of the project site.

The infectious wastewater generated in the new facility will be sterilized in the new facility, and then treated in a septic tank located outside the facility together with general wastewater in a separate system via a neutralization tank outside the facility and connected to the public sewage system.

Access for people and vehicles to the new facility is planned to be via the existing main front gate on the KEMRI site, using an internal road, and approaching the entrance to the new facility via the new dedicated parking area from the existing gate on the project site.

2) Main Structure and Building Scale

The new facility will be a two-story building with basement (partly one-story building), three-layer reinforced concrete (RC) structure. The foundation type will be direct foundation, and the upper frame will be a column-and-beam rigid-frame structure with basic 8.0 m x 8.0 m and some 8.0 m x 4.0 m modules. A machine room for infectious wastewater treatment equipment, mainly for the bio risk control zone, is planned on the basement floor, and an air conditioning and ventilation machine room, an electrical room, and a private generator room are planned on the second floor.

The conference zone, which is a single-story area, is designed to be closely connected to the bio-risk control zone on the first floor. However, from the perspective of biosafety and biosecurity measures, the Bio risk Control Zone is designed to have a dedicated entrance hall to allow direct access from outside to the Bio risk Control Zone.

The size of the new facility will be determined based on the expected appropriate number of personnel for the use of each laboratory, the staffing arrangements obtained from KEMRI, and the use of the facility, and will take care to ensure the optimal work area and flow lines in accordance with the characteristics of each laboratory.

3) Zoning and Floor Plan

The bio-risk control zone in the new facility will be divided into two zones for biosafety measures: a general control zone (mainly service areas and office management areas) and BSL2 and 3 control zones (mainly laboratory areas), and each control zone will be completely physically separated, including air conditioning, ventilation, and drainage systems.

Laboratory enhancements including animal experiments are required based on the bio risk control of the BSL3 laboratory. Such enhancements include: in consideration of the concept of "Shower-out", the composition of anteroom is planned to have a flow of "changing room" → "shower room" → "changing room" to strengthen the safety for researchers, and to allow them to dress-in PPE (Personal Protective Equipment) in the changing room. In addition, an interlock door shall be installed in the front room. Infectious waste and contaminants generated in the BSL2 and BSL3 laboratories will be sterilized in each laboratory before being carried out of the controlled area, such as laboratory exhaust air in addition to HEPA filters, laboratory effluent decontamination.

BSL3 laboratory will have two rooms for animal experiments and cell culture, and BSL2 laboratory will have four rooms for central, molecular biology, immunology, and clinical, on the first floor of the bio risk control zone. In addition, an electron microscope room will be planned in the BSL2 laboratory (central) and a PCR room in the BSL2 laboratory (molecular biology). On the second floor, two types of laboratories (private type and multipurpose type) will be planned for research activities and open interaction of researchers.

4) Equipment

Wastewater and exhaust air from BSL2 and BSL3 laboratories should be planned in consideration of measures to prevent environmental pollution to surrounding facilities and the community. In addition, each system should be completely physically separated and isolated, and the plan should be based on biosafety. From the perspective of biosecurity and disaster prevention, the monitoring plan should focus on entry and exit from the new facility and the bio risk control zone (especially BSL2 and 3 laboratories).

5) Soft Components

Guidance on the operation and maintenance of the air conditioning and ventilation systems for BSL 2 and 3 laboratories to be developed under this project, as well as guidance on infectious liquid wastewater treatment and waste management, will be provided to strengthen KEMRI's ability to maintain and manage the new facility.

(2) Policy on Facility Size Considerations

1) Policy for setting the Scale of research Function Enhancement

We studied the number and layout of BSL2 and BSL3 laboratories to be constructed by the grant aid, based on a survey of KEMRI's priorities, operation and maintenance capabilities, roles, needs, and overall operation plan as an open laboratory including existing facilities.

Based on the results of the survey as well as the priorities of the planning and selection, a plan for the facility plan (draft) was agreed with the KEMRI side. Details are described in 2-2-1

The size of the building for this project should be large enough to perform major tasks safely, quickly, and accurately such as isolation, cultivation, and gene extraction of bacteria, viruses, and other organisms from specimens from a biosafety perspective, with a view to future pathogen control and research enhancement.

Specific plans for the pathogens to be studied/experimented on, the content and number of studies/programs, the content of testing, the number of specimens, etc., will be developed by KEMRI in the future, in cooperation with other donors, collaborators, and international organizations. The survey team will design the minimum laboratory content and size necessary for the main work in handling specimens and other materials that pose a high threat of various infectious diseases, including COVID-19.

The BSL3 laboratory is especially essential for experiments handling COVID-19 and haemorrhagic fever viruses, handling unidentified samples suspected to be pathogens of BSL3 or higher, and for research involving cell culture. Therefore, based on the concept of biosafety management, the laboratory will consist of two rooms: a BSL3 laboratory for handling cell culture and a BSL3 laboratory for handling animal specimens and conducting animal experiments.

The following facility criteria are currently being used by Kenya and KEMRI in planning the new facility with BSL2 and BSL3 laboratories that will be the focus of this project.

- KEMRI Bio risk Manual: prepared in 2016 and not currently in use.
- An association called Bio risk Management Association of Kenya (BMAK) provides training to Safety Officers at KEMRI.
- BMAK training is based on International Federation of Biosafety Association (IFBA) guidance and the Kenya Laboratory Bio risk Management Curriculum of the MOH.

The KEMRI requested that the WHO Laboratory Biosafety Manual Fourth Edition be used as the standard for KEMRI's research facilities, since the KEMRI Biosafety Manual is not currently in use. The survey team agreed to plan the facilities and equipment based on that standard. The following facility standards are included in this standard.

- WHO Laboratory Design and Maintenance
- WHO Decontamination and Waste Management

The plan for mother's rooms is based on the Ministry of Health's Guidelines for Securing a Breastfeeding Friendly Environment at the Workplace (May 2018) and the Health Act (2017), which clearly stipulate the obligation to install such rooms.

The hand washing area for corona control will be planned based on the Ministry of Health Environmental and Social Management Framework for Kenya COVID-19 Health Emergency Response Project (CHERP) (P173820) (June 2021), which specifies the provision of hand washing spaces including sanitizers for the protection of workers.

2) Policy for setting the Scale of the Training Function

Three conference rooms for 36 people and one conference room for 24 people will be planned as lecture rooms mainly for classroom lectures. The conference rooms are planned to be used not only for training purposes but also for internal meetings, laboratory networking using a videoconferencing system, and surveillance activities.

The virtual lab will be an online meeting room equipped with cameras and screens for training activities and simulations for capacity building purposes and will be designed to accommodate approximately 14 people.

3) Calculation of the Parking Lot

Twelve parking spaces (including spaces for disabled persons) for the director, VIP visitors, etc., are planned for the entrance side of the new facility. In addition, 14 parking spaces for staff will be planned at the rear of the new facility.

4) Required Rooms and Planned Number of Personnel

Based on KEMRI's staffing plan and facility utilization plan, the following plan shall be used for the required rooms and the number of persons planned to use and accommodate them.

Table 2-2 Requested Rooms and Number of Staff

Zone	Names of Various Rooms	Staffing [Man]	Accommodation of Various Rooms [Man]
Bio-Risk Control Zone	BSL3 Laboratory (Animal Experiment)	2-3	4-5
	BSL3 Laboratory (Cell Culture)	2-3	4-5
	BSL2 Laboratory (Central)	2-3	3-4
	BSL2 Laboratory (Molecular Biology)	2-3	3-4
	BSL2 Laboratory (Immunology)	2-3	3-4
	BSL2 Laboratory (Clinical)	2-3	3-4
	Cold room	1-2	two
	Sample Reception Room	0-1	two
	Washing room	(KEMRI under consideration)	10
	Equipment Service Centre	23	25
	Office (including monitor corner)	10	10
	Chief's office	one	one
	Staff room	10	10-15
	2nd floor laboratory (private room type)	-	1-5
	2nd floor laboratory (multi-purpose type)	-	6-15
	2nd Floor Data Centre	(KEMRI under consideration)	4-5
Conference Zone	Training and Conference Rooms (1-4)	36/room	36-40
	Training and Conference Rooms (5)	24/room	24-30
	Virtual laboratory	14	14-20
	Office 2	two	1--5.

Source: JICA Survey Team

(3) Basic Policy for Equipment

Select laboratory equipment that is an appropriate level for P2 and P3 Laboratory operation. The equipment plan shall be developed from the requested equipment based on the necessity and appropriateness. They are analysed based on the priority and equipment selection criteria. The specifications of the equipment will be planned considering the following items.

- The equipment uses the AVR installed on the facility to respond to voltage fluctuations.
- For power outages, the equipment utilizes the generator installed in the facility.
- A UPS (Uninterruptible Power Supply) is attached to equipment that causes operational problems due to short-term power failure or momentary power failure until power is supplied from the generator.
- The filters and a water softener are attached to the water supply to the high-pressure steam sterilizer.
- The water, such as ultra-pure water and pure water for the experiments and the research shall be procured on the KEMRI side.

The maintenance management for procured equipment

- After delivery of the equipment, in principle, the Maintenance Department will perform the maintenance, calibration and validation of the equipment.
- KEMRI will procure for the replacement of consumables and spare parts required for the maintenance, calibration, and validation. To enable KEMRI to procure these consumables and spare parts of the equipment, the procured equipment shall have distributors in Kenya or neighbouring countries.
- For equipment that is difficult to maintain in the Maintenance Department, the KEMRI side will conclude a maintenance management contract with the manufacturer's agent and sustain the maintenance.

2-2-2 Basic Plan (Construction Plan / Equipment Plan)

2-2-2-1 Construction Plan

(1) Site and Facility Layout Plan

1) Site Conditions

The project site for the new facility was verified through a site survey, and KEMRI finally agreed to the site proposed by KEMRI as the project site, which includes the proposed construction site and alternative site A.

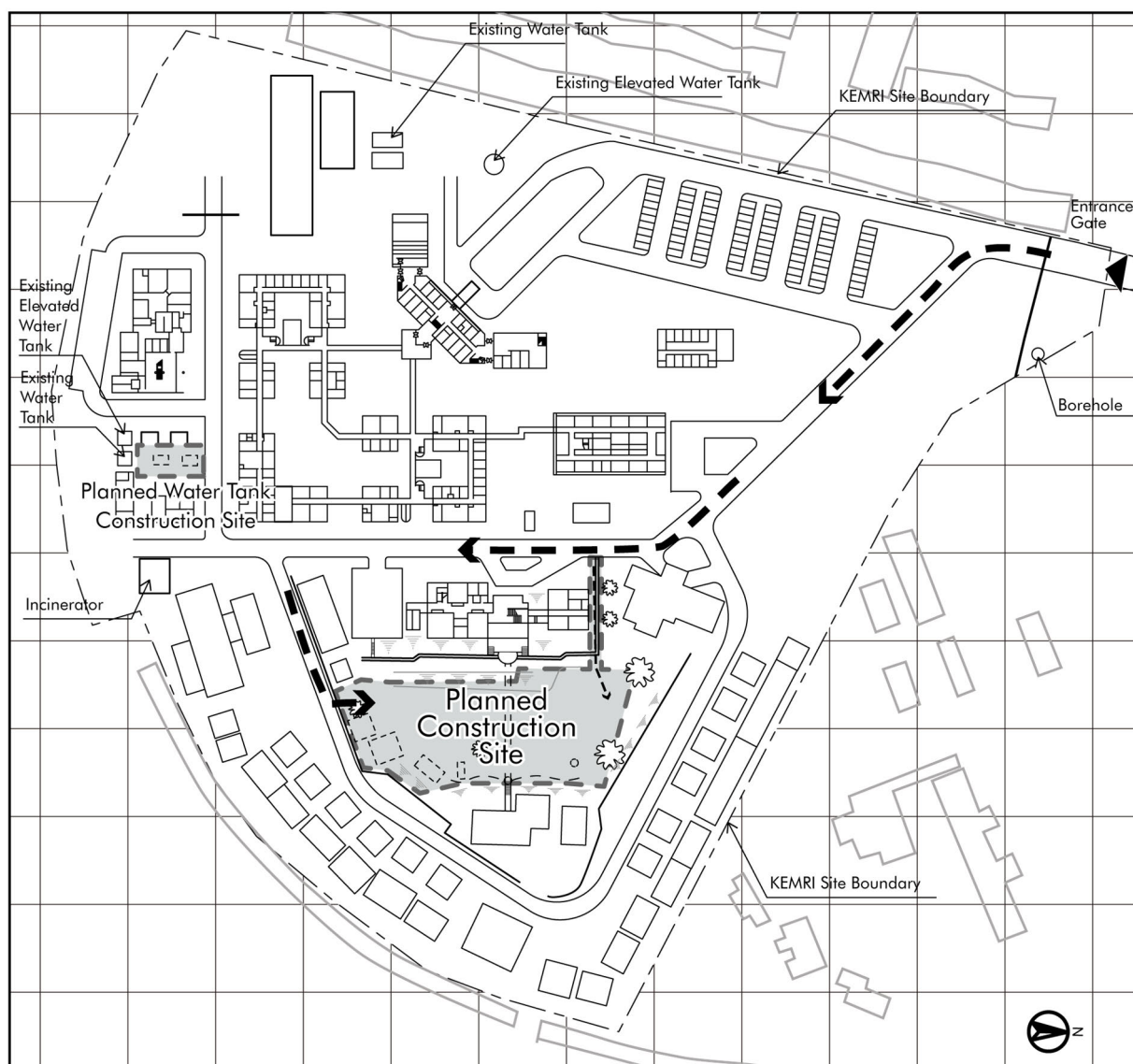
The project site is entirely surrounded by the existing road shown below, and the overall topography of the site is almost flat with a gentle slope without significant elevation differences, so it can be concluded that there are no topographical issues for the construction of the new facility. However, the project site is approximately 600 mm lower than the existing main gate, so to prevent rainwater from entering the area around the main entrance of the

new facility, we plan to use fill to level the area from the gate area to the main entrance area. The fill will be made by reusing soil generated during underground construction.

The status of the surroundings of the project site is below.

- West side: Existing training building (constructed by Japanese grant aid) and internal road (width: approx. 6m, sidewalk width: approx. 1.2m)
- East side: Existing facilities and internal road (width: approx. 4m, sidewalk width: approx. 1.2m)
- South side: Front road (front gate side, width: approx. 4m, sidewalk width: approx. 1.2m)
- North side: Internal road (width: approx. 4m, sidewalk width: approx. 1.2m)

It can be concluded that there are no problems with accessibility.



Source: JICA Survey Team

Figure 2-1 Project Site and Main Access

2) Layout and Zoning Plan

Given the special purpose of the new facility as a research facility, it was agreed with KEMRI that the new facility will have two zones: a "Bio-Risk Control Zone" protected by biosafety and biosecurity measures, and a "Conference Zone," a general area used by an unspecified number of trainees and researchers.

These two different zones will be planned as independent facilities, both structurally and in terms of safety control zones. In particular, the Research Centre area, which is the location for researchers using open laboratories (laboratories), is separated from the Conference Zone and is planned to be part of the Bio-Risk Control Zone so that it can be closely linked to research and experimental activities.

In addition, the vertical zoning plan of the main laboratory zone (BSL2 and BSL3 laboratories) in the Bio-Risk Control Zone, with the air conditioning and electrical rooms for laboratory use located on the floor directly above, and the sterilization and wastewater/wastewater treatment rooms for laboratory use on the floor directly below, is very effective from a biosafety perspective. It is also an appropriate zoning plan with less waste in terms of construction period and cost.

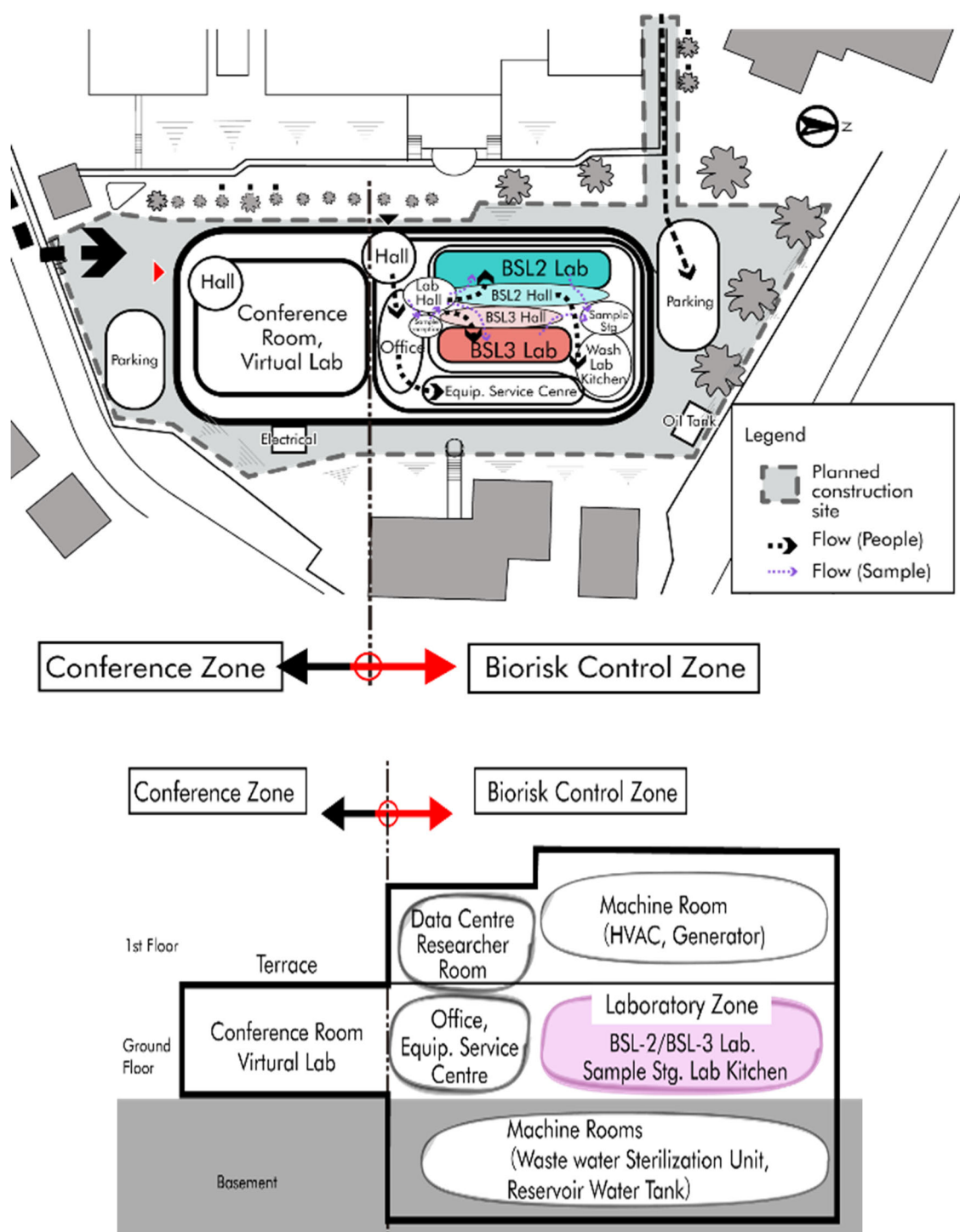
Based on the above, the zoning plan for the new facility consists of the following facility components, as shown in Figure 2-2.

a) Bio-Risk Control Zone

- BSL3 Management Area
- BSL2 Management Area
- Laboratory Service Area
- Research area
- Data Centre Area
- Laboratory Office Management Area
- Equipment Service Centre
- Laboratory Common Area

b) Conference Zone

- Conference centre
- Virtual laboratory
- Public area



Source: JICA Survey Team

Figure 2-2 Zoning Plan

(2) Architectural Planning

1) Basic Structure

The architectural plan was based on the policy of enhancing KEMRI's research capabilities, and as indicated in the Minutes of Discussion (M/D), the survey team was prepared based on a list of facility components and equipment that were high priorities for the KEMRI side.

The facility components of the two main zoning of the new facility (Bio-Risk Control Zone and Conference Zone) are described below.

a) Bio-Risk Control Zone

i) BSL3 Management area

- Two BSL3 laboratories (animal experiments and cell culture): Research on high-risk pathogens such as COVID-19 and research on unknown infectious diseases, with expected interactions with the molecular biology laboratories.
- Biobank for BSL3: Secure temporary storage of infectious specimens tested in the BSL3 laboratory.

ii) BSL2 Management area

- BSL2 Laboratory 4
 - BSL2 laboratory (central): to share state-of-the-art equipment and other resources across KEMRI, to share them widely among KEMRI researchers, and to enhance and promote research collaboration.
 - BSL2 Laboratory (Molecular Biology): Research on cell culture, DNA binding, gene analysis, molecular cloning, proteomic analysis for drug development, expected to collaborate with BSL3 Laboratory.
 - BSL2 Laboratory (Immunology): Immune profiling for detection of infectious diseases, elucidation of mechanisms of autoimmune diseases and cancer, and development of models for immunotherapy.
 - BSL2 (Clinical): Analyse specimens from clinical studies and trials in rural areas to verify safety and efficacy
- Cold room: for experiments that require low temperatures (around 4 degrees Celsius)
- Biobank for BSL2: Secure temporary storage of confirmed specimens in the BSL2 laboratory.
- Specimen storage room: Specimens collected at other hospitals and other facilities are stored in an ultra-low temperature freezer.

iii) Laboratory Service area

- Lab Kitchen
- Washing room, etc.
- Service corridor, etc.

iv) Research area

- Research Rooms (Laboratories) 1-6

v) Data Centre area

To manage KEMRI's research and development data in a centralized manner under appropriate security measures so that researchers can safely and easily access the data for their research.

- server room
- staff room

vi) Laboratory Office Management area

- Entrance for laboratory area
- Office (Centre Director's Office, Staff Office, and Monitor Corner): This office will be responsible for administrative management of the laboratory area in the new facility, reception and management of researchers, visiting researchers, and senior visiting personnel, and bio-risk control of the new facility. In other words, monitoring in the laboratory and security of the facility will be centrally controlled here. In addition, the office will be located near the stairs to the 1st floor (2nd floor in Japan), the entrance, and the entrance of the EV, and a reception counter will be set up on the hall side so that visitors from outside can be visually monitored. Furthermore, TV monitoring equipment, etc., will be installed in Hall 1, Hall 2, and inside the EVs to ensure complete security measures.
- Staff room: A room that corresponds to a researcher's doctor's office, with a window facing the outside, for non-experimental research and a rest area. The room is designed to accommodate 1 to 5 people. The room is also used for brief meetings with people from the outside. For multipurpose use or conferences with a large number of people, the research rooms (No.5 and 6) on the second floor are expected to be used.
- Basement machine room: Machine room where wastewater treatment equipment is mainly installed. The BSL2 machine room and BSL3 machine room should be clearly separated from each other to avoid biosafety risks.
- 1F machine room, electrical room, and rooftop machine room: The 2nd floor machine room and electrical room will mainly be installed with air conditioning and ventilation equipment, and the rooftop will be installed with scrubbers and other equipment, etc. As in the basement machine room, the BSL2 machine room and BSL3 machine room will be clearly separated from each other to avoid biosafety risks as much as possible.

vii) Equipment Service Centre

It will support the sustainability of research by performing regular inspections, maintenance, and calibration of research equipment and other equipment within

KEMRI. The existing Engineering and Maintenance Department will consist of three sections: Civil, Electrical & Electronics, and Mechanical Sections.

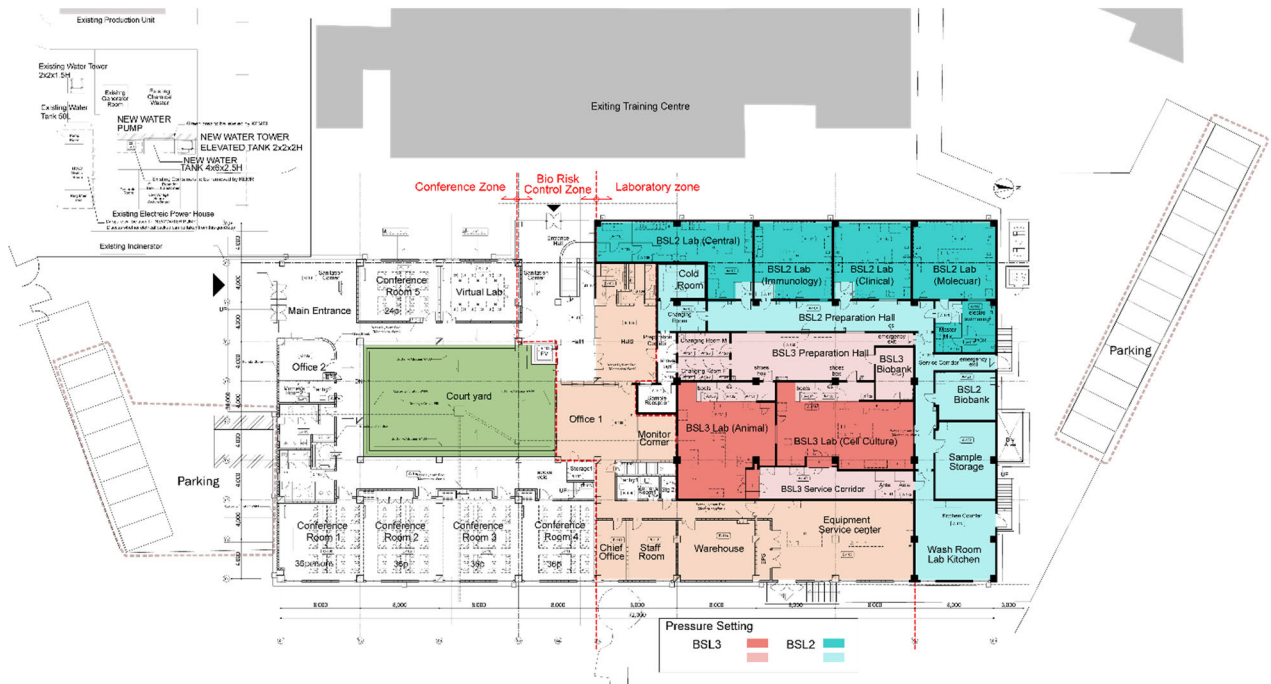
viii) Warehouse

Warehouse for short-term storage of consumables, reagents, equipment, and supplies

ix) Common areas for Laboratories (Entrance hall for Laboratory area only, WC for Laboratory area only, Pantry, Nursing room, Storage room)

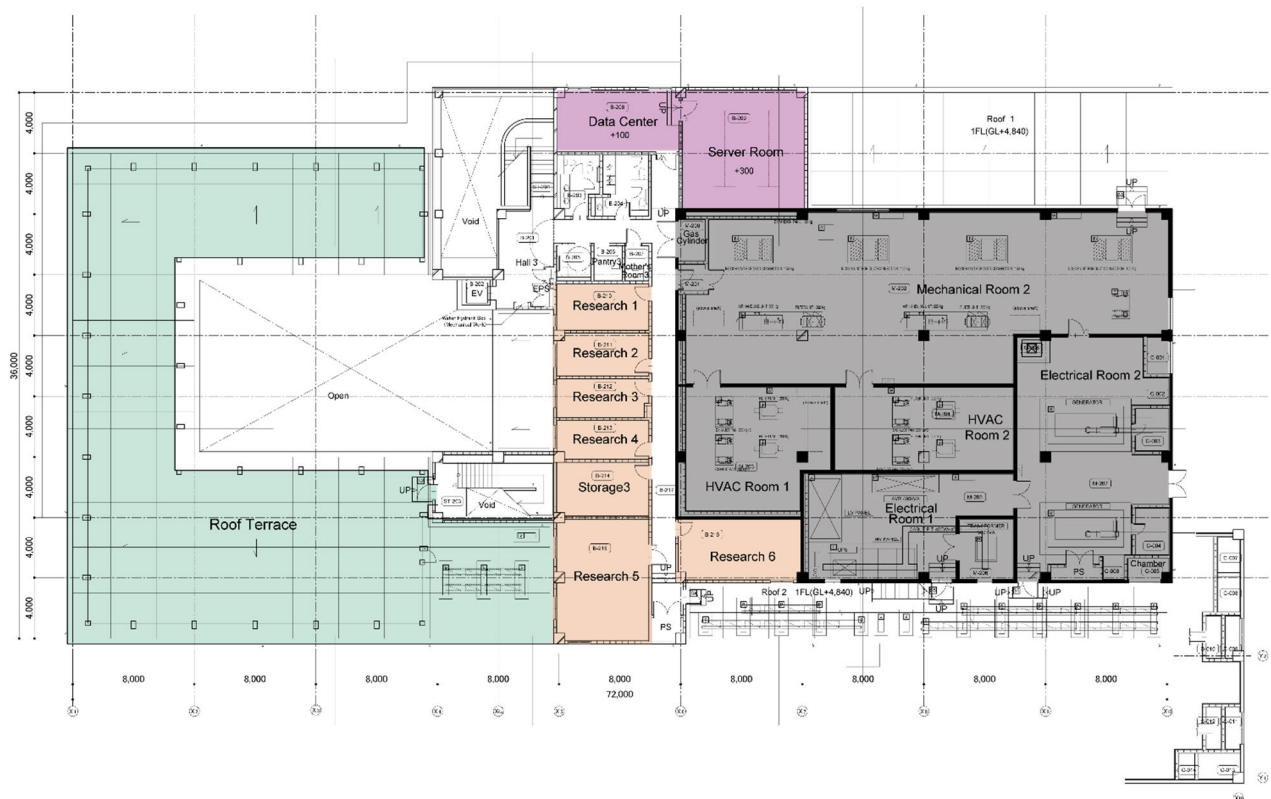
Under the above facility components for each area, the flow plan is planned as follows:

- A front room and preparation hall are planned on the flow line to each of the BSL3 and BSL2 laboratories. In particular, the removal of contaminated materials from the BSL3 laboratory is planned to use the sterilization equipment (pass-through autoclave) installed in each laboratory to prevent the risk of infection from contaminated materials. Each laboratory is planned to have three researchers (including one technician) in each room.
- An office management room, staff room, lavatory, and machine room will be planned in the Office Management Department. Specimens received at the Specimen Reception Room in the Bio-Risk Control Zone will be delivered directly to researchers in BSL3 or BSL2 laboratories by dedicated staff using the pass boxes located in each Preparation Hall 1.
- Laboratory Service Area: The biosafety management category for this area is planned to be included in the BSL2 management area, and the equipment and machinery rooms (air conditioning and ventilation, sterilization, and wastewater treatment, etc.) are also planned to be included in the BSL2 management area.



Source: JICA Survey Team

Figure 2-4 Ground Floor Plan



Source: JICA Survey Team

Figure 2-5 First Floor Plan

Floor	Zone	Room Name	Area [m ²]	Total [m ²]
GF	Bio Risk Control Zone	Entrance Hall	112.4	587.1
		EV	4.6	
		Hall 2	50.6	
		Toilet	26.9	
		Office, Monitor Corner	84.9	
		Chief Office	20.6	
		Staff Room	31.8	
		Warehouse	50.8	
		Equipment Service Centre	124.1	
		Storage 1	6.1	
		Pantry 1	5.9	
		Mother Room 1	5.3	
		Storage 2	4.3	
		Corridor	40.7	
		EPS	9.5	
		Stair	8.6	
1F		Hall 3, Corridor	103.2	439.1
		Data Centre	103.9	
		Research 1	20.6	
		Research 2	19.1	
		Research 3	17.5	
		Research 4	17.5	
		Research 5	53.0	
		Research 6	35.9	
		Storage 3	23.8	
		Pantry 3	5.1	
		Toilet for Disabled	6.4	
		Mother Room 3	4.4	
		Toilet	26.9	
		EPS	1.8	
GF	Conference Zone	Main Entrance, Corridor	224.5	712.3
		Office 2	23.5	
		Conference Room 1	70.0	
		Conference Room 2	73.1	
		Conference Room 3	73.1	
		Conference Room 4	65.6	
		Conference Room 5	52.4	
		Virtual Lab	52.4	
		Pantry 2	6.2	
		Mother Room 2	7.0	
		Toilet	58.5	
		Stair	5.1	
		EPS	0.9	
1F		Stair	37.6	
BF	M&E	Machine Room	295.7	295.7
1F		HVAC Machine Room	504.2	772.6
		Electrical Room	268.4	
		Main Building Total	3,904.1	
GF		Water Pump Room, Elevated Water Tank Tower	28.6	
		Oil Pump Room	4.8	
		Grand Total	3,937.5	

Total Floor Area

	Main Building				Others		Grand Total
Floor	Basement	Ground Floor	First Floor	Total	Water Pump	Oil Pump	
Area [m ²]	295.7	2,359.1	1,249.3	3,904.1	28.6	4.8	3,937.5
Building Area [m ²]				2,500.5	28.6	4.8	2,533.9

Source: JICA Survey Team

3) Section Plan

The cross-sectional plan will be designed to ensure that the BSL2 and 3 laboratories, with appropriate biosafety and biosecurity measures, will be fully functional, taking into full consideration the facility conditions and the local climate and weather, with the following considerations:

- The new facility will basically be managed by whole-building mechanical air conditioning.
- The new facility will consider future storm water damage, which will be reflected in the floor level study and exterior drainage plan.
- The roof shape of the new facility is based on a flat roof in consideration of the use of the rooftop for carry-in/out of equipment and maintenance work, and is designed to be sufficiently sloped to prevent rain leakage. At the same time, the thermal load of the entire building will be reduced by utilizing the insulation effect of the air layer in the back of the shed.
- The new facility will be designed with appropriate canopies at the main entrances and exits to block the intense sunlight and heavy rainfall during the rainy season.
- The standard height of the ground floor of the Bio-Risk Control Zone is 4.5 m, the first floor is 4.5 m, and the room ceiling height is 2.8 m. The main part of the building will be finished directly on the slab without a ceiling, exposing the supply and exhaust ducts for the large air conditioning and ventilation systems and safety cabinets. The standard height of the first floor of the conference zone will be 3.9 m, and the living room ceiling height will be 2.8 m, which will allow easy installation of equipment piping, etc., behind the ceilings. In addition, a machine room for dedicated equipment will be located on the floor directly below and above the BSL2 control area to ensure that space is available for installation and maintenance of the equipment.

Table 2-4 Uniaxial Compression Test

Sample BH No.	Depth (m)	Density (kg/m ³)	UCS (N/mm ²)	Safe Bearing Capacity (KN/m ²)	Rock Classification (BS 5930)
BH 1	3.0-6.0	1801	10.1	700	Moderately Weak
	6.0-9.0	1796	17.3	1209	Moderately Strong
	9.0-12.0	1765	7.6	525	Moderately Weak
	12.0-15.0	1706	23.1	1616	Moderately Strong
Average			14.5	1012.6	Moderately Strong
BH 2	15.-5.0	1593	25.5	1782	Moderately Strong
	5.0-8.0	1438	19.6	1368	Moderately Strong
	8.0-11.0	1433	38.8	2720	Moderately Strong
	11.0-15.0	2456	67.0	4709	Strong
Average			37.7	2644.9	Moderately Strong

Source: JICA Survey Team

The soil composition of BH-2 is clay layer with sand and gravel at GL-1.0 m and moderately weathered tuff layer at GL-1.0 m and deeper. For the entire site, clay layers with sand and gravel are distributed at GL-1.0 m~3.0 m. The uniaxial compression test results for the tuff show a bearing capacity of 700 kN/m² for BH-1 and 1,782 kN/m² for BH-2.

2) Structural Planning

Since the proposed building is a two-story building (partially one-story), the type of structure shall be reinforced concrete, which is common in the area. Since the building is required to be airtight, the walls around the perimeter and the laboratory shall be of RC construction, while the other walls shall be of concrete block construction and light steel partitions. There are rooms where experimental equipment and heavy objects are located, and sufficient floor slab and beam rigidity shall be secured to prevent floor deformation and floor vibration. The type of foundation shall be direct foundation (independent foundation), the long-term allowable ground bearing capacity shall be 500 kN/ m², and ground improvement (rubble concrete) shall be provided under the foundation that does not reach the tuff layer. Since the south and east sides of the building are in close proximity to the slope in plan, the foundation should be planned to be sufficiently deep-rooted.

3) Design Condition

a) Design Criteria to be followed

The Kenyan building code will be used as the basis, but BS and Japanese standards will be used as references.

b) Design Strength

Concrete strength

- Rubble concrete Grade 15 (N/mm²)
- Concrete slab on grade Grade 20 (N/mm²)
- Concrete frame Grade 25 (N/mm²)
- Concrete block Grade 5 (N/mm²)

Rebar strength

- BS4449 < D16 GR460 (N/mm²)
- BS4449 > D16 GR425 (N/mm²)

c) Design Load

Material weight

- Concrete 24k N/m³

Dead load

- Water proofing sheet 0.15 kN/m²
- Ceiling material 0.20 kN/m²
- Floor finishing Materials 1.00 kN/m²

Live load

- Roof Slab 900 N/m², Frame 650 N/m², Seismic 300N/m²
- Walk roof Slab 1800 N/m², Frame 1300 N/m², Seismic 600 N/m²
- Office, laboratory Slab 2900 N/m², Frame 1800 N/m², Seismic 800 N/m²
- Hall Slab 3500 N/m², Frame 3200 N/m², Seismic 2100 N/m²
- Warehouse Slab 3900 N/m², Frame 2900 N/m², Seismic 2000 N/m²
- Machine room Slab 5000 N/m², Frame 4000 N/m², Seismic 3000 N/m²

Wind load

- The standard wind speed shall be 33.1 m/sec in accordance with BS standard.

Seismic load

- According to the seismic code of Kenya, it is stated that seismic load need not be considered for low-rise buildings (4~6 stories), but a base shear factor $C_0 = 0.10$, which is half of the Japanese standard commonly used in JICA projects, is adopted.

(4) Facility Planning

1) Existing Infrastructure and Facilities

Through discussions with the Kenya Power Lighting Company (KPLC), the Nairobi City Water and Sewerage Company (NCWSC), the KEMRI Facilities Engineer, and others, and through a site survey of the existing KEMRI premises, the following results were obtained regarding the condition of the infrastructure and existing facilities surrounding the proposed site.

a) Water Supply

The existing water source is city water from the Nairobi City Water Company and a well located on the site. Due to the low and unstable water pressure of the city water, we confirmed that the water is stored in a receiving tank together with the well water, pumped up to an elevated water tank, and then supplied to the existing building. The status of the existing facilities is described below.

- City water piping diameter: 80 mm ϕ
- Well water piping diameter: 80 mm ϕ (depth: 310 m)
- West side ground receiving water tank capacity: 150 tons x 2
- West side elevated water tank capacity: 24 tons (height: approx. 30 m)
- South side ground receiving water tank capacity: 50 tons
- South side elevated water tank capacity: 6 tons (height: approx. 25 m)
- Capacity of well pump: 10 m³/h
- Actual data for KEMRI's water supply volume is approximately 6140 m³ as of January 2022.
- Drainage pipe: 150 mm ϕ ; sewer main on east side road: 250 mm ϕ
- Existing drawings are "2004 Kenya Central Institute of Medical Research Facilities Development Plan for the Control of Infectious Diseases and Parasitic Diseases", etc.

b) Domestic and Infectious Wastewater

In Nairobi City, the Nairobi City Water and Sewerage Company (NCWSC) provides public sewerage services. In the existing building at KEMRI, laboratory wastewater is treated by a neutralization tank or sterilizer before being combined with domestic wastewater (sewage and miscellaneous wastewater) and discharged into the main sewerage system.

c) Electric Power

The existing facility is drawn overhead from the KPLC medium voltage distribution network (11KV) and receives power via disconnects installed on the poles to the receiving facilities located in the electrical room building. There are two substation facilities.

i) Electrical system and distribution status of existing KPLCs

Medium voltage power feed-in (KPLC, Power Company) 11kV 3-phase 3-wire 50Hz

Existing power receiving and transforming facilities

- Power receiving type: Indoor transformer capacity
- 500 kVA (transformer manufactured in 2004), 11 kV /415V/ 240V
- Indoor low voltage switchgear panel (800A) is installed on the secondary side of the transformer
- 1000kVA (transformer manufactured in 2005), 11 kV /415V/ 240V
- Indoor low voltage switchgear panel (1600A) is installed on the secondary side of the transformer
- Low-voltage side power distribution type
- 3-phase, 4-wire, 415V/240V, grounding method TN-S method (neutral wire and protective conductor separation method)

- The low voltage trunk line is distributed by buried cables from the indoor low voltage switchgear panel installed on the secondary side of the transformer to the power distribution panel in the existing building.
- The maximum power demand of the existing KEMRI is 380 kW (based on hearing).

ii) Emergency Generator

During the field survey, there were almost no power outages and no generator start-ups; interviews with KEMRI electrical engineers indicated that power outages sometimes occur 2-3 times a week for 3-5 hours.

KEMRI has two diesel generators and a land-based fuel tank (9,000 L) capacity.

The generators are connected to the same grid with two substations and are used depending on the overall load. The existing power supply facility has an automatic voltage regulator (AVR) at the input of the low-voltage main distribution panel to prevent voltage fluctuations. According to hearings with the KEMRI facility electrical engineer, voltage fluctuations are within $\pm 10\%$, but an AVR is planned to supply power to the laboratory equipment.

d) Telephony and Telecommunications

KEMRI has a telephone line and an optical line for network service pulled into the existing administration building to supply communication lines to the premises. Based on interviews with KEMRI's facility telecommunications engineer, it was confirmed that it would be possible to supply telecommunication lines from the administrative office building to the new facility.

Currently, KEMRI has contracts with Safaricom and KENET providers, and the current communication speed specification is 100 Mbps service.

2) Sanitary Facilities Plan

a) Water Supply Facility

i) Water Source

Nairobi City Water and Sewerage Company (NCWSC), the water supply company, provides water supply services (water supply and drainage) in the city of Nairobi. The water is drawn into KEMRI from a 150 mm water main laid on the north side road (Mbagathi Way) of the proposed site, and piping is laid on the site in 100 mm dia. to the receiving water tank. The water source for KEMRI is city water and well water located on the site. Since the city water pressure is low and unstable, the water is stored in a receiving tank together with the well water, and it was agreed with KEMRI that the water supply to the new facility will be in the form of a receiving tank and elevated water tank, with branches from the city water and well water pipes on the site.

- Water main diameter: 300 mm ϕ (existing)
- Water supply pressure: 0.02 MPa (based on hearing)
- Diameter of on-site water supply pipe: city water 80 mm ϕ , well water 80 mm ϕ

ii) Estimated Daily Water Use

Number of users: 40 staff + 170 visitors (training room) = 210 total

Average daily water consumption per person (domestic water) : 70 liters/person/day

210 persons x 70 liters/person/day = 14,700 liters/day

Shower room: P3: 3 persons x 2 rooms = 6 persons, 6 persons x 150 liters/times = 900 liters/day

Laboratory (autoclave steam supplemental water supply, etc.): 2 units x 50 liters/unit x 6 revolutions = 600 liters/day

Total: 16,200 liters/day

iii) Water Supply System and Main Equipment Capacity

Since it is difficult to provide a stable water supply to the new facility by taking water from the water pipes buried on the premises, based on discussions with the KEMRI facility management staff, a ground receiving water tank will be installed and water will be pumped up to the elevated water tank as in the existing facility, and then the water will be supplied to the new facility. The water receiving tank and elevated water tank for the new facility will be installed near the existing electric room building on the south side of the facility, based on the on-site meeting with the KEMRI facility management staff, and it was confirmed that the water supply pipe work from the elevated water tank to the new facility will be done within the scope of the Japanese side construction work.

The ground receiving water tank and the elevated water tank shall be made of a FRP ground-mounted type in consideration of sanitation and shall be of a dual tank type with a partition to allow for cleaning while in use. The capacity of the receiving water tank shall be 3-day usage, as requested by KEMRI, and the capacity of the elevated water tank shall be sufficient for half a day's usage.

- Receiving tank: Capacity $16.2 \text{ m}^3/\text{day} \times 3 \text{ days} = 48.6 \text{ m}^3 \Rightarrow 50 \text{ m}^3$, external dimensions 3 m x 9 m x 2.0 m (height)
- Elevated water tank: Capacity $16.2 \text{ m}^3/\text{day} \times 1/2 \text{ day} = 8.1 \text{ m}^3 \Rightarrow 8 \text{ m}^3$, external dimensions 2 m x 3 m x 1.5 m (height), installation height H = 25 m
- Lifting pumps: 2 units (automatic alternating operation)

iv) Prevent Cross Contamination

To prevent backflow due to negative pressure in the pipes, backflow prevention valves should be installed in the water supply system to the BSL2 and BSL3 laboratories.

b) Drainage Facilities (Domestic and Laboratory Wastewater)

The wastewater system of the new facility will consist of a domestic wastewater system (sewage and miscellaneous wastewater) generated outside the BSL2 and BSL3 laboratory areas, and a laboratory wastewater system that may cause infection generated inside the BSL2 and BSL3 laboratory areas, each of which will be discharged independently.

Domestic wastewater is discharged directly into the main sewerage system. On the other hand, the laboratory wastewater system in the BSL2 and BSL3 laboratory areas shall be the wastewater from the lab sinks, hand washing, and emergency showers in the laboratories, and the BSL2 and BSL3 laboratories shall be separated wastewater systems. A batch-type sterilization wastewater treatment system will be installed, and the wastewater will be sterilized and disinfected by a high-temperature steam sterilization wastewater treatment system before being discharged into the main sewer system. The sterilization wastewater treatment system will be installed in a separate machine room at the bottom of BSL2 and BSL3 laboratories.

c) Fire Extinguishing Equipment

In Kenya, the Building Standard Law and Occupational Safety and Health Law have been established to regulate fire extinguishing equipment for the safety of building occupants. Fire extinguishing systems should be planned in accordance with international standards.

In this project, judging from the use and scale of the building, indoor fire hydrants and fire extinguishers that are effective for initial fire extinguishing are to be installed. In particular, access to the BSL2 and BSL3 laboratories is controlled, thus fire extinguishers are to be installed at the entrance and exit of each laboratory to enable rapid fire extinguishing.

In addition, a gas fire extinguishing system (FM200) will be installed in the data centre.

3) Air Conditioning and Ventilation System Planning

a) Air Conditioning

Nairobi City, the target site of this project, is located almost directly below the equator at an altitude of about 300 m above sea level at a latitude of 4°S. The climate is tropical, but similar to that of a dry savanna. The climate is comfortable and not too hot throughout the year, with a heavy rainy season from March to May, but relatively little precipitation in the other months.

According to the handbook of the American Society of Heating, Refrigerating and Air-conditioning Engineers, Inc. (ASHRAE), which provides design conditions for air

conditioning systems in cities around the world, the design conditions (for cooling only) are as follows.

- Design conditions: dry bulb temperature 28.1°C, wet bulb temperature 15.8°C (Reference: ASHRAE Fundamentals 2013: at Nairobi)

Taking into consideration the climate and the use of the planned building, air conditioning systems will be planned for rooms where dusty, hot, and humid conditions are undesirable, and for rooms where an appropriate indoor environment must be maintained to improve operational efficiency.

Split-type air conditioners that can be operated individually in each room are planned as general air conditioning equipment. The rooms to be equipped with general air-conditioning facilities are the office, management room, conference room, and staff rooms. The server room of the data centre is planned to be equipped with an under-floor air-conditioning system, in which conditioned air is blown in from the floor using a double-floor system.

b) Ventilation Equipment

To eliminate stench, heat, and humidity, mechanical ventilation systems are to be installed in the following rooms.

The following table shows the design criteria for the ventilation system to be applied in this project, based on the aforementioned ASHRAE criteria and the design criteria of the Ministry of Land, Infrastructure, Transport and Tourism of Japan.

Table 2-5 Ventilation Equipment Desing Conditions

Name of Room	Ventilation Type	Unit Ventilation	Remarks.
Rooms subject to general air conditioning	Air supply fan	25 m ³ /person/hour	For fresh air introduction
Diagnostic and treatment rooms, etc.	Exhaust fan	2-3 times/hour	For fresh air introduction and odour removal
Warehouse	Exhaust fan only	5 times/hour	
WC	Exhaust fan only	10 times/hour	For odour removal
Water tank room	Exhaust fan only	3 times/hour	
Electrical room	Exhaust fan only	10 times/hour	For removal of heat generation
Generator room	Exhaust fan	25-30 times/hour	Combustion air supply and calorific value removal

Source: AHRAE, MLIT Standard

c) Air conditioning and Ventilation Systems for BSL2 and BSL3 Laboratories

The facility design for BSL2 and BSL3 laboratories, which is the main objective of this project, will meet the following international and Japanese standards, and will be designed to enable the facility to obtain international certification.

- WHO (World Health Organization): Laboratory Biosafety Manual
- CDC (Centers for Disease Control): Biosafety in Microbiological and Biomedical Laboratories

- National Institute of Infectious Diseases (NIID): Regulations for the Safety Management of Pathogens

In particular, the air conditioning and ventilation system in the BSL3 laboratory is required to control negative pressure, control room airflow, ensure room cleanliness, high efficiency particle air filter (HEPA) filtration in the exhaust system, and maintain room temperature. In addition, the air conditioning and ventilation system must maintain appropriate negative pressure control for the exhaust of the biological safety cabinet (BSC), which is installed in the laboratory and handles infectious materials.

To meet these requirements, each BSL3 laboratory, including ancillary rooms such as ante rooms, shower rooms, changing rooms, etc., will be equipped with air conditioning and ventilation equipment and ducts, each consisting of a single packaged air conditioner, HEPA filter unit, exhaust fan, air volume control unit, etc.

The support spaces to each of the BSL3 laboratories will also have their own HVAC systems. These air conditioning and ventilation systems will be installed in a mechanical room on the first floor (second floor in Japan) directly above the laboratory. The BSL2 laboratory will also have a similar air conditioning and ventilation system, although the containment requirements will be less stringent than those for the BSL3 laboratory.

To manage these laboratory air conditioning and ventilation systems, an operation control monitoring panel will be installed in the monitor corner of the new facility to enable monitoring of the operating status of each device, the static pressure of the HEPA filter, and the pressure in each room in the controlled area.

4) Electrical Facility Plan

a) Transformer System

KPLC electrical engineers and KEMRI electrical engineers were briefed on the project and the assumed capacity (500 kVA) for supplying electricity to the new facility, and the method of receiving electricity was confirmed.

The existing facility receives 11 KV intermediate voltage from KPLC, a public power corporation, and distributes power to each building at low voltage using a transformer installed in the power receiving substation. After discussions with KPLC and the KEMRI facility electrical engineer regarding the distribution of power to the new facility, KPLC and KEMRI agreed that since the KEMRI site will have only one power line, an RMU (Ring Main Unit) will be added to the existing electrical room to supply power to the planned building, and a new 11 kV underground power cable equivalent to 500KVA capacity will be installed.

KEMRI also confirmed that the cost of supplying electricity to the new facility would be the responsibility of KEMRI.

- Power received: 11 kV 3-phase 3-wire, 50 Hz

The assumed capacity calculation for the power receiving and transforming facilities shall be the total capacity calculated according to the following.

Table 2-6 Estimated Load Capacity

Load Name	Load Density (VA/m ²)	Floor Area (m ²)	Load Capacity (KVA)	Remarks.
Lighting outlet load	30	4000	120	
BSL2 inspection room HVAC equipment and equipment	60 KVA	4 rooms	240	
BSL2 inspection room HVAC equipment and equipment	100 kVA	2 rooms	200	
Data centre equipment			50	assumption
Air conditioning equipment	100	1500	150	General Air Conditioning
Sanitary equipment	-	-	20	
Plan			780	

Source: JICA Survey Team

Assuming a total assumed facility capacity of 780 KVA and a demand factor of 50%, the maximum power demand is as follows.

- $780\text{KVA} \times 0.5 = 390\text{KVA} \rightarrow 390\text{KW}$

b) Emergency Generator System

Equipment such as safety cabinets, incubators, freezers, and refrigerators, for which a power failure would be fatal, will be installed in the new facility. In addition, the air conditioning and ventilation systems in the BSL2 and BSL3 laboratories, which require strict bio risk management, must continue to operate even in the event of a power failure, so an emergency generator will be installed.

A new generator is planned to be installed for the minimum necessary load so that it will not be interrupted by power failure. The capacity of the emergency generators is expected to be approximately 80% of the maximum power demand. In addition, an outdoor fuel tank will be installed to allow for 24-hour running time, although there will be no continuous power outage for an extended period of time.

- Type: Low-noise radiator-cooled indoor installation package type
- Capacity: 3-phase 3-wire 415 V 50 Hz 200 KVA x 2 units (fuel consumption: 80 L/hour)
- Operation time: 24 hours (long-hour operation specification) $\times 80 \text{ L} = 1,920 \text{ L}$
- Fuel tank: 2,000 L light oil

Uninterruptible power supply (UPS) should be planned as an equipment portion for equipment such as inspection and laboratory equipment that is sensitive to power fluctuations. In addition, the constant voltage device (AVR) will be planned for the entire laboratory area as an equipment portion.

c) Trunk Line Facilities

The power shall be distributed from the transformer board to each location via distribution boards, using 3-phase 4-wire 415/240V 50Hz, with the system divided in consideration of load application and facility classification. The main line capacity shall be set to satisfy the appropriate voltage drop and allowable current according to the capacity of the connected facilities. In principle, cable racks shall be used for wiring in the shafts, and piped wiring shall be used for other areas. The power distribution system shall be as follows:

- Power distribution system/trunk line: 3φ4 W 240 V/415 V
- Single-phase load: 1φ2 W 240 V
- Power load: 3φ3 W 415 V

d) Lighting Equipment

In consideration of maintenance and running costs, LED (light-emitting diode) lighting will be mainly used in each room and corridor. The lighting criteria (general illuminance) shall be as follows, referring to the average illuminance of international standards and JIS standards, and taking into consideration the current situation in Kenya.

Table 2-7 Illumination Criteria

Office and Staff Room	350lux
Conference Room	400lux
Research Room	500lux
BSL2 and BSL3 Lab	500lux
Corridor and Stairs	150lux
WC、 Warehouse	100lux
Mechanical and Electrical Room	150lux

Source: JICA Survey Team

Lighting switches should be located in each room in general, and lighting circuits should be separated so that lighting can be turned on in each necessary compartment. Electricity should be distributed to the lighting and outlet circuits using 240 V single-phase, two-wire circuits. Emergency lighting should be planned for each room, with guide lights installed as appropriate in BSL2 and BSL3 laboratories where access is controlled and in evacuation routes such as stairways.

e) Telephone and Telecommunications System

Since the new facility will require communication among the various rooms and with outside parties, on-site telephony facilities and information and communication (computer network) will be installed. In the new facility, consideration should be given to the availability of a communication network that will be improved from the viewpoint of data centre operations.

Currently, there are several private telecommunication carriers that provide cell phone and data communication services in Nairobi, but only a few of them offer combined phone and data communication services. For the planned building, KEMRI was requested to install the telephone equipment, network optical cable, and buried piping from the existing administration building to the new building. The telephone equipment will include an IP telephone switchboard with the following specifications and telephone equipment in each room.

- One IP telephone switchboard (with uninterruptible power supply UPS)
- Number of lines drawn: 3 lines, 30 extensions

f) Broadcasting System

KEMRI has requested the installation of a broadcasting system in the new facility, and an emergency broadcasting system linked to the fire alarm system will be planned.

In addition, a projector, audio equipment, etc., will be planned for the virtual lab and conference room.

g) LAN (Local Area Network) System

A LAN (Local Area Network) will be set up for the data centre and for the collaboration with overseas and domestic Kenyan laboratories and research institutes via Internet. The network will consist of a backbone switch in the data centre of the planned building, floor switching hubs on each floor, and LAN cables (UTP CAT6A) connected to various rooms. Network equipment at the data centre will be a different construction work. 19-inch racks installed in the data centre, switching HUBs installed in the office, and LAN wiring from switching HUBs on each floor to LAN outlets installed in various rooms will be provided by the Japanese side.

- LAN standard: Single-mode optical cable, UTP (CAT6)
- Data transmission speed: 100Mbps to 1000Mbps

h) Access Control System

Access to the BSL2 and BSL3 controlled areas of the new facility must be controlled strictly. Therefore, the main flow lines to the BSL2 and BSL3 laboratories will be restricted to authorized personnel only, and an access control system will be installed to allow recording of access to these laboratories. Biometric authentication methods such as iris recognition will be used, and the system control panel will be installed in the monitor corner.

i) Surveillance TV System

A surveillance TV system will be planned to install surveillance cameras in each laboratory, preparation hall, and sterilization room in the BSL2 and BSL3 controlled areas of the new facility, and to display them at the monitor corner.

j) Emergency Call System

An emergency call system is planned to be installed in each laboratory in the BSL2 and BSL3 controlled area of the Inspection and Research Centre, in the preparation hall, and in the sterilization room, with emergency buttons and a monitor corner to display these buttons.

k) TV Co-receiving System

The conference room in the new facility will be equipped with a TV co-reception system: a UHF type TV antenna with an amplifier in the terminal panel and piping and wiring to the TV outlets in the various rooms.

l) Fire Alarm System

The new facility will include a virtual lab for research and training purposes, conference rooms, and a data centre. Thus, the entire building will be equipped with an automatic fire alarm system to enable early detection of fires. At the request of KEMRI, an emergency alarm system will be planned in combination with the automatic fire alarm system and an emergency broadcast system. Fire receivers will be installed in the monitor corner of the new facility.

m) Lightning Protection System

To avoid damage caused by lightning, the entire new facility will be protected by lightning protection systems.

In recent years, damage to electronic equipment, computers, and other devices caused by internal lightning has become a major problem in many countries. When lightning strikes, either by a direct strike or induced lightning, abnormal currents and voltages enter electronic equipment through power and telephone lines, causing equipment malfunctions. Therefore, the plan should be designed to ensure that computers, telephone switchboards, and equipment are not affected by abnormal currents and voltages from power lines, telephone lines, etc., and that a stable power supply is available.

2-2-2-2 Equipment Plan

(1) Analysis of requested Equipment

The requested equipment and the priority on the KEMRI side were confirmed as shown in Table 2-8 and discussions of equipment selection were held.

Table 2-8 Required Equipment Priority

Priority	Criteria
1	The essential equipment to ensure the functionality of the BSL2 and 3 laboratories. Or equipment with the highest procurement priority as KEMRI.
2	The equipment to ensure the functionality of the BSL2 and 3 laboratories. Or equipment with the higher procurement priority as KEMRI.
3	Equipment that needs to be procured in KEMRI research activities. (Slightly higher priority)

Priority	Criteria
4	Equipment that needs to be procured in KEMRI research activities. (Medium priority)
5	Equipment that needs to be procured in KEMRI research activities. (Lower priority)

Source: JICA Survey Team

It became clear during the discussion that the equipment priorities 2, 3, 4 and 5 have a high possibility to be arranged for the new facility on the KEMRI side budget even if they are not included in this plan. In addition, in this plan, it is judged appropriate to consider the equipment plan focusing on the equipment of priority 1. Of the priority 1 equipment, 2 items that are particularly expensive were examined as follows.

1) Electron Microscope

Currently, the electron microscope is not operating with KEMRI. The microscope (made in Japan) was provided by Japan, twice in 1983 and 1985, had been in operation for more than 30 years until 2016. They become obsolete and spare parts have been discontinued and no longer be usable. A researcher still belonging to KEMRI and CVR, who is mainly researching rotavirus now, was operating the electron microscope. The researcher has received one-year training in electron microscopy in Japan. There is no electron microscope that can be utilized by KEMRI in Kenya. It is necessary to go abroad to implement research that necessary an electron microscope. As a result, there is no research plan that requires an electron microscope at present.

An electron microscope is required for the research like Ultra-fine morphological analysis of tissues and cells containing pathogens (viruses of great interest in CVR are haemorrhagic fever virus, polio, SARS-CoV-2), the discovery of new pathogens, histological imaging (mitochondrion, etc.), nano research, and they are high priority research topics to KEMRI.

In actual use, it is necessary to give guidance to the researchers who use it. It is necessary to have refresh training for an existing researcher and training for new researchers for utilization of the electron microscope. The initial operation instruction and soft components of the grant aid project do not cover this kind of training. KEMRI has a researcher training program and budget to conduct this kind of training in Kenya and/or abroad for master's degrees, doctor's degrees, and other specific fields. KEMRI has proposed to use this program to train existing and new researchers once the equipment plan is decided.

Regarding the maintenance and management of equipment, the existence of an electronic microscope agency including a Japanese manufacturer has been confirmed in Nairobi. The maintenance can be performed through these agents. In the procurement, equipment for preparing samples, like an ultra-centrifuge, and an ultra-microtome will be procured together with the electron microscope. As for the installation location, it is possible to prepare an appropriate location for the new facility.

From the above situation, the introduction of electronic microscopes is in high demand, and it is feasible for operation and maintenance.

2) LCMS (Liquid Chromatography Mass)

This equipment is requested for pharmaceutical research. Currently, KEMRI has HPLC (High-Performance Liquid Chromatography), which is being utilized. This device also enables the drug analysis currently being carried out. On the other hand, LCMS analysis is used for mass / structural analysis, nanotechnology research and proteome analysis of unknown compounds that are expected in research fields in the future. The LCMS is an easy-to-use device that makes these analyses relatively easy for researchers and can be said to be an essential device for this research purpose.

On the other hand, it is a very delicate device to perform a stable measurement. It is required to operate (power-on) and keep the room temperature constant for 24 hours. This environment can be realized in the new facility, and appropriate installation space can be secured.

The equipment is currently not in use, and training for laboratory technicians is required. Since HPLC is operated by several laboratory technicians, LCMS can be operated by improving the capabilities of these technicians. It is possible to train them through initial operation instruction and application training for about a week at the time of delivery of equipment.

Regarding the maintenance of equipment, the existence of LCMS distributors including Japanese manufacturers has been confirmed in Nairobi. The maintenance can be performed through these distributors. It is also possible in Nairobi to procure the consumables and medical gas required to operate the LCMS. As for the installation location, it is possible to prepare an appropriate location for the new facility.

From the above situation, the introduction of LCMS is in high demand, and it is feasible for operation and maintenance.

(2) Selection of Equipment

Equipment selection policy

The following equipment selection criteria were created for the equipment plan, and each requested equipment was examined as shown in Table 2-9. Based on the results of this analysis, the equipment that was judged as ◎ and ○ as planned equipment will be selected equipment to be procured in this project.

- ① Equipment with a priority of 1 in the requested equipment list.
- ② There are human resources who can operate and maintain the equipment. Or the system can be constructed.
- ③ It is possible to secure the research expenses required for the operation of the equipment.
- ④ An installation space for proper operation of the equipment can be secured in the new facility.

Table 2-9 Requested Equipment and Plan

No.	Equipment	①	②	③	④	Plan	Plan Q'ty	KEMRI Priority	Total Request
1	Autoclave, vertical	⊙	○	○	○	⊙	8	1	8
2	Autoclave, double door A	⊙	○	○	○	⊙	1	1	1
3	Autoclave, double door B	⊙	○	○	○	⊙	1	1	1
4	Biochemistry analyser	×	○	○	○	×	-	4	1
5	Safety cabinet	⊙	○	○	○	⊙	8	1	8
6	Blood cell counter	×	○	○	○	×	-	4	1
7	Blood analyser	×	○	○	○	×	-	3	1
8	BSL3 laboratory calibration kit		○	○	○	⊙	1	1	2
9	Centrifuge, high speed	○	○	○	○	○	6	1	6
10	Centrifuge, low speed	×	○	○	○	×	-	4	6
11	Centrifuge, spin-down	×	○	○	○	×	-	4	6
12	Clean bench, tabletop	○	○	○	○	×	1	1	1
13	CO ₂ incubator	×	○	○	○	×	-	3	2
14	Data logger, temperature	×	○	○	○	×	-	2	30
15	Personal computer	×	○	○	○	×	-	5	6
16	DNA/RNA Extraction and purification unit	×	○	○	○	×	-	4	2
17	Draftchamber	○	○	○	○	○	1	1	1
18	Drybath	×	○	○	○	×	-	5	2
19	Electric balance 2kg/0.01g	×	○	○	○	×	-	5	4
20	Electric balance 200g/0.0001g	×	○	○	○	×	-	2	1
21	Electron microscope	○	△	○	○	○	1	1	1
22	Electrophoresis unit	×	○	○	○	×	-	4	1
23	ELISA set	×	○	○	○	×	-	4	1
24	ESR analyser	×	○	○	○	×	-	4	1
25	Flowcyte meter	×	○	○	○	×	-	3	1
26	Freezer -30°C	×	○	○	○	×	-	4	7
27	Freezer -80°C	×	○	○	○	×	-	3	8
28	Gel documentation system	×	○	○	○	×	-	4	1
29	Glove box A	⊙	○	○	○	⊙	1	1	1
30	Glove box B	⊙	○	○	○	⊙	1	1	1
31	Drying sterilizer	×	○	○	○	×	-	5	5
32	Ice maker	×	○	○	○	×	-	4	1
33	Incubator	×	○	○	○	×	-	5	6
34	Laboratory refrigerator	×	○	○	○	×	-	4	6
35	LCMS	○	△	○	○	○	1	1	1
36	Microscope, binocular	×	○	○	○	×	-	2	6
37	Microscope, fluorescent, with camera	×	○	○	○	×	-	2	1
38	Microscope, inverted, with camera	×	○	○	○	×	-	2	2
39	Micro spectrophotometer	×	○	○	○	×	-	4	2
40	Nano drug generator	×	○	○	○	×	-	2	1
41	pH meter	×	○	○	○	×	-	4	4
42	Pipette set, single	×	○	○	○	×	-	5	13

No.	Equipment	①	②	③	④	Plan	Plan Q'ty	KEMRI Priority	Total Request
43	Pipette set, multi	×	○	○	○	×	-	5	2
44	Protein synthesizer	×	○	○	○	×	-	2	1
45	Real time PCR	×	○	○	○	×	-	4	1
46	Sequencer	×	○	○	○	×	-	4	1
47	Shaker	×	○	○	○	×	-	4	1
48	Spectrophotometer UV-VIS	×	○	○	○	×	-	4	2
49	Standard thermometer	×	○	○	○	×	-	4	1
50	Standard weight	×	○	○	○	×	-	4	1
51	Thermocycler	×	○	○	○	×	-	4	1
52	Ultracentrifuge	×	○	○	○	×	-	2	3
53	Ultrasound homogenizer	×	○	○	○	×	-	4	1
54	Vortex mixer	×	○	○	○	×	-	5	6
55	Thermostatic bath	×	○	○	○	×	-	5	6
56	Water distiller	×	○	○	○	×	-	4	1
57	Ultrapure water production unit	×	○	○	○	×	-	2	1
58	Laboratory sink	⊙	○	○	○	⊙	5	1	5
59	Shelf	×	○	○	○	×	-	2	7
60	Work bench, Central	⊙	○	○	○	⊙	8	1	8
61	Work bench, Side A	⊙	○	○	○	⊙	18	1	18
62	Work bench, Side B	⊙	○	○	○	⊙	2	1	2
63	Work bench, Side C	⊙	○	○	○	⊙	1	1	1
64	UPS	⊙	○	○	○	⊙	18	1	18
65	Table A	○	○	○	○	○	7	1	7
66	Table B	○	○	○	○	○	58	1	58
67	Chair A	○	○	○	○	○	14	1	14
68	Chair B	○	○	○	○	○	172	1	172
	Total						334		500

Source: JICA Survey Team

From the above examination, the planned equipment and the location of the equipment are as shown in Table 2-10.

Table 2-10 Allocation List

No	Equipment	Total	BSL3 Laboratory (Animal)	BSL3 Laboratory (Cell culture)	BSL2 Central laboratory	BSL2 Immunology	BSL2 Molecular laboratory	P2 Clinical Research	Equipment service centre	Cold room	Virtual Lab.	Conference room
1	Autoclave, vertical	8	2	2	1	1	1	1				
2	Autoclave, double door A	1	1									
3	Autoclave, double door B	1		1								
4	Biosafety cabinet A	4			1	1	1	1				
5	Biosafety cabinet B	2	1	1								
6	Biosafety cabinet C	2	1	1								

No	Equipment	Total	BSL3 Laboratory (Animal)	BSL3 Laboratory (Cell culture)	BSL2 Central laboratory	BSL2 Immunology	BSL2 Molecular laboratory	P2 Clinical Research	Equipment service centre	Cold room	Virtual Lab.	Conference room
7	BSL3 laboratory calibration kit	1							1			
8	Centrifuge, high speed	6	1	1	1	1	1	1				
9	Clean bench, tabletop	1					1					
10	Draft chamber	1						1				
11	Electron microscope	1			1							
12	Glove box A	1	1									
13	Glove box B	1		1								
14	LCMS	1			1							
15	Laboratory sink	5	1	1		1	1	1				
16	Work bench, Central A	8	1	1	1	1	1	1	2			
17	Work bench, Side A	18	1	1	3	3	4	3	2	1		
18	Work bench, Side B	2					2					
19	Work bench, Side C	1			1							
20	UPS A(1kw)	15	3	3	3	2	2	2				
21	UPS B (1.5kw)	2	1	1								
22	Table A	7									7	
23	Table B	58										58
24	Chair A	14									14	
25	Chair B	172										172
	Total	333	14	14	13	10	14	11	5	1	21	230

Source: JICA Survey Team

(3) Major Specifications of the Equipment

The major specifications of the planned equipment are shown on Table 2-11.

Table 2-11 Major Specifications of the Equipment

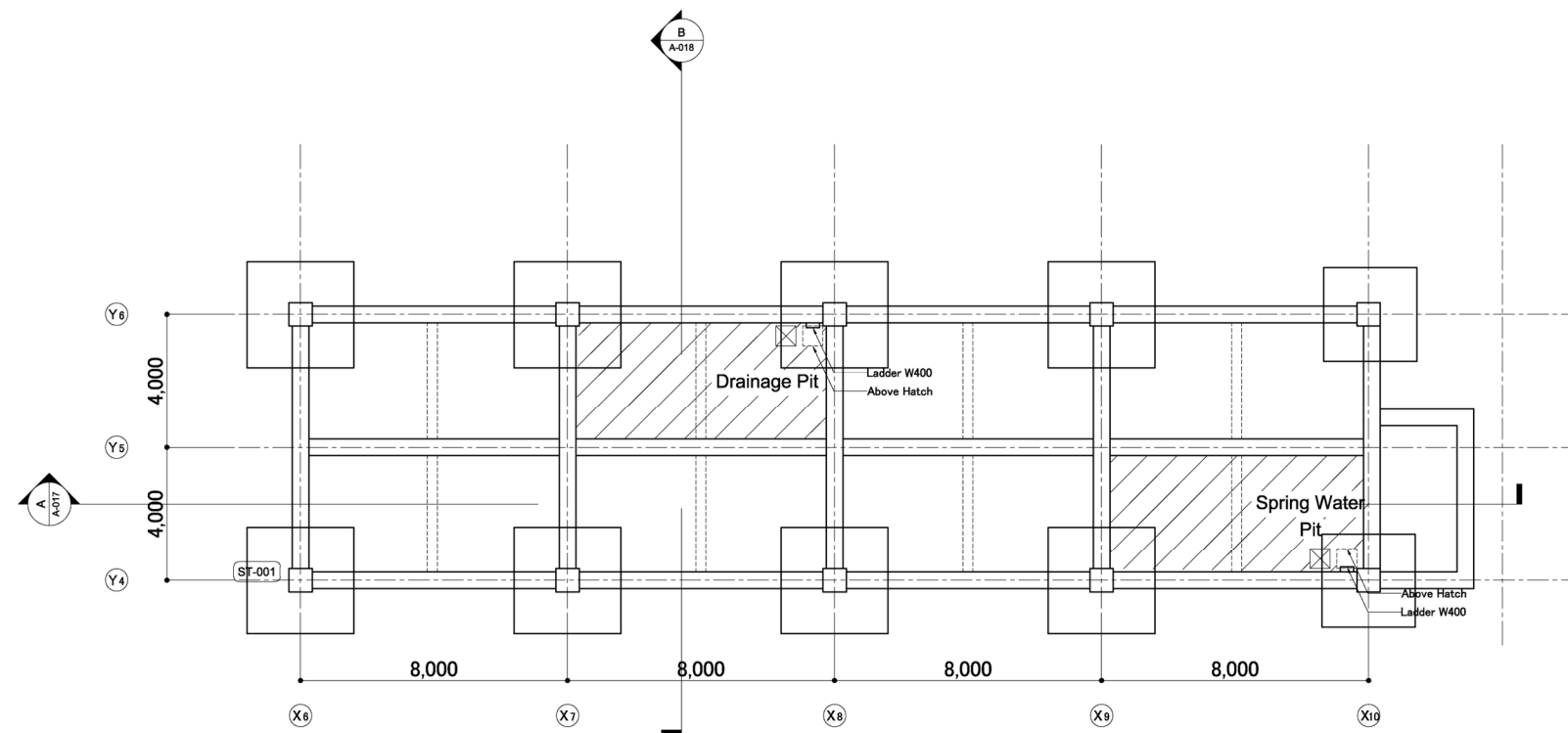
No.	Equipment	Major specification	Q'ty
1	Autoclave, vertical	Effective capacity 68 ~ 110 L or wider 、 Sterilization temperature 100~137°C or wider	8
2	Autoclave, double door A	Internal dimensions 1200 x 660 x 1000 mm±10% 、 Sterilization temperature 105°C~134°C or wider, Both door handle close type, Steam generator, Compressor, Water softener equipped	1
3	Autoclave, double door B	Internal dimensions 500 x 500 x 900mm±10%、 Internal width 105°C~134°C or wider, Both door handle close type, Steam generator, Compressor, Water softener equipped	1
4	Biosafety cabinet A	Class II, Internal width 1,300mm±10%、 HEPA filter equipped	4
5	Biosafety cabinet B	Class II, Internal width 1,300mm±10%、 HEPA filter and canopy equipped.	2
6	Biosafety cabinet C	Class II, Internal width 1,300mm±10%、 HEPA filter, canopy, pass box connection equipped.	2
7	BSL3 laboratory calibration kit	Air velocity meter, digital photometer, aerosol generator, flow hood kit, stand set, formalin detection kit, tool set, multi-meter, full face gas mask, fumigation unit, formalin destruction set. hot plate, air circulator and exhaust duct set	1

No.	Equipment	Major specification	Q'ty
8	Centrifuge, high speed	Refrigerated centrifuge, High-speed, Self-standing type, Revolving speed 15,000rpm or more, Rotor and seal cap equipped	6
9	Clean bench, tabletop	Tabletop type, HEPA filter equipped	1
10	Draft chamber	Exhaust type, with Scrubber	1
11	Electron microscope	Transmission electron microscope, Magnification 200 - 650k or wider, Voltage 20 - 120kV or wider Camera, Camera, Micro centrifuge, Ultra microtome equipped	1
12	Glove box A	Size 2080 - 2130 x 980 - 1000 x 690 - 780mm, Glove 4 pairs or more, HEPA filter, exhaust fan, CO ₂ incubator and inverted microscope equipped.	1
13	Glove box B	Size 1750 - 1850 x 530 - 580 x 680 - 720mm, Glove 2 pairs or more, HEPA filter, exhaust fan, CO ₂ incubator and inverted microscope equipped.	1
14	LCMS	Triple quadrupole mass spectrometer, Mass range 5 - 2000mz or wider	1
15	Laboratory sink	Sink size 1000 ~ 1700 x 450 - 700 x 400mm or more, Material : full stainless	5
16	Work bench, Central	Central work bench, Size 3,000 x 1500 x 850mm $\pm$ 10% with shelf and chair	8
17	Work bench, Side A	Side work bench, Size 3,600 x 750 x 850mm $\pm$ 10% with chair	18
18	Work bench, Side B	Side work bench, Size 3,000 x 750 x 850mm $\pm$ 10% with chair	2
19	Work bench, Side C	Side work bench, Size 1,200 x 750 x 850mm $\pm$ 10% with sink and chair	1

Source: JICA Survey Team

2-2-3 Outline Design Drawing





PROJECT TITLE

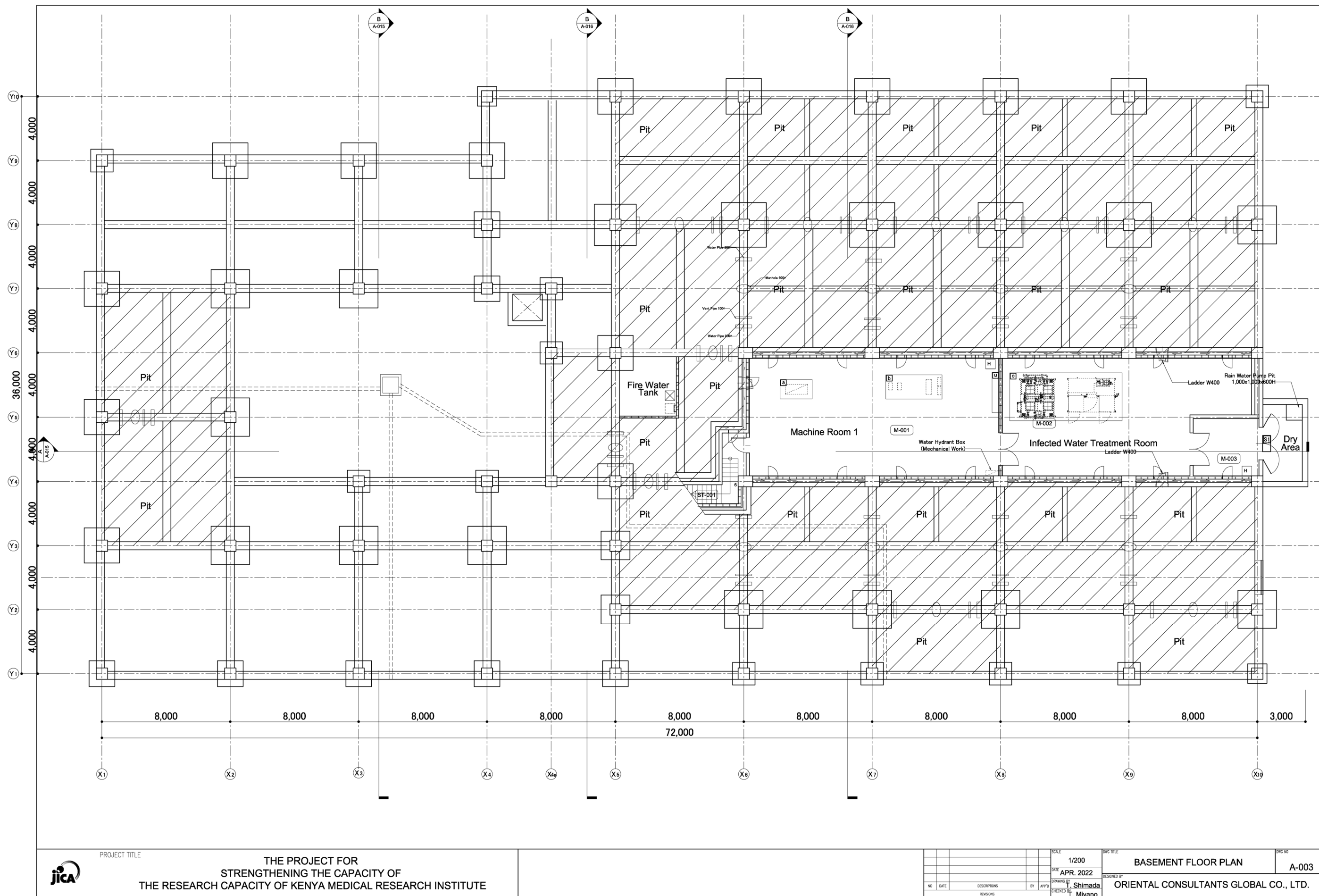
THE PROJECT FOR
STRENGTHENING THE CAPACITY OF
THE RESEARCH CAPACITY OF KENYA MEDICAL RESEARCH INSTITUTE

NO.	DATE	DESCRIPTIONS	BY	APPROV.	CHECKED	SCALE	DATE	DRAWING BY	CHECKED BY
						1/200	APR. 2022	T. Shimada	T. Miyano

ORIG. TITLE	PIT FLOOR PLAN	ORIG. NO.	A-002
DESIGNED BY	ORIENTAL CONSULTANTS GLOBAL CO., LTD.		

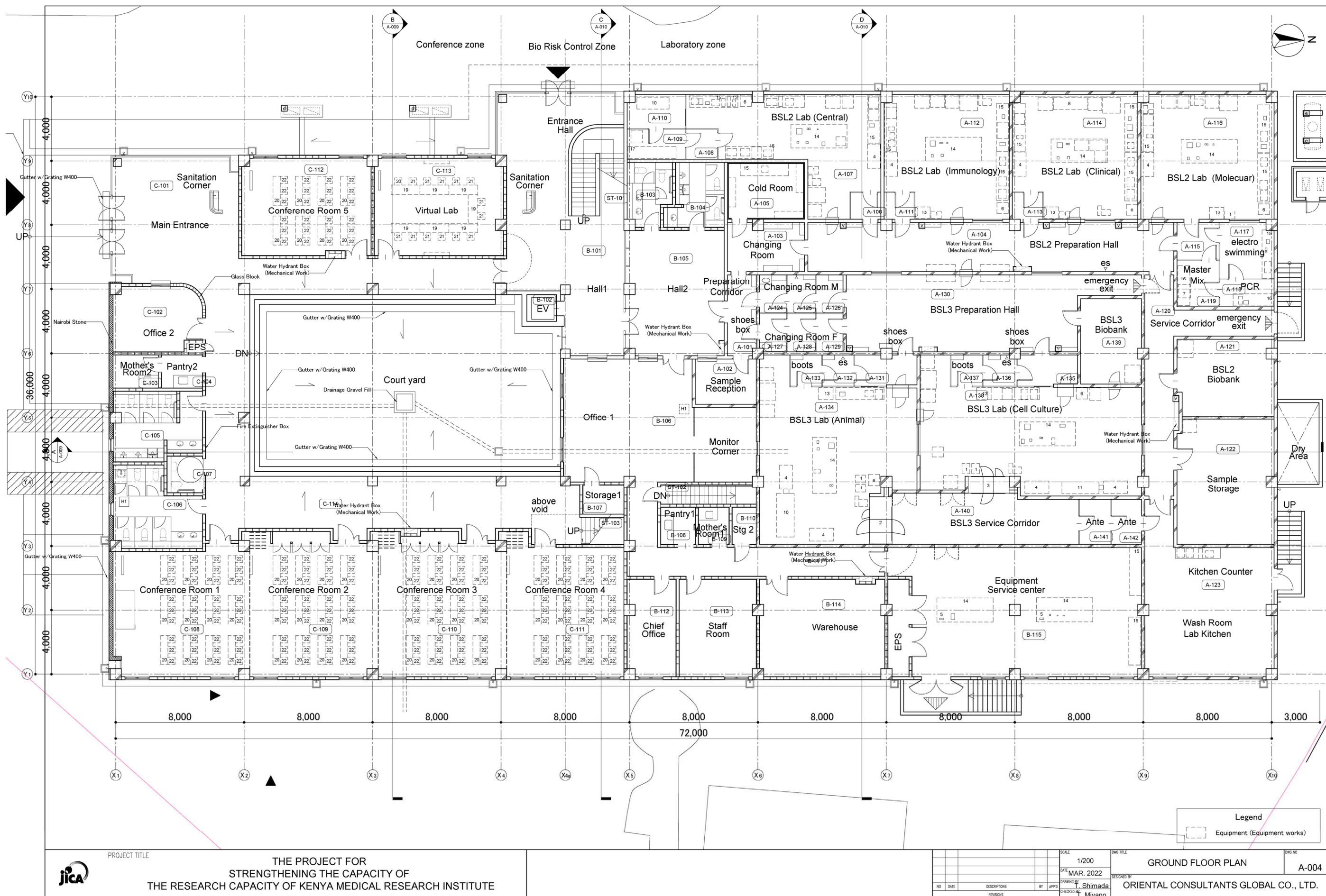
Source: JICA Survey Team

Figure 2-10 Pit Floor Plan



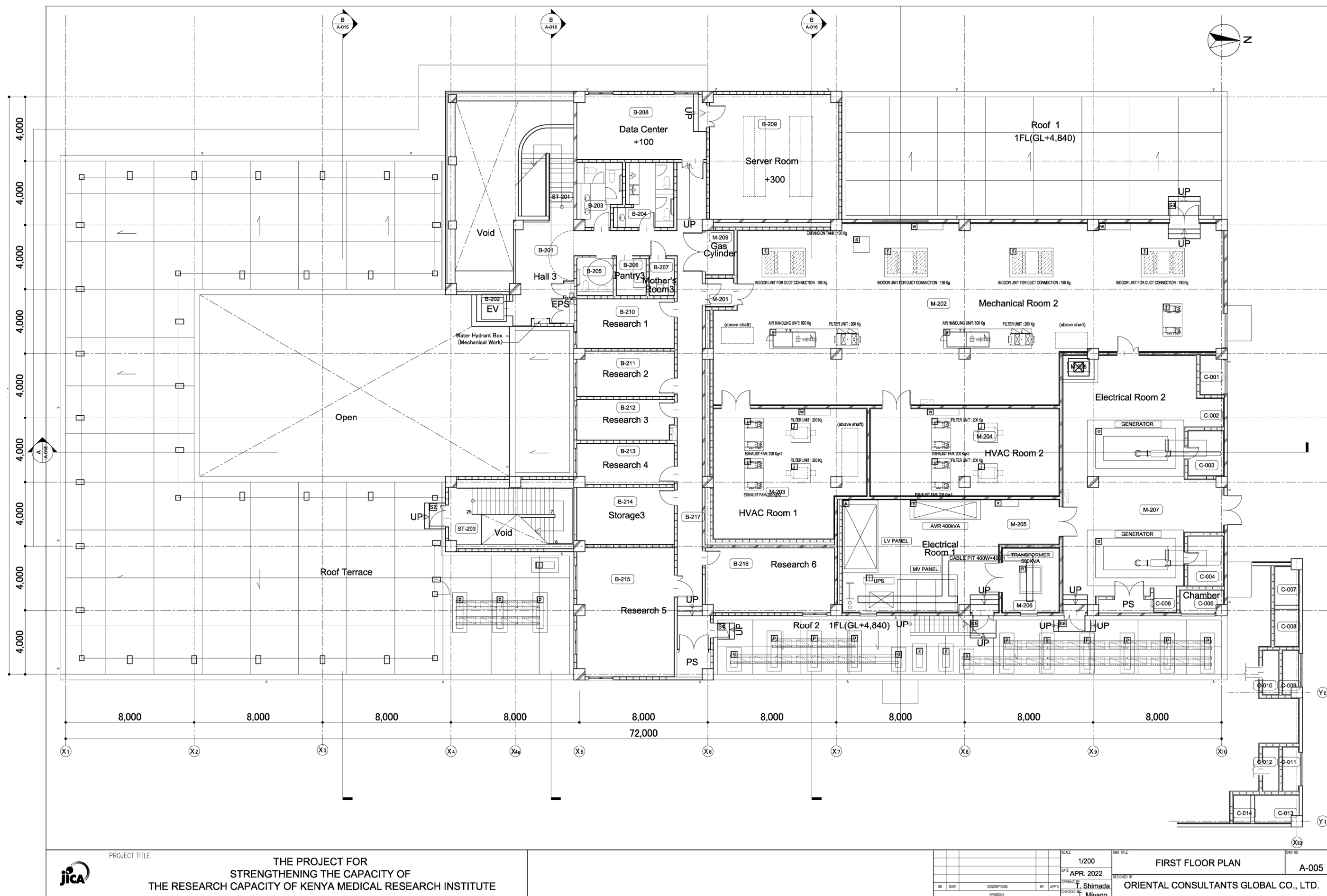
Source: JICA Survey Team

Figure 2-11 Basement Floor Plan



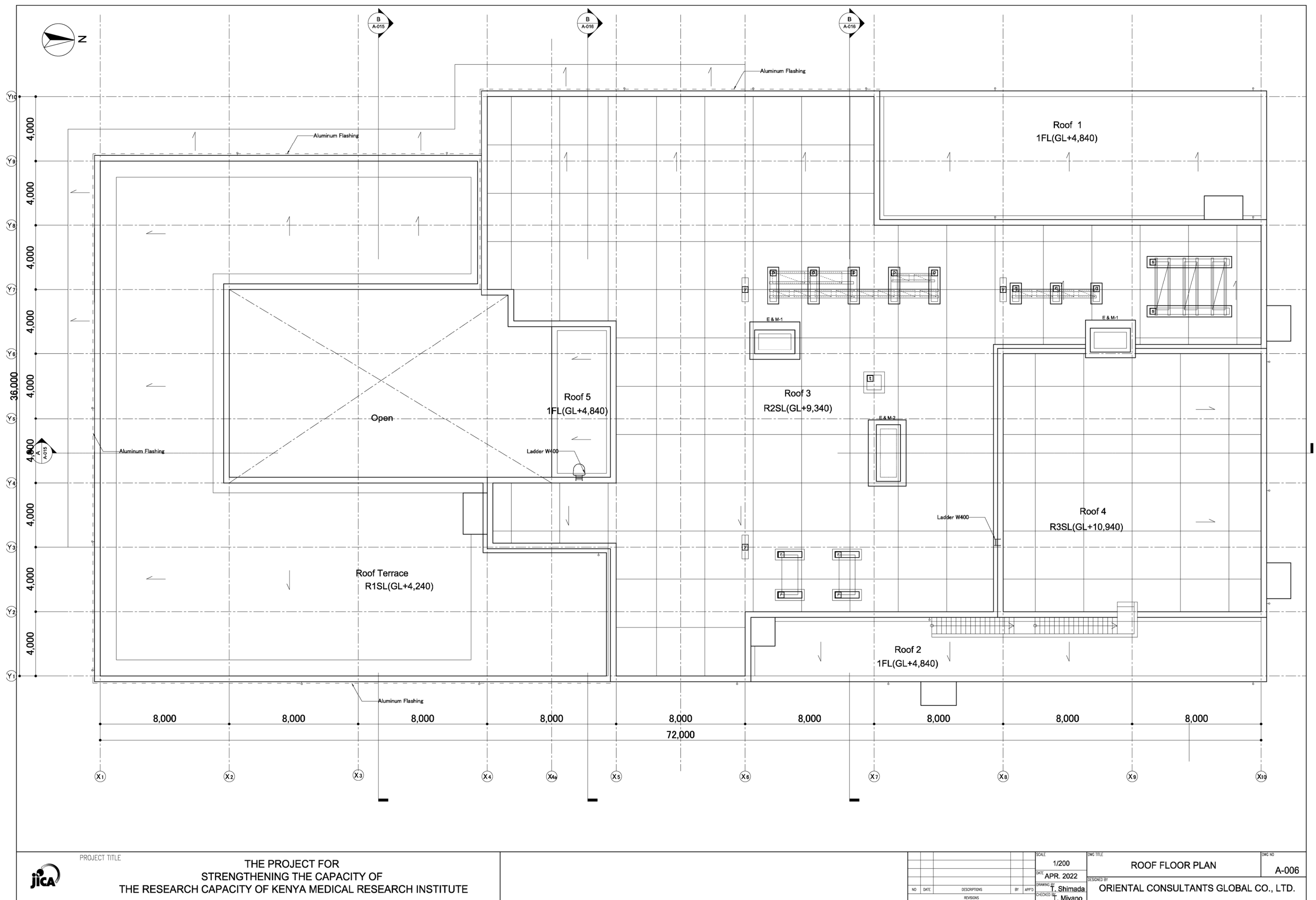
Source: JICA Survey Team

Figure 2-12 Ground Floor Plan



Source: JICA Survey Team

Figure 2-13 First Floor Plan



Source: JICA Survey Team

Figure 2-14 Roof Floor Plan

No.	Material / Finish
①	AEP Paint
②	Nairobi Stone Masonry
③	Glass Curtain Wall
④	Flashing Aluminum
⑤	Down spout
⑥	Handrail Stainless Steel
⑦	Eaves
⑧	

∇Max height(GL+11,540)
 ∇R3SL(GL+10,940)
 ∇R2SL(GL+9,340)
 ∇1FL(GL+4,840)
 ∇R1SL(GL+4,240)
 ∇GFL(GL+340) 1,706.34
 ∇GL±0 1,706.00 GATE LEVEL
 Planned Ground Level
 ∇1,705.00
 ∇1,704.00
 ∇1,703.00

4,000 4,000 4,000 4,000 4,000 4,000 4,000 4,000 4,000
 36,000

∇1,708.00
 ∇1,707.00

∇Max height(GL+11,540)
 ∇R3SL(GL+10,940)
 ∇R2SL(GL+9,340)

8,000 8,000 8,000 8,000 8,000 8,000 8,000 8,000 8,000
 72,000

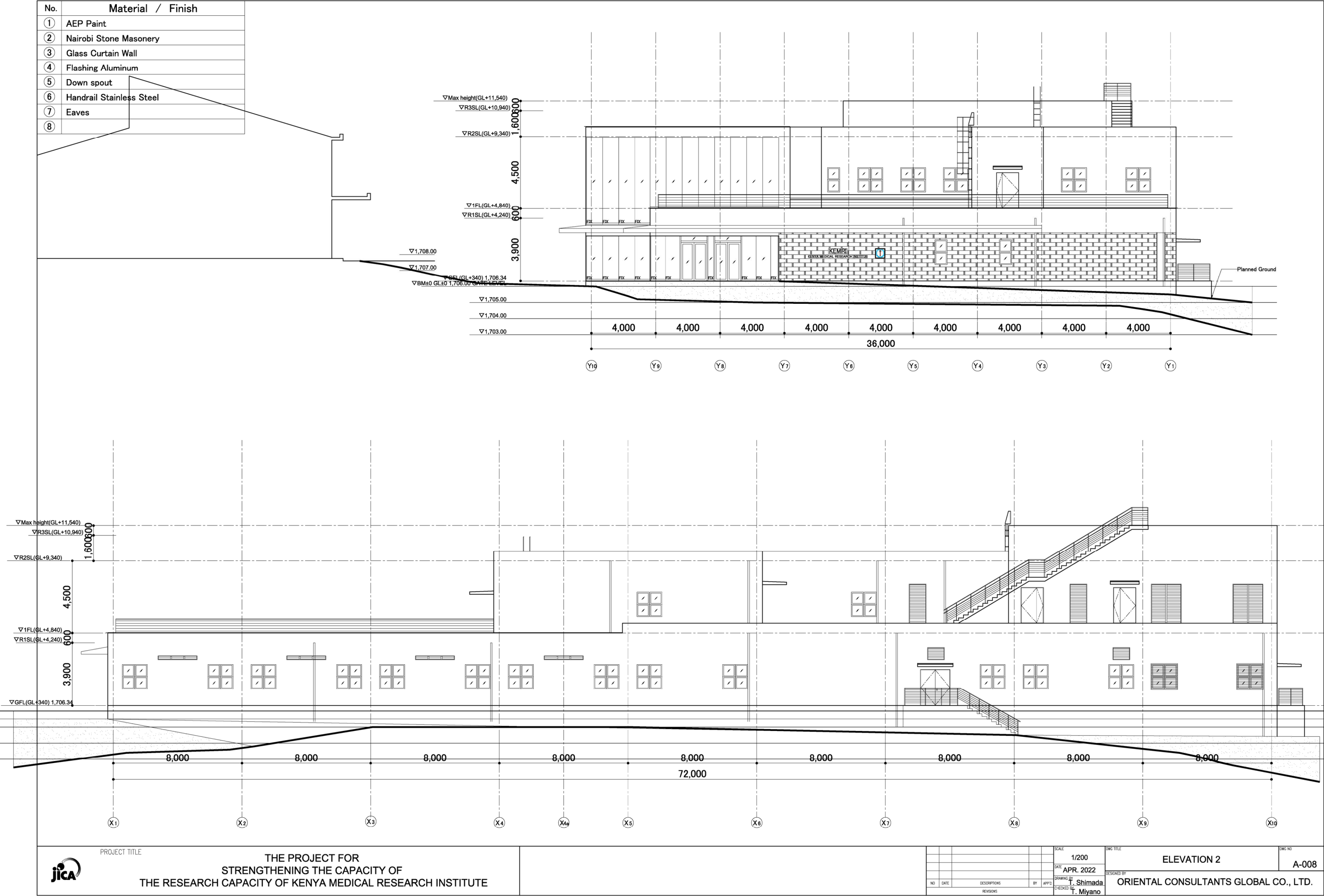
X19 X9 X8 X7 X6 X5 X4 X3 X2 X1

PROJECT TITLE
 THE PROJECT FOR
 STRENGTHENING THE CAPACITY OF
 THE RESEARCH CAPACITY OF KENYA MEDICAL RESEARCH INSTITUTE

SCALE
 1/200
 DATE
 APR. 2022
 DRAWING BY
 T. Shimada
 CHECKED BY
 T. Mivano

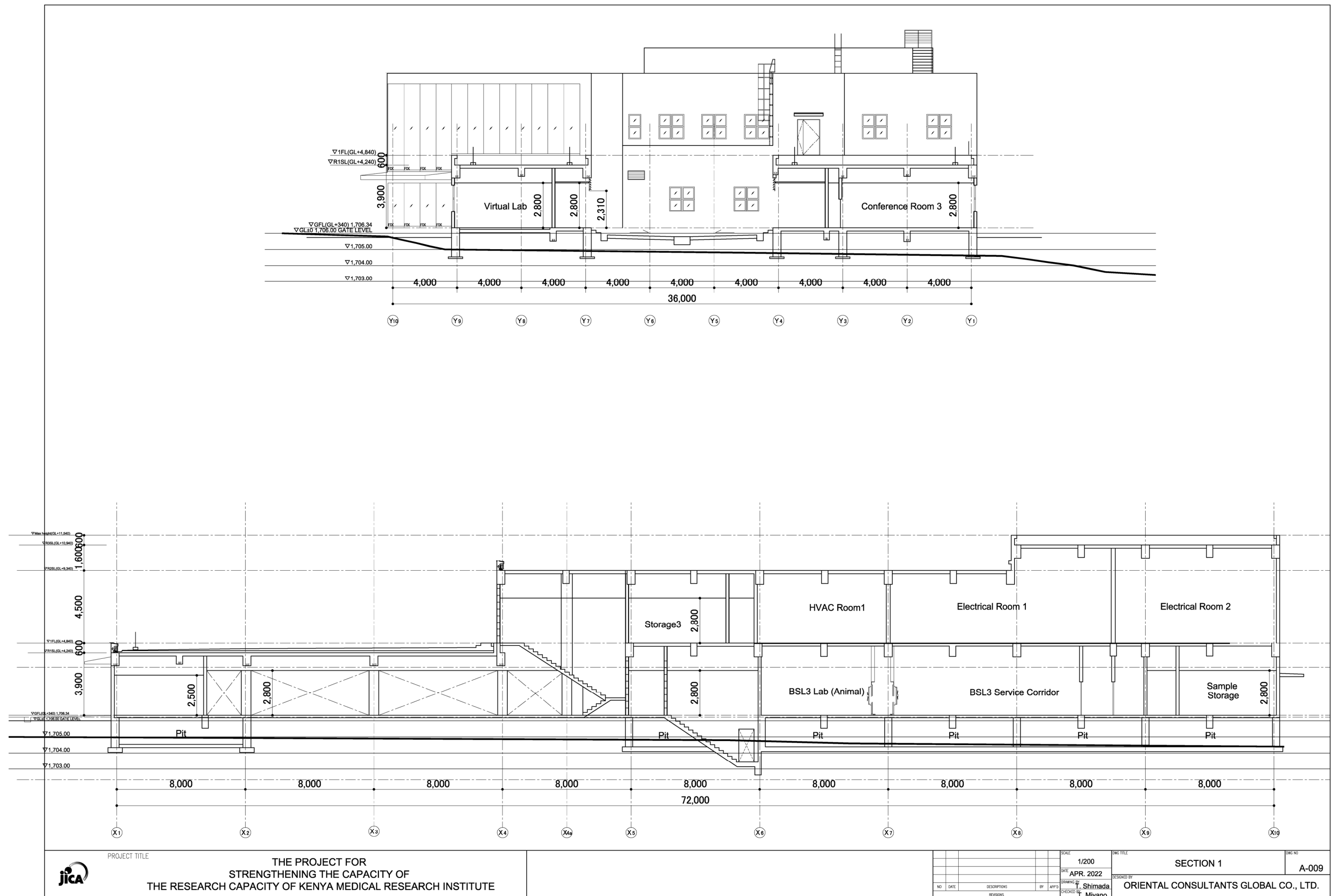
ELEVATION 1
 ORIENTAL CONSULTANTS GLOBAL CO., LTD.

A-007



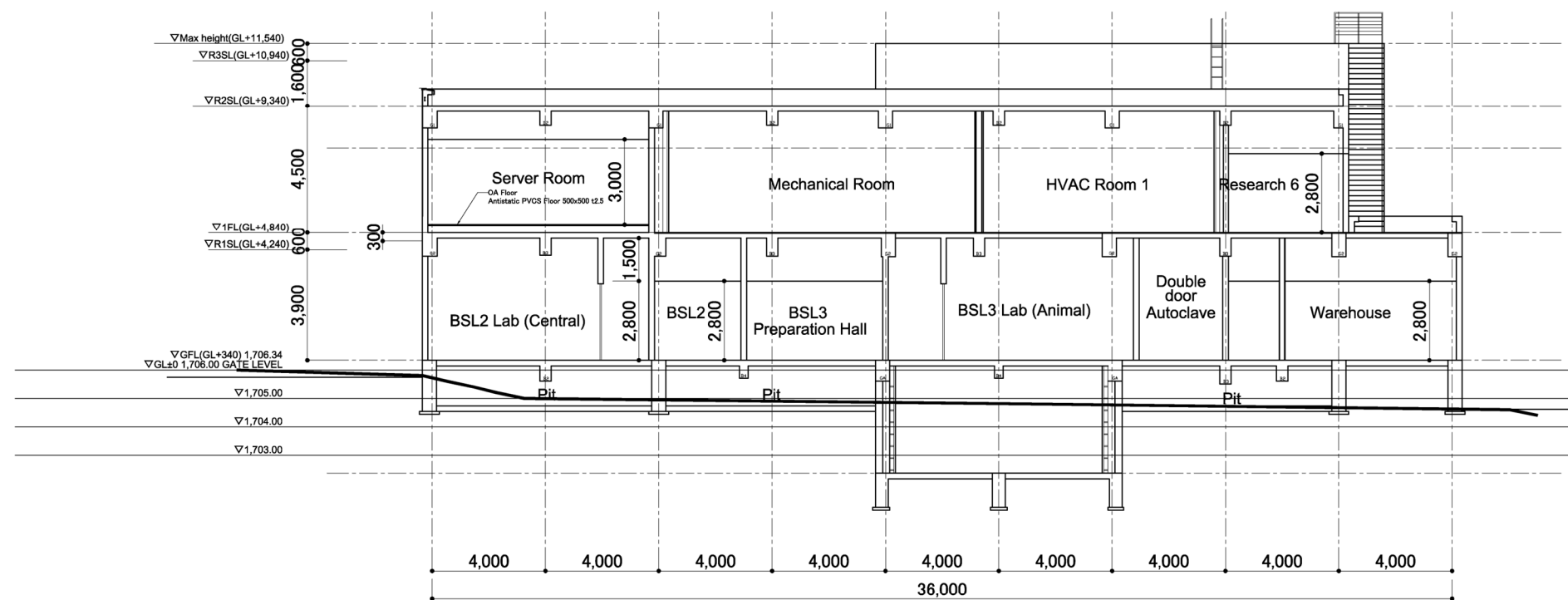
Source: JICA Survey Team

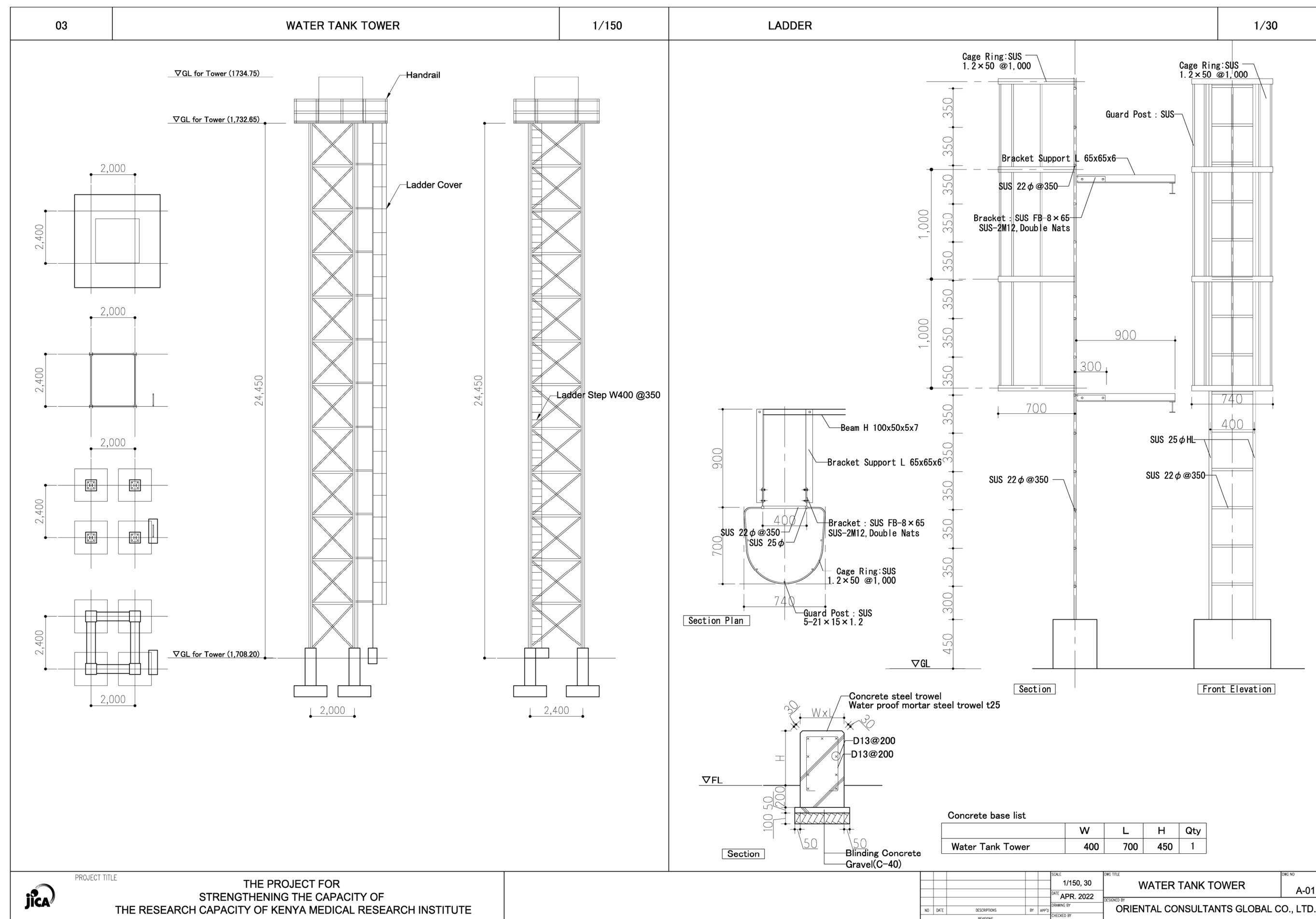
Figure 2-16 Elevation 2



Source: JICA Survey Team

Figure 2-17 Section 1





2-2-4 Implementation Plan

2-2-4-1 Implementation Policy

(1) General

- The Exchange of Notes (E/N) for the Grant Aid Project shall be concluded between the Government of Japan and the Government of Kenya after the cabinet meeting and decision by the Government of Japan.
- With the signing of E/N, Grant Agreement (G/A) shall be entered into between JICA and the recipient country. On the basis of the G/A, JICA will make payments to the recipient country as the Project progresses.
- The signing of E/N and G/A will mark Japan's official commitment to provide the aid in question and its practical implementation.
- Following conclusion of G/A, consultants of Japanese nationality and the government of Kenya will conclude an execution design and supervision contract, and immediately start detailed design work.

(2) Detailed Design Stage

- For the Detailed Design, full details of facilities and equipment in the Outline Design should be carefully confirmed and discussed with the implementing agency.
- The consultant shall discuss the technical issues through meetings with the relevant authorities in Japan and Kenya during the detailed design stage.
- The design period will require approximately 3 months.

(3) Tender

- Tendering will follow the JICA tendering guidelines.
- There are three possible methods for the tender, (a) a Japanese construction company for facility construction and equipment, (b) a stand-alone method dividing facilities and equipment or (c) a consortium between Japanese construction companies and trading companies that combines facility construction, the evaluation is carried out after a careful verification of the peculiarities of the Project.
- The party executing the tender will be the implementing agency, but it is necessary for consultants to cooperate sufficiently while taking instructions from JICA.

(4) Construction

- According to the result of the Preparatory Survey in Kenya, local building materials which are acceptable in quality and quantity should be used for the Project as much as possible. Ensuring and maintaining quality are the most important items to be noted.
- For the planning of labore supply, the quality level of locally organized skilled and semi-skilled workers will be taken into consideration. It is important that a Japanese contractor

is the prime contractor, the contractor will supervise and manage the local contractor and his laborers to maintain the quality assurance required for the Project.

(5) Implementation Organization (Project Implementation Agent)

The organization responsible for the Project is the Ministry of Health and the implementation organization is KEMRI. The following diagram shows the relationship between the implementation organization, the Japanese consultant and contractor.

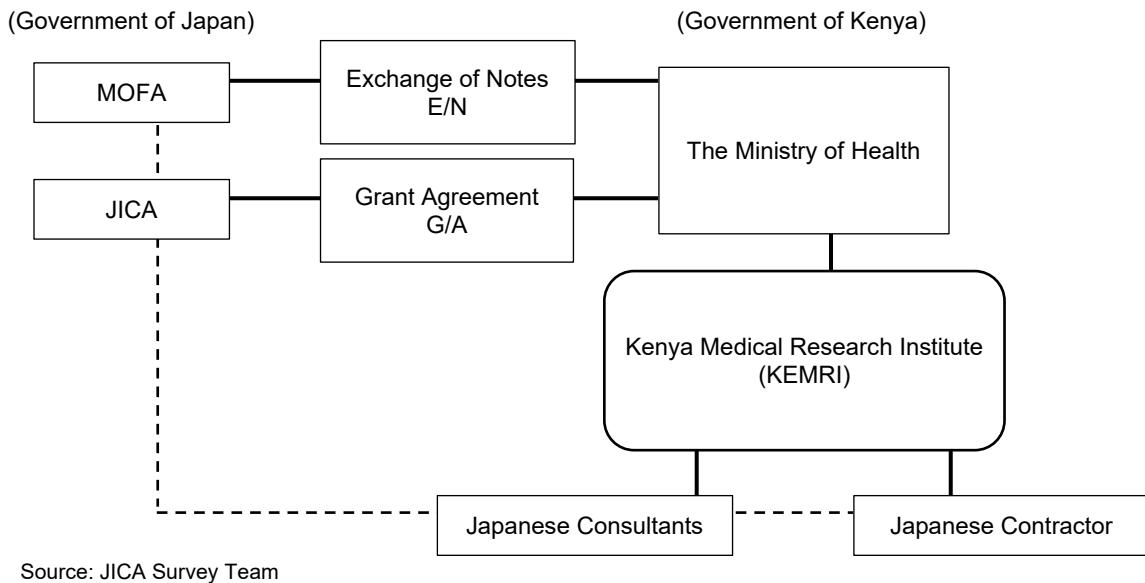


Figure 2-20 Implementation Organization

2-2-4-2 Implementation Conditions

- The rainy season in Nairobi occurs twice a year, with heavy rains from March to May and light rains from October to December. Hence it is necessary to prepare for changes in the groundwater level, prevention of rainfall, handle of rainwater on the premises, plans for the basement floor, etc.
- The standards and laws concerning construction are based on Kenyan standards and Japanese standards, and in some cases BS, etc., standards shall be applied after considering local circumstances.
- Detailed coordination and adjustment shall be necessary for the contractors to schedule construction works, installation of laboratory equipment.
- Since the construction works is implemented inside the compound of KEMRI, the following consideration shall be taken for the surrounding environment.
 - Construction methods that minimize the negative impacts on the existing facility shall be adopted. The construction plan shall be formulated to prevent construction pollution such as noise, accidents etc., during the construction period.
 - It is important to establish a HSE (Health, Safety and Environment) plan to ensure the safety of life and property, to ensure traffic control of construction vehicles as

well as pedestrians, and for preventing existing roads and surrounding area from damages.

- The safety plan shall be formulated for the proper storage of construction materials, machinery and equipment, the placement of temporary buildings etc., to prevent KEMRI from suffering interruptions in the operation of the existing facility.
- Value Added Tax, customs duties, and other taxes, which are imposed in Kenya for those materials and equipment procured for the purpose of the Project, shall be subject to tax exemption. However, it takes up to 7 months to obtain a tax exemption permit for locally procured materials and equipment and VAT for outsourced services, so it is necessary to start construction 7 months after the contract with the contractor in order to actually exempt the tax. In order for the contractor to start construction immediately after the contract, it is necessary to pay VAT for locally procured materials and equipment and outsourced services before the tax exemption permit. It is necessary for the Japanese side and the Kenyan side to agree on tax exemption in order to have the VAT refunded by the Kenya Revenue Authority (KRA) after the tax exemption permit is granted.

2-2-4-3 Scope of Works

The responsibilities of the Japanese side and the Kenyan side for the implementation of Japan's Grant Aid Project are shown in the Table 2-12.

Table 2-12 Division of works between the Japanese Government and the Recipient Country for Grant Aid Project

Japanese side	Kenyan side
Building works Structure works, finishing works, parking etc. Electrical works Wiring work from the arrival panel in the electrical room (including the arrival panel), lightning protection equipment, lighting / socket, communication equipment Plumbing works a) Water supply works Water equipment works b) Drainage works Piping work to the catch basin on the KEMRI site c) Water treatment facility d) Water reservoir, Water Tank Tower e) Fire hydrant etc. External works in Project site Driveway, Parking Equipment works a) Equipment procurement b) Drainage works c) Delivery and installation of equipment d) Trial test and explanation of the instructions for use Compliance with the environmental management plan stipulated by Kenya Technical guidance on special facility and equipment for P2 and P3 laboratory	(1) Site preparation a) Ground-preparation works: Site preparation, removed items (including of floors, walls, roofs, foundations, etc., and removal of left-over materials) b) The temporary electricity supply and water for construction works (2) Basic works a) Water supply Installation and preparation of the water supply pipe from the city water system to the connection point at the boundary of the site b) General drainage Drainage pipe laying work from the last basin on the construction site to the existing drainage connection basin c) Rainwater drainage work Drainage pipe laying work from the last basin on the construction site to the existing drainage connection basin d) Electrical power installation works Installation and preparation of the electrical power supply from the commercial power network to the connection point at the boundary of the site e) Telephone and network works Installation and preparation of the telephone and telecommunication line from the city network to the connection point at the boundary of the site

Japanese side	Kenyan side
Basic technical assistance for maintenance of facility, utility, and equipment (including initial operation training)	(3) Other formalities Formalities for applying for a building permit, formalities relating to social and environmental considerations, formalities for requesting the connection of facilities, formalities, and exemption from customs clearance of materials and equipment for the construction of installations, etc. (4) Budget required for the maintenance, management, and operation of new facilities (5) Exemption from customs duties, internal taxes, and other charges for Japanese and third-country nationals involved in the works for the Project (6) Facilities and privileges of Japanese technicians during their entry and leave of Kenya (7) All works other than those supported by the Japanese side
	(1) Payment to the B/A (Banking Arrangement) and A/P (Authorization to Pay) (2) Tax exemption of equipment import (3) Participation in the explanation of the instructions for use of the equipment (4) Assignment of maintenance staff and participation in technical supervision (5) Issuance of certificate of completion after acceptance of equipment (6) Participants in soft components, staffing in charge of maintenance and participation in technical guidance

Source: JICA Survey Team

2-2-4-4 Consultant Supervision

(1) Policy

It is planned that a resident supervisor (who specializes in construction) shall be dispatched to supervise the entire construction in order to thoroughly carry out proper quality control on site upon commencement of construction works by the contractor. In addition, specialized supervisors shall perform on the spot supervision at appropriate times according to the progress of various stages of construction (framework construction, building facility construction, etc.). The Project manager shall undertake on-site supervision and/or inspections at the specified milestones i.e., at commencement of works, at the completion of concrete works and at the final completion of works.

Table 2-13 Plan of Personnel Necessary for Supervision

Name of supervisor (Expertise)	Period (Kenya)
<Building facility>	
Resident construction supervising engineer	19.0 months
Non-resident supervised engineer	
• Project manager/construction supervised engineer 1 (architecture)	1.5 months
• Construction supervised engineer 2 (architecture)	0.7 months
• Construction supervised engineer 3 (structure)	0.5 months
• Construction supervised engineer 4 (electric/machine)	1.0 months
• Construction supervised engineer 5 (HVAC)	2.0 months

Name of supervisor (expertise)	Period (Kenya, Japan)
<Equipment>	
• Resident construction supervised engineer (first dispatch)	0.27 months
• Resident construction supervised engineer (second dispatch)	1.23 months
• Supply supervised engineer (confirmation, acceptance /delivery)	0.37 months
• Inspection engineer (examination / verification of shop drawings)	0.70 months
• Inspection engineer (inspections with witness)	0.30 months
• Inspection engineer (defect inspection)	0.35 months

Source: JICA Survey Team

(2) Contents of Consultants Assignment

The resident supervisor for construction works shall be mainly in charge of:

- Inspection, confirmation, and coordination on site of work progress on construction works and equipment procurement and installation.
- Review and approval of construction documents such as relevant construction plans, construction drawings and the like.

Headquarters in Tokyo shall be responsible for:

- Monitoring and supporting the on-site supervision.
- Reporting the progress of construction works to JICA headquarters.
- Attending the factory/product inspection, pre-shipment inspection etc. in Japan.

The resident supervisor for procurement of equipment shall be in charge of:

- Receive and cooperate with official inspectors on-site
- Inspection, confirmation, coordination on site on the progress of installation works on equipment procured by trading companies.

(3) Issuance of Certificates

The certificates on import of construction materials and equipment, the payment for construction, practical completion, and final completion, etc., are issued.

(4) Submission of Reports, etc.

Checking and approving monthly progress reports, completion documents and photos of works from the contractor and submitting to the Government of Kenya and JICA. After completion, the completion report shall be prepared and submitted to JICA in accordance with the Grant Aid guidelines.

(5) Others

Monitoring and expediting the schedule of works to achieve smooth operation of related works executed by the Government of Kenya, shall be done as necessary.

2-2-4-5 Quality Control Plan

(1) Basic policy

The Detailed Design drawings shall be developed based on the studies analysed from actual circumstances in Kenya, maintenance cost, use of local materials and local construction methods. The specification should comply with the Kenyan construction standards, Japanese Regulations such as Japanese Architectural Standard Specification (JASS), The Building Codes (1968), The Revised Building By-laws (1995), British Standards (BS) and American Society for Testing and Materials (ASTM) to ensure the quality of buildings, utilities, and equipment.

The construction plan, implementation schedule and shop-drawings which are to be submitted by the contractor during the construction period shall be examined and approved by the consultant.

(2) Quality Examination (Building Construction)

The Consultant shall examine the implementation plan submitted by the Contractor prior to the commencement of each stage of the works and approve it if the construction materials and the execution methods conform to the Specification. The Consultant should inspect necessary portions of work based on the implementation plan and Specifications. The key supervisory items will be determined on the basis of the implementation plan, and inspections will be carried out properly.

In this Project many materials can be purchased locally, besides the manufacturers' warranty on the products. Unannounced quality assurance inspections shall be carried out to assure quality.

1) Earthwork

The work plans and schedule shall be developed based on the open cut method for excavating the basement floor and foundation, considering the groundwater level and rainy season. It is important to pay attention to the disposal of the excavated soil and the quality of the borrowed materials.

2) Reinforcing Bar Work

The Mill-Sheet and so on, showing re-bar content submitted by the Contractor should be confirmed by the Consultant. In addition, bar quality and strength should be inspected to match yield strength in the specification.

3) Concrete Work

It is planned to use the ready mixed concrete which is available in Abuja city. The main items for the supervision works (items to be inspected, method of inspection) are as follows:

a) Items to be inspected for Concrete Material

Material	Item to be inspected	Method of inspection
Cement	Hydration Heat	Dissolution Heat
Sand/ Gravel/ Crushed Stone	Grading	Sieve analysis
	Absolute dry specific gravity	Specific gravity & ratio of water absorption
	Alkali aggregate reaction	Alkali aggregate reaction test
Water	Organic impurities	Quality test of water

b) Items to be inspected for the Mixing Test

Item to be inspected	Method of inspection
Estimate test for structural concrete	Compression test machine
Slump	Slump cone
Concrete humidity	Hygrometer
Air content	Manometer
Chloride volume	Measuring instrument for salt

c) Items to be inspected for the Concrete Placing

Item to be inspected	Method of inspection
Time from mixing to completion of concrete placing	Confirmation of completion time
Slump	Slump cone
Concrete humidity	Hygrometer
Air content	Manometer
Chloride volume	Measuring instrument for salt

d) Items to be inspected in the Progress Schedule

Item to be inspected	Method of inspection
Estimate test for structural concrete	Compression test machine
Accuracy for the openings of door & windows	Measurement
Accuracy for horizontal level of concrete slab	Spirit level & measurement
Status of Finishing	Visual inspection

(3) Quality Inspection (Equipment)

During the equipment procurement and installation supervision, the most appropriate work plan shall be established through coordination of work schedule, work contents and placement plan etc., with the Kenyan side and the Procurement Company. After establishing procurement equipment, smooth progress of the overall operation will be implemented in accordance with the construction plan. For procurement and supervision, the following points should be followed:

- After concluding the equipment procurement contract, they shall promptly confirm the content of the procured equipment, the allocation plan, country of manufacture, supplier, utility to building, facility consultant, Kenyan side facility personnel and outsourcing company for procurement.
- Under the supervision of a consultant, the equipment procurement contractor conducts an inspection for custom-made equipment at the manufacturer's factory and pre-shipment inspection prior to the export packaging.

- For the equipment shipping from Japan, consign to a third-party institution and conduct pre-shipment equipment verification inspection under the supervision of consultant.
- On the installation work of the equipment procurement contractor, a person in charge of supervision from the consultant will be dispatched to witness the work on site and make necessary coordination with facility side based on the arrangement plan.
- In the final delivery inspection, confirm the number of contracted equipment, any discrepancy, required specification and function, implementation of operation training etc., and carry out delivery work.

2-2-4-6 Procurement Plan

(1) Procurement Plan

The main building materials and equipment needed for the construction work are available and can be supplied in Kenya. However, since a large part of the structures and finishing materials will be imported from neighbouring countries through distributors in Nairobi, it will be necessary to ensure homogeneity and quality.

For concrete, ready-mix concrete available from power plants in the city of Nairobi will be used.

Locally manufactured products such as tiles as interior and exterior coating materials, paint, aluminium products, lighting fixtures for installation work, switches, ceiling fans, electrical wires, cables, conduit material, plumbing fixtures, pumps, water tank, distribution board, including imported products, are widely available in the market, but it will be necessary to ensure the homogeneity and quality of the products.

Roofing waterproof materials, aluminium coping, windows, doors, finishing materials (polyvinyl chloride (PVC) floor sheet and steel panel), pass box, plaque, air conditioning units, the air filtering unit and evacuation filter (integrated HEPA), variable air volume unit, air distribution vents, automatic control devices, water treatment system, pumps, emergency shower enclosure, materials used in the finishing of pipelines such as steel pipes coated with PVC and stainless steel pipes necessary for installation work, are planned to be supplied from Japan.

Also, the equipment will be basically procured from Japan or Kenya. However, there is a possibility that competitive and fair bidding will not be established by procuring the equipment limited to Japanese product. Therefore, procurement from third countries will be considered for the cases shown below.

- BSL3 laboratory Calibration kits, centrifuge (high speed), electron microscopes, clean benches (desktop), LCMS, etc.

The procurement countries of major items are shown in Table 2-14 and Table 2-15

Table 2-14 Procurement country of major construction materials

Name of material	Procurement country			Remarks
	Local	Japan	Third country	
[Materials]				
Portland Cement	○			
Sand	○			
Gravel	○			
Re-bar	○			
Form	○			
Concrete Blocks	○			
Timber	○			
Metal Fittings	○	○		Aluminium coping is procured in Japan
Windows and Doors		○		
Glass	○			
Paint	○			
Waterproof material	○	○		Rubber asphalt-based coating waterproof material and polyurethane resin coating waterproof material are supplied in Japan
PVC floor sheet		○		Including chemical resistant PVC sheet
Steel Panel		○		Including interlocking system
Pass Box		○		
Plaque		○		
Distribution Panel	○			
Wire, Cable	○			
Wiring Devices (Switch, Outlets)	○			
Conduit Pipe	○			
Lighting Fixtures	○			
Air Conditioning Units (Split Type)			○	Supplied in neighbouring countries or Japan
Supply and Exhaust fan	○			
Water reserving tank	○			
Pumps	○			
Sanitary Fixtures	○		○	Supplied locally or in Japan
Pipe	○	○		PVC lining steel pipes, stainless steel pipes, etc., are supplied in Japan
Valve	○	○		Valves for infectious drainage, hardware attached to piping, etc., are supplied in Japan
Filter unit (HEPA)		○		
Variable and Constant air volume		○		
Air conditioning control system		○		
Infectious wastewater treatment equipment		○		
Emergency shower unit		○		

Source: JICA Survey Team

Table 2-15 Procurement country of major equipment

Name of material	Procurement country			Remarks
	Local	Japan	Third country	
Sterilizer, double door		○		
Safety cabinet		○		
BSL3 laboratory calibration kit		○	○	*
Centrifuge, high speed		○	○	*
Draft chamber		○		
Electronic microscope		○	○	*
Glove box		○		
LCMS		○	○	*
Central laboratory table		○		

* Planning third-country procurement to conduct proper competitive bidding.

Source: JICA Survey Team

2-2-4-7 Operational Guidance Plan

(1) Initial Operation Training

The engineers and technicians from the building contractor will conduct initial operation trainings of the facility related to building, mechanical and electrical functions by the time of handover. The trainings are intended for facility users to be able to operate and maintain the facility safely and properly.

(2) Equipment Initial Operation Training

The engineers and technicians from the equipment supplier will conduct initial operation trainings of all equipment at the time of installation intended for researchers, laboratory technicians, and engineers from the Engineering and Maintenance Department. The training contents include operating procedures, handling precautions, daily inspections, trouble shooting and periodic maintenance. The contents of daily inspections before and after use should be carefully explained to ensure that the equipment is maintained in good condition for a long period of time.

2-2-4-8 Soft Component (Technical Assistance)

(1) Background

The Engineering and Maintenance Department of the Corporate Services Bureau is responsible for the operation and maintenance of KEMRI's facilities and equipment. The department is divided into the Civil Engineering Section, the Electrical and Electronics Section, and the Mechanical Section, and has a total of 23 employees (4 engineers, 8 engineering technologists, 9 engineering technicians, and 2 others). Among engineers, one is department head, two is assigned to the Electrical and Electronics Sections and remaining one is assigned to the Mechanical Section. Among engineering technologists, one is assigned to the Civil Engineering Section, six to the Electrical and Electronics Section, and one to the Machinery Division. Engineering technicians are technicians in their respective fields of expertise.

Although the existing facilities and equipment are properly operated and maintained, the department has little experience in air conditioning, ventilation, negative pressure management, and infectious medical effluent treatment required for the BSL2 and BSL3 laboratories in the new facility. Therefore, it is necessary to strengthen the capacity of the department for maintenance and management of the new facility.

Under these circumstances, KEMRI requested that the technical assistance for above capacity development. To promote the appropriate use of the BSL2 and BSL3 laboratories to be established in this project, technical assistance from the Japanese side as a soft component is considered effective.

(2) Purposes, Outputs and Activities

The purposes, outputs and activities of the soft component are as follows.

Table 2-16 Purposes, Outputs and Activities of Soft Component

Purpose	Output		Activity
KEMRI will be able to properly operate and maintain air conditioning, ventilation, and negative pressure for the BSL2 and BSL3 laboratories to be developed by the Project	Air conditioning, ventilation, and negative pressure for the BSL2 and BSL3 laboratories are properly operated and maintained.	Technical Instruction Book and other documents are prepared for operation and maintenance of air conditioning, ventilation, and negative pressure	- Examine contents of the Technical Instruction Book related to operation and maintenance. (System summary, airflow control, negative pressure control, devices, etc.) - Prepare Technical Instruction Book, Check List, Inventory and Forms - Prepare Training plans - Explain Technical Instruction Book and training plans
		Operation and maintenance staff learns basic knowledge and technique	- Conduct lectures and practical trainings by using the Technical Instruction Book (Outline of system, operation and maintenance, system planning and budgeting, hands-on training) - Conduct lectures and practical trainings on negative pressure control by using Standard Operation Procedures based on trial operation and calibration.
KEMRI will be able to properly operate and maintain the infectious medical effluent treatment facility to be developed by the Project	Infectious medical effluent treatment system is properly operated and maintained.	Technical Instruction Book and other documents are prepared for operation and maintenance of infectious medical effluent treatment system	- Examine contents of the Technical Instruction Book related to operation and maintenance. (System summary, devices, etc.) - Prepare Technical Instruction Book, Check List, Inventory and Forms - Prepare Training plans - Explain Technical Instruction Book and training plans
		Operation and maintenance staff learns basic knowledge and technique	- Conduct lectures and practical trainings by using the Technical Instruction Book (Outline of system, operation and maintenance, system planning and budgeting, hands-on training) - Conduct lectures and practical trainings on infectious medical effluent treatment by using Standard Operation Procedures based on trial operation and calibration.

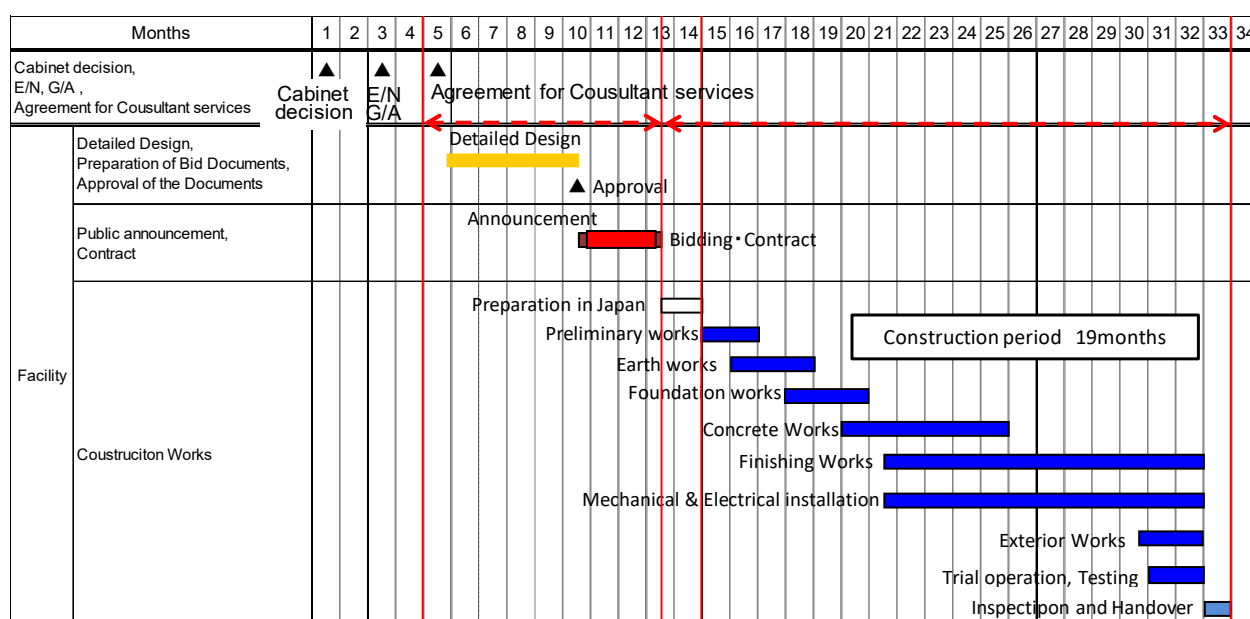
Source: JICA Survey Team

The following experts will be dispatched for implementation of above proposed soft component. For effective training, these experts will coordinate with Japanese engineering consultants (project manager and mechanical engineer) and confirm the organization responsible for operation and maintenance as target of soft component.

- Engineer for air conditioning and ventilation system
- Engineer for infectious medical effluent treatment system

2-2-4-9 Implementation Schedule

The tentative implementation schedule for the Project is expected as shown in Figure 2-21.



Source: JICA Survey Team

Figure 2-21 Tentative General Project Schedule

2-3 Security Plan

Three guards (3 gates) will be assigned during the day to monitor the overall safety of the site of this project, manage access to the site, prevent theft of equipment storage, etc., and prevent occupational accidents associated with machine work. At night, one guard (1 gate) will be assigned to guard 24 hours a day.

2-4 Obligations of Recipient Country

The portion by the Kenyan side is shown in the Table 2-12. The major items are noted as follows:

2-4-1 Before Implementation of the Project

- Clearing the Site, such as demolishing and removing equipment, trees and roots, etc., shall be completed before the construction starts.

- Temporary electric power for construction work and temporary water supply pipes shall be secured.
- Mandated procedures related to the renewal/modification of land ownership of the Project site (sub-division of the land lot if required) and the change of land use of the same shall be completed and approved.
- Mandated procedures related to the building permit shall be completed and the related license and approval shall be acquired. The relevant license and approval due the existing NRL facility shall be also obtained when required incidentally.
- Mandated procedures related to the environmental impact assessment shall be completed and related license and approval shall be obtained. The relevant license and approval due the existing KEMRI facility shall be obtained when required.
- Utility services such as water supply, electric power, communication etc., necessary for implementation of the Project shall be provided to the Project site.

2-4-2 During Implementation of the Project

- Permits and licenses, etc., necessary for the implementation of the Project shall be issued without delay.
- Necessary environmental monitoring activities etc., shall be carried out according to the contents of the environment-related license and approval.
- General furniture, curtains, and carpets, etc. for the new building facility shall be purchased and furnished if necessary.
- If necessary, shall carry out landscaping work and tree planting work on the premises.
- Support for voucher acquisition procedures (issue of invitation letter, etc.) for Japanese engineers and third-country engineers of consultants, construction, and equipment suppliers, etc., during the construction period.
- Select and appoint KEMRI trainees during the soft component period. In addition, the Kenyan side shall pay the related expenses (travel expenses, daily allowance, accommodation expenses) incurred by participating in the training.

2-4-3 After Implementation of the Project

- Necessary environmental monitoring activities etc., shall be carried out according to the contents of environment-related license and approval.
- Implementation organization for the operation and maintenance of the facility and equipment shall be secured.
- Budget of expenses for the operation and maintenance of the new building facility and equipment shall be allocated.

In order to carry out the Project smoothly for the portion allocated to the Kenyan side, sufficient explanation of the contents, schedule, etc., should be given.

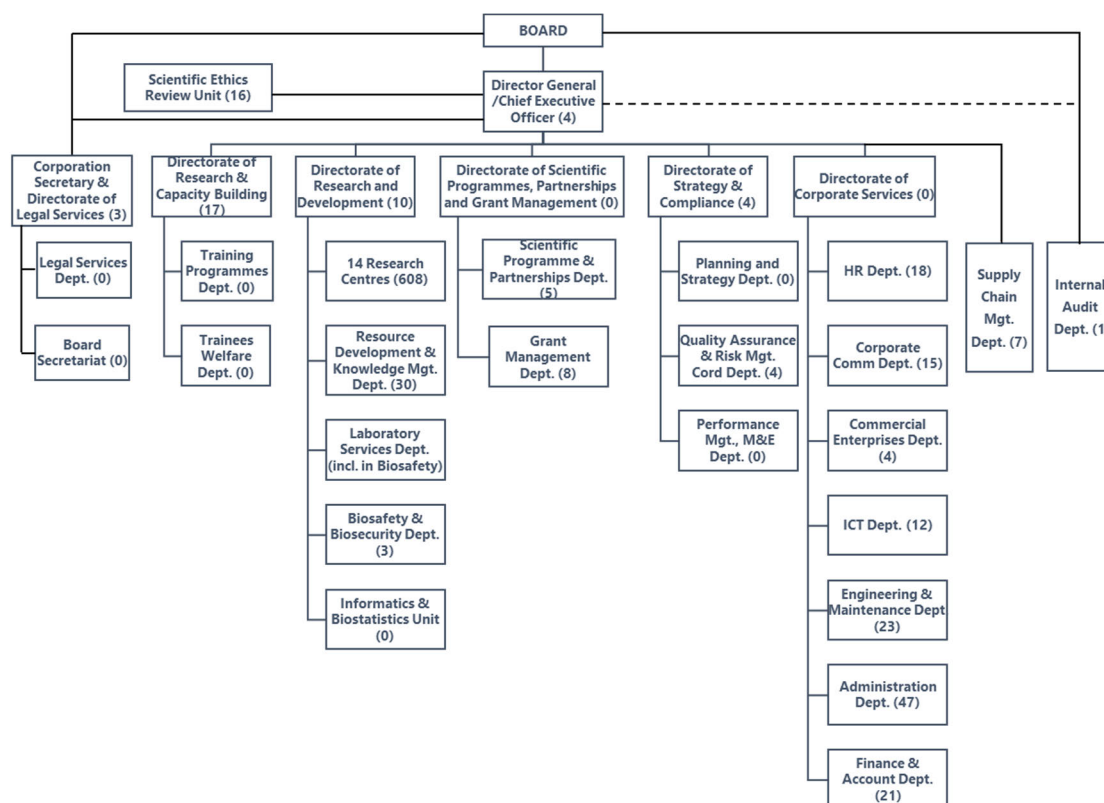
The budget for the portion allocated to the Kenyan side should be prepared by KEMRI. In order to facilitate the completion of construction in accordance with the schedule, the Kenyan side must complete their scope of works on schedule and coordinate their works with the Japanese side, in order to meet the final completion date. The preparatory survey team has also explained the importance of this. It is necessary for the Japanese side to monitor work progress with regards to this matter.

2-5 Project Operation Plan

2-5-1 Operation and Maintenance Policy

2-5-1-1 Organization

The Executing Agency of the project is KEMRI which organization chart is as shown in Figure 2-22. KEMRI consists of six directorates under the Director General: Corporation Secretary & Directorate of Legal Services, Directorate of Research & Capacity Building, Directorate of Research and Development, Directorate of Scientific Programmes, Partnerships and Grant Management, Directorate of Strategy & Compliance and Directorate of Corporate Services



Source: KEMRI

Figure 2-22 KEMRI Organization Chart (Number of Staff)

The total number of permanent staff in KEMRI is 860 according to the above organization chart. The number of staff of directorates which has departments with zero staff is as shown in the bracket in the directorates (e.g. Directorate of Research & Capacity Building including two lower departments has 17 staff in total). The number of staff of directorates with zero staff is the sum of staff in lower department (e.g. Directorate of Corporate Services has 170 staff who are assigned to lower departments). In addition to permanent staff, there are 4,221 contract staff who are engaged in each research project by donors and collaborators.

Staff under the Directorate of Research and Development will manage the facility developed by the project. Regarding operation and maintenance, the Engineering and Maintenance Department under the Directorate of Services will oversee the facility. As explained in 2-2-4-8, the soft component will be proposed to strengthen the capacity of the department for maintenance and management of the BSL2 and BSL3 laboratories.

(1) Budget and Finances

Table 2-17 shows KEMRI's financial statements in last five years. Operation and maintenance cost for facility and equipment is reported in the items of "Use of Goods and Services" and "Repairs and Maintenance": KES 143 million (2020 – 2021), KES 149 million (2019 – 2020) and KES 106 million (2018 – 2019).

Table 2-17 Financial Statements (KES)

	2016-2017	2017-2018	2018-2019	2019-2020	2020-2021
Revenue	6,541,954,082	6,669,105,018	6,641,432,179	7,905,650,742	7,595,761,262
Transfer from Ministry of Health	1,834,962,265	2,087,547,218	1,855,385,079	2,951,288,215	2,577,644,999
Collaborators Funds	4,466,193,289	4,169,514,088	4,326,305,598	4,419,799,734	4,386,313,311
Revenue form Exchange Transactions	102,202,264	136,934,778	-	-	-
Rental Revenue form Facilities and Equipment	-	-	28,330,708	26,277,250	29,204,188
Financial Income – External Investments	-	-	30,506,394	30,713,177	42,651,930
Other Income	138,596,264	249,947,975	400,904,390	477,572,347	559,946,835
Expenses	6,570,519,889	6,830,848,330	6,805,827,288	7,845,861,018	7,867,993,131
Use of Goods and Services	-	-	84,195,822	125,655,277	95,606,890
Employee Costs	1,513,076,142	2,020,391,112	1,638,230,146	2,243,301,00	2,473,540,993
Remuneration of Directors	23,772,966	23,282,023	35,573,046	51,638,012	25,227,518
Depreciation and Amortization Expense	109,786,985	97,479,325	117,709,304	136,618,808	146,099,260
Administrative Cost	325,851,297	452,245,231	-	-	-
Repairs and Maintenance	-	-	22,150,415	22,881,295	46,979,460

	2016-2017	2017-2018	2018-2019	2019-2020	2020-2021
Contracted Services	-	-	53,767,913	54,637,541	49,367,237
Collaborators Expenses	4,466,193,289	4,169,514,088	4,326,305,598	4,390,858,010	4,386,313,311
Operating Expenses	131,839,210	67,936,550	63,971,579	202,913,738	220,574,516
General Expenses	-	-	463,923,464	617,357,335	424,283,945
Other gains/losses	0	659,750	0	0	54,097
Surplus/Deficit	(28,565,808)	(161,083,561)	(164,395,118)	59,789,725	(272,177,773)

Source: KEMRI Annual Report and Financial Statements

Table 2-18 shows the balance sheet as of end of fiscal year 2020 – 2021. Fiscal year 2020 – 2021 ended with deficit of KES 272,177,773 which reported as the accumulated surplus in the balance sheet. The current ratio is 118%, the capital ratio is 92% and KES 21 billion is reported as total net assets.

Table 2-18 Balance Sheet (KES)

Assets		Liabilities	
Current Assets	2,148,210,790	Current Liabilities	1,814,628,978
Non-current Assets	21,110,490,082	Total Liabilities	1,814,628,978
		Net Assets	
		Revaluation Reserve	21,716,249,667
		Accumulated Surplus	(272,177,773)
Total Assets	23,258,700,872	Total Net Assets	21,444,071,893

Note: There is a discrepancy of KES 1 in the total net assets

Source: KEMRI Annual Report and Financial Statements

JICA Survey Team informed KEMRI of the necessity of operation and maintenance cost of KES 80 million for the new facility based on the record of similar research institute project in Nigeria. KEMRI explained that the government allocates operation and maintenance budget up to 10% of project cost (facility and equipment) during the project periods, and also allocates operation and maintenance budget as regular budget of KEMRI after completion of the project. KEMRI will demand budget after necessary documents are concluded between KEMRI and JICA.

2-5-2 Equipment Maintenance Plan

(1) Facility

The maintenance and management of KEMRI's facilities and equipment is carried out mainly by the engineers of the Electrical and Electronics Department of the Equipment Service Centre, which belongs within KEMRI. Since the existing facility is installed with equipment and systems that require special technology similar to that of the new facility (BSL2 and 3 laboratories already exist), in addition to maintenance and inspection of general buildings, facilities, and equipment, KEMRI has practical experience in maintenance and inspection of infectious wastes, etc., generated from the infectious system laboratories.

However, since the new facility will be installed with the latest BSL2 and BSL3 laboratory building specifications and equipment, more specialized skills and experience will be required for

its operation and maintenance. In addition to technicians in charge of testing equipment, a facility and equipment maintenance management team consisting of technicians specializing in building, air conditioning, electricity, and water supply, drainage, and sanitation will be established to provide sufficient support for daily operation and inspection, periodic inspection, and preventive maintenance management in the infection prevention control area. The laboratory air conditioning / ventilation system and infectious liquid waste treatment / waste disposal system, which require particularly appropriate management from a biosafety perspective, will be supported by a soft component to provide the basic knowledge and skills necessary for operation and maintenance.

(2) Equipment

Currently, the Engineering and Maintenance Department manages the entire facility maintenance including inspection of the laboratory equipment. The Engineering and Maintenance Department will be responsible for facility and equipment maintenance of the new building as well. Six of the 25 staff members are in charge of equipment maintenance and calibration including periodical inspections and repairs in the event of a failure.

For safety cabinets and BSL-3 labs, in the past, an NRL-certified KEMRI engineer had been performing validation and repairing. But the engineer has already retired. The six engineers, who were trained by him, are currently calibrating equipment (including periodic inspections) and repairing it in the event of a failure. For other laboratory equipment such as balance, lab refrigerator, freezer, incubator, etc., these 6 engineers carry out calibration (including regular inspection) and repair in case of failure.

The equipment beyond the Engineering and Maintenance Department's capability is separately concluding a regular maintenance contract with a manufacturer agency and carrying out maintenance. The equipment that includes this category is many analytical instrument devices such as sequencers, real-time PCRs, thermocyclers, flow cytometers, and various spectrophotometers.

The scheduled calibration (including regular inspection) for the safety cabinet (wind speed, HEAP filter leak, airflow, other function checks), balance (weight calibration), refrigerator, freezer, and incubator (temperature calibration), etc., is implemented once per year. The inspection records are also kept in the office. These six engineers handle failures that are confirmed during calibration and failures that are pointed out by the user. If spare parts are needed, KEMRI will procure them. Due to the procurement procedure and budget condition, the procurement period takes one to several months. All agencies that procure spare parts exist in Kenya.

2-6 Project Cost Estimation

2-6-1 Initial Cost Estimation

Regarding the Project Cost required to implement this project, the breakdown of the Project Cost for both Japan and Kenya based on the burden classification is estimated as follows. However,

this does not indicate the limit in the Exchange of Notes. For the grant for contingencies, the expense ratio shall be 5%.

2-6-1-1 Costs to be borne by Japan Side

Not disclosed until construction / equipment contract certification

2-6-1-2 Costs to be borne by Kenya Side

Items	Estimated Cost (KES)	Remarks
(1) Site Preparation		
1) Site Preparation (Demolition, relocation, land levelling)	1,750,000	Existing structure, trees, etc.
2) Water Connection	1,000,000	Water pipe: 225φ
3) Electricity Connection	1,500,000	Connection cable: 3φ3W11KV50Hz Ring main unit
4) Telephone Connection	1,200,000	CPEV0.65-30P (PVC50φ)
5) Internet Connection	1,200,000	Optical Cable SM-24C (PVC50φ)
(2) Building Permit	676,000	Total floor area 3,977m ² ×KES 170
(3) EIA Processing Fee	3,000,000	0.1% of project cost
(4) Furniture	2,324,000	Tables and chairs: 83 sets
(5) Advising and Payment Commission based on Banking Arrangement	3,000,000 63,000	Advising Commission: 0.1% of project cost Payment Commission: 0.1% of payment and maximum JPY 4,500(Payment for consultant 7 times, contractor 4 times and supplier 3 times)
Total	15,713,000 (JPY 16,081,000)	Exchange Rate: KES 1 = JPY 1.0234

2-6-1-3 Condition of Cost Estimation

Date of estimation: February 2022

Exchange rate: Average three-month rate from 1st November 2021 to 31st January 2022

1KES = 1.0234 Japanese yen

1US\$ = 115.26 Japanese yen

Construction Period: 20.5months (including 1.5 months domestic preparation period)

Other: The Project shall be implemented in compliance with Japanese Grant Aid Scheme.

2-6-2 Operation and Maintenance Cost

2-6-2-1 Required Charges for Fuel and Lighting

The running cost (expenses for power and fuel) for the new building is estimated as follows:

(1) Electricity Charge

Conditions

Maximum demand	390	kw
Load factor	0.3	

Tariff of electricity charge (Tariff of Kenya Power and Lighting Company (KPLC) for 11KV power receiving)

Basic charge	520	KES/kw
Metered charge	10.9	KES/kwh
Fuel energy charge	3.97	KES/kwh
Levies Electric energy kwh	×1.25	KES
Adjustment cost Unit charge	×0.05	KES

Monthly electricity charge

Basic charge	390kw ×520 KES/kw	=	202,800 KES/month
Metered charge	390kw×720h/month×0.3×10.9 KES/kwh	=	918,216 /month
Fuel energy charge	84,240kwh×3.97 KES/kwh	=	334,432 /month
Levies	84,240kwh	×	1.25=151,109 KES
Adjustment cost	918,216	×	0.05=45,910 KES
Value Added Tax	(Unit charge + Levies cost + Adjustment cost)×16%		216,616 KES
Total	1,869,083 KES /month	⇒	1,870,000 KES/month

Annual electricity charge

1,870,000	KES/month	×	12 month	=	22,440,000 KES /year
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(2) Telephone and Internet Charge

100Mbps use	250,000 KES/month
Annual charge	250,000 KES/month × 12 month = 3,000,000 KES/year

(3) Water Charge

Maximum volume of water consumption per day

Maximum volume of water consumption per day	16.2 m ³ /day
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Tariff of water charge (Nairobi City Water and Sewerage Company (NCWSC))

Unit charge	64 KES/m ³
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Annual water charge

16.2m ³ /day ×	360 day/year ×	0.7	×	64 KES/m ³	=	270,000 KES/year
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(4) Sewage Charge

Maximum volume of water consumption per day

Maximum volume of water consumption per day	16.2 m ³ /day
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Tariff of water charge (Nairobi City Water and Sewerage Company (NCWSC))

Unit charge (water charge x 75%)	48 KES/m ³
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Annual sewage charge

16.2m ³ /day ×	360 day/year ×	0.7	×	48 KES/m ³	=	202,500 KES/year
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(5) Fuel Charge

Stand-by generator specification	Output 270KVA×2units 3-phases 4wire 415V 50HZ (Diesel)	
	Fuel consumption	80.0 L/hour
Consumption	Monthly operation hours (5hours /day)×10days	50 hours/month
Unit price of diesel fuel		115.21 KES/L
Annual fuel charge	80.0 L/hour×50 hours/month×12month ×115.21 KES/L=	5,530,080 KES /year

(6) CO₂ Gas Charge

Replacement frequency	For CO ₂ incubator	10times/unit/month
Consumption	Capacity 167 L×10% ×10 times =	167 L/unit/month
Annual consumption	167 L/unit/month×6 units×12month =	12,024 L/year
Conversion to of cylinder (30kg/unit)	12,024 L/year÷15,272 L/unit = 0.79 unit	1.0unit/year
Unit price of CO ₂ gas		270 USD/unit
Annual CO ₂ gas charge	1.0 unit/year×270 USD/unit=	270 USD/year
Exchange rate:1.0 USD = 112.62 KES →		30,407 KES/year

2-6-2-2 Required Costs for New Building Facilities

The maintenance and management costs for this facility are estimated as follows.

(1) Maintenance Cost for Septic Tank

Septic tank maintenance cost is not applicable because of the use of public sewerage.

(2) Maintenance Cost for Facility

	Monthly repair cost (USD)				Annual repair cost (USD)
	Spare parts	Consumables	Inspection	Total	
Lighting fixtures	200	600	100	900	10,800
Standard air conditioning equipment	400	600	120	1,120	13,440
Sanitary equipment	300	400	600	1,300	15,600
Repair of interior and exterior	20 USD/m ² /year×4,000 m ² =				80,000
Total					119,840 USD/year

Exchange rate:1.0 USD = 112.62 KES →

13,496,381 KES/year

(3) Replacement Cost for HEPA Filter

Frequency and unit price of replacement

Medium efficient filter	For BSL3 Laboratory 1 time/year	360 USD/pcs
HEPA filter	For BSL3 Laboratory 0.5 time/year	900USD/pcs

Annual cost of replacement

Medium efficient filter	360 USD/pcs × 10 pcs×1 time/year =	3,600 USD/year
HEPA filter	900USD/pcs × 26 pcs×0.5 times/year =	11,700 USD/year
Total		15,300 USD/year

Exchange rate:1.0 USD = 112.62 KES→

1,723,086 KES /year

(4) Maintenance Cost for Infectious Wastewater Treatment System

Filter, trim, etc.	300,000yen×1time/year =	300,000 yen/year
Annual cost		300,000 yen/year

Exchange rate:1.0 Japanese yen = 0.98 KES→

294,000 KES/year

(5) Elevator maintenance and management

Regular inspections and emergency response	12 times regular inspection /year,	3,000 USD/year
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Exchange rate:1.0 USD = 112.62 KES→ 337,860KES /year

(6) Formalin fumigation

Formalin fumigation	1 time /year,	9,284USD/year
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Exchange rate:1.0 USD = 112.62 KES→ 1,045,564KES /year

2-6-2-3 Necessary expenses for maintenance of new equipment

Table 2-19 shows the annual maintenance costs for the equipment that is expected for the project equipment.

Table 2-19 Maintenance cost for project equipment

No.	Equipment	Maintenance consumables/spare parts and cost (annual)	Q'ty	Total cost (Yen)
1	Autoclave, vertical	Door packing 80,000 yen x 1 time	8	80,000
2	Autoclave, double door A	Exhaust filter 108,000 yen x 2 pcs. x 1 time Door packing 25,000 yen x 2 pcs. x 1 time Air filter 140,000 yen x 1 time Pre-filter 14,000 yen x 2 times Recording paper and ink ribbon 45,000 yen x 2 boxes Resin (ion exchange resin) 15,000 yen x 1 time Maintenance contract and validation 500,000 yen	1	1,115,000
3	Autoclave, double door B	Exhaust filter 108,000 yen x 2 pcs. x 1 time Door packing 25,000 yen x 2 pcs. x 1 time Air filter 140,000 yen x 1 time Pre-filter 14,000 yen x 2 time Recording paper and ink ribbon 45,000 yen x 2 boxes Resin (ion exchange resin) 15,000 yen x 1 time Maintenance contract and validation 500,000 yen	1	1,115,000
4	Safety cabinet A	HEPA filtre etc. 329,000 yen x 1 time	4	1,316,000
5	Safety cabinet B	HEPA filtre etc. 329,000 yen x 1 time	2	658,000
6	Safety cabinet C	HEPA filtre etc. 329,000 yen x 1 time	2	658,000
7	BSL3 laboratory calibration kit	Instruments calibration cost 250,000 yen x 1 time	1	250,000
8	Draft chamber	Activated charcoal filter 230,000 yen x 1 time	1	230,000
9	Electron microscope	Filament 10,000 yen x 24 pcs. Maintenance contract 1,000,000 yen x 1 time	1	1,240,000
10	Glove box A	HEPA Filter 123,000 yen x 1 time Maintenance contract and validation 300,000 yen	1	423,000
11	Glove box B	HEPA Filter 123,000 yen x 1 time Maintenance contract and validation 300,000 yen	1	423,000
12	LCMS	Maintenance contract 1,500,000 yen	1	1,500,000
				9,008,000

Exchange rate: 1.0 KES = 1.0234 JPY, 9,008,000 JPY =8,802,032 KES/year

Source: JICA Survey Team

2-6-2-4 Annual estimated maintenance Costs

From the above, the estimated annual maintenance costs are as follows.

Table 2-20 Annual Operation and Maintenance Cost

Items	Annual cost (KES)	VAT (16%) (KES)	Total (KES)
(1) Charges for Fuel and lighting			
1) Electricity Charge	22,440,000	3,590,400	26,030,400
2) Telephone and Internet Charge	3,000,000	480,000	3,480,000
3) Water Charge	270,000	43,200	313,200
4) Sewage Charge	202,500	32,400	234,900
5) Fuel Charge	5,530,080	884,813	6,414,893
6) CO ₂ Gas Charge	30,407	4,865	35,272
		Subtotal(1)	36,508,665
(2) Costs for New Building Facilities			
1) Maintenance Cost for Septic Tank	0	0	
2) Maintenance Cost for Facility	13,496,381	2,159,421	15,655,802
3) Replacement Cost for HEPA Filter	1,723,086	275,694	1,998,780
4) Maintenance Cost for Infectious Wastewater Treatment System	294,000	47,040	341,040
5) Elevator maintenance and management	337,860	54,058	391,918
6) Formalin fumigation	1,045,564	167,290	1,212,854
		Subtotal(2)	19,600,394
(3) Expenses for maintenance of new equipment	8,802,032	1,408,325	10,210,357
		Subtotal(3)	10,210,357
		Total(1) + (2) + (3)	66,319,416

Source: JICA Survey Team

Chapter3 Project Evaluation

3-1 Preconditions

To proceed the Project smoothly, it is important to ensure that the obligations of the Kenyan side as described in 2-4 is implemented at the appropriate time before and during the construction of the Project.

3-2 Necessary Inputs by Recipient Country

The research and conference facilities including BSL3 and BSL2 laboratories will be built, and related laboratory and research equipment will be installed by the implementation of the Project. To improve KEMRI's research and training functions and completely fulfil its role as a regional and international research centre both domestically and internationally utilizing those investment by the Japanese side, the following are the matters to be undertaken by the Kenyan side.

(1) Staffing for the Facilities to be Extended

The new facilities will be operated by existing personnel in KEMRI and new personnel to be employed by KEMRI in the future. A director who is directly responsible for the management of the facility will be appointed. No additional research staff will be hired, as the research projects will be conducted by existing research staff. Maintenance will also be handled by the existing Engineering and Maintenance Department. Detailed staffing plans for existing personnel to be concurrently assigned or reassigned, as well as qualification requirements, number, and allocation of new staff, need to be planned and certainly implemented.

(2) Securing of Budget for Operation and Maintenance of Facilities and Equipment

The operation and maintenance budget for the facilities and equipment will be secured by KEMRI. KEMRI's operating budget consists of the Kenyan government budget, the collaborators funds and KEMRI's internal income. According to the annual report and financial statements for FY2018 to FY2020 presented by the Kenyan side during the preparatory survey, it was confirmed that there is no shortage of income and expenditure expected for the operation and maintenance of the planned facilities and equipment. Sufficient budgetary arrangements should continue beyond 2025, the year of completion of the Project.

(3) Implementation of Management of Operation and Maintenance of Facilities and Equipment

The operation and maintenance of the new facilities and equipment will require specialized skills and experience to handle the special construction specifications, equipment operation, and maintenance associated with the installation of BSL3 and BSL2 laboratories as ever. The Engineering and Maintenance Department is in charge of maintenance of facility and equipment in KEMRI and it consists of three divisions: Civil Engineering, Electrical and Electronics, and Mechanical. Organizational setting shall be maintained for operation, daily maintenance, preventive maintenance and periodic inspections for laboratory ventilation, air conditioning

system, medical wastes / wastewater disposal system and the infection prevention control area. Training on air conditioning control, exhaust control and negative pressure control for BSL2 and BSL3 laboratories and building management system will be provided as soft components.

The maintenance for equipment will be carried out through a combination of the Engineering and Maintenance Department and the use of outsourced maintenance. For general equipment, daily inspections in accordance with operation manuals are required to maintain the equipment in good condition. Daily inspections by the users and the Engineering and Maintenance Department, periodic inspections by professionals outsourced and parts replacement and adjustment are required. Annual maintenance management contracts would be concluded as necessary to ensure safe and efficient operation of the equipment.

(4) Realization of Research Programs and Training Programs

Proposals for target pathogens and research projects will be prepared by each Principal Investigators in KEMRI through consultations within KEMRI and with collaborators in the usual manner. The proposed research and experiments can be proceeded after the proposals are approved by Scientific Ethics Review Unit (SERU). As of February 2022, the number of approved research projects in progress was 510. After the completion of the Project, continuous efforts will be required to promote an increase in research projects, collaborators, and peer-reviewed papers, by fully utilizing the new facilities and equipment including BSL2 and BSL3 laboratories. The equipment to be provided by the Project is the minimum required for testing, research, and training considering the optimum use of existing equipment. Therefore, existing available sequencers, real-time PCR, spectrophotometers, etc., are required to be relocated from existing facilities.

To develop the human resource of scientists, KEMRI expects to modernize and improve the quality of training and information sharing technology through the virtual laboratory to be established under the Project. KEMRI's plans for e-Learning, simulation of experimental procedures, and introduction of WikiLabo were presented during the preparatory survey. The entire conference facility is planned to be used for online and offline meetings and seminars. After the completion of the Project, continuous efforts will be required to ensure high quality training programs, to attract participants, and to hold conferences by using the planned facilities and equipment including the virtual laboratory and conference facilities. In addition, a high-speed data communication environment and servers to function the virtual laboratory, development of training contents, and the establishment of a database and other platforms will be required.

(5) Strengthening of Biosafety and Biosecurity

With the extension of the BSL3 laboratories, it is essential to complete the guidelines for the use of the BSL3 laboratory that KEMRI is drafting and to update the appropriate BSL2 and BSL3 laboratory management systems. Since the experiments with high-risk pathogens are performed in the BSL3 laboratories, the research would have to be suspended or terminated due to the closure of the research facilities and long-term external investigations once incidents of leakage of

pathogens or infection occur. To ensure the safe and proper operation of the planned facilities and equipment, biosafety measures to prevent unintentional exposure or leakage and biosecurity measures to prevent missing, theft, misappropriation, or intentional release of pathogens must be strengthened. And also, disaster prevention and environmental pollution measures in the surrounding area must be ensured.

(6) Implementation of Environmental Monitoring

Based on the environmental impact assessment and its environmental management plan developed by the Kenyan side, environmental monitoring related to pollution control measures is required to be conducted continuously and reported to JICA periodically. The monitoring will be conducted in accordance with the impact items, monitoring items, measurement methods, and confirmation details that conform to the JICA Guidelines for Environmental and Social Considerations, to confirm that the planned facilities and equipment are being used appropriately for infection control and do not become a significant environmental pollution threat to the surrounding area.

3-3 Important Assumptions

The important assumptions for the development and sustainability of the Project's effects are considered as follows.

(1) Kenya's national development plan and health sector policies and strategies are not changed significantly.

One of the four pillars of the Big Four agenda in the Third Medium Term Plan 2018-2022 (MTP III) of Kenya's long-term national development plan, Vision 2030, is the achievement of UHC, and the health sector is positioned as a key priority in Kenya's development plan.

In the "Kenya Health Policy 2014-2030", a long-term plan for the health sector, "Eliminate communicable diseases" is the first of six policy objectives. The eight policy orientations, high-priority policy investment areas which facilitate attainment of the policy objectives, include "Research and development". In addition to the above policy objectives and orientations, the current "Health Sector Strategic Plan 2018-2023" also mentions strengthening health security as one of the strategies. The framework of the Project is designed according to these development plans and health policy requirements. Therefore, the continuation of these policies in the area of infectious disease control and in research and development is important to achieve the goal of the Project.

The presidential election, which has been held every five years since 2002, is scheduled for August 2022. It is important that the health policies are not changed significantly by the election result.

(2) Support by development partners and collaborators including JICA is not interrupted.

Outbreaks of high-risk emerging and re-emerging infectious diseases have been reported frequently in Kenya and neighbouring countries. The trend of the epidemic of COVID-19 in Kenya has been confirmed up to the fifth wave as of February 2022 since the confirmation of the first case of COVID-19 in March 2020. Besides, HIV/AIDS remains as the top cause of death in Kenya. The Ministry of Health has high expectations for JICA's support for the Project with BSL3 laboratory, which is the infrastructure for early detection of these high-risk emerging and re-emerging infectious disease outbreaks, analysis of pathogens, and diagnostic and therapeutic research. Japan has been providing technical and grant cooperation to KEMRI since 1979, and the "Project for Research Capacity Building at Kenya Medical Research Institute" (technical cooperation project) to be launched in 2022 is expected to have synergistic effects with the Project.

KEMRI has received support from collaborators such as the Wellcome Trust, the U.S. CDC, WHO, and Walter Reed. The collaborators funds account for nearly 60% of KEMRI's revenue. It is important to continue to obtain support from existing collaborators and to find new collaborators.

(3) Extreme and prolonged distribution disruptions and/or shortages of products throughout the world do not occur.

At this moment, it is undeniable that there are factors such as unstable world situation and surging of crude oil price that could bring the disruptions of distribution of goods and shortages throughout the world. Such a situation could affect the implementation of the Project.

(4) Political and economic situation in Kenya does not worsen extremely

Kenya is a parliamentary democracy, and the political and social situation is stable at present. A presidential election is scheduled for August 2022. If riots or a deterioration in public security happen because of dissatisfaction with the election result, which has occurred in the past, the impact on implementation of the Project is undeniable. On the economic aspect, Kenya has developed as the centre of the East African regional economy, and the negative impact of COVID-19 on the economic growth rate is smaller compared to other countries. It is required that the political and economic situation does not worsen extremely in the future.

3-4 Project Evaluation

3-4-1 Relevance

Expected effects of the Project and its relevance are as follows.

The effects of the Project can be expected that strengthening research capacity of KEMRI for various infectious diseases including COVID-19 by provision of facilities and equipment for research on infectious diseases and early response to testing and diagnosis, and thereby contribute to strengthening health security in Kenya and Africa (particularly in the East African region).

According to the reasons as mentioned below, the implementation of the Project by Japanese grant aid cooperation is relevant.

(1) Benefits from the Project and relevance of the Project goal

By extending facilities and equipment for research and training at KEMRI, the Project will contribute to improve research for diagnosis and therapeutics of emerging and re-emerging infectious diseases, rapid response in testing, diagnosis, and pathogen analysis during a pandemic, and training of scientists. This will strengthen the capacity of Kenya and East Africa to respond to health security, including the fight against emerging and re-emerging infectious diseases, in order to comply with International Health Regulations (hereinafter referred to as “IHR”). Accordingly, the Project goal meets international and domestic needs of preparedness for Public Health Emergencies of International Concern (PHEIC). The beneficiaries are estimated to be 53.77 million people as the total population in Kenya.

Currently, KEMRI plays a key role in research, diagnosis, and human resource development related to infectious diseases, and provides recommendations and advice for policymaking based on evidence from research findings. The strengthening of KEMRI's function by the extension of research and conference facilities, including the BSL3 laboratory, through the Project will lead to strengthening of the capacity for infectious disease control in Kenya, and will contribute to improved access to health services and appropriate policymaking. In addition, Kenya and neighbouring countries have been urgently addressing the threat of infectious disease outbreaks caused by high-risk pathogens such as COVID-19 and VHF in recent years. Therefore, KEMRI is expected to play a significant role as a leading research institute for infectious disease control and is further expected to benefit Kenya and neighbouring countries in the future.

(2) Consistency with Kenyan health policy

As stated in “Vision 2030”, the “Kenya Health Policy 2014-2030”, and “Legal Notice No. 35”, which defines KEMRI's function, Kenya has identified the elimination of infectious diseases as a policy objective, and KEMRI plays a key role in research and human resource development in infectious diseases. The “KEMRI Strategic Plan 2018-2023” also identifies upgrading of research infrastructure and equipment as one of its strategic objectives. The Project will realize those policies and strategic objectives.

(3) Consistency with development assistance policy of Japan

Japan's Country Development Cooperation Policy for Kenya (2020) sets six priority areas: ① Economic infrastructure development, ② Industrial development, ③ Agriculture and rural development, ④ UHC, ⑤ Environment, and ⑥ Social stabilization. The Cooperation Program (2020) lists "Pandemic Preparedness" as Development Issue 2 of UHC, and states that cooperation will be developed in human resource development for infectious disease control and the establishment of a regional laboratory network to contribute to the achievement of Sustainable Development Goals 3 (health), 4 (education), and 9 (infrastructure, industrialization, innovation).

“The Nairobi Implementation Plan”, the outcome document of the 6th Tokyo International Conference on African Development (TICAD VI) in 2016, identifies "Promoting resilient health systems for quality of life" as Pillar 2, and focuses on ①Health system strengthening, ②Response to public health crises, ③UHC, and ④Nutrition. In terms of ①Health system strengthening, the report states the following specific future initiatives: IHR core capacity building (enhancing surveillance and the capacity of laboratories at the national, regional, and continental levels) and strengthening countermeasures and research and development for various diseases. In terms of ②Response to public health crises, enhancing of the capacity of each country to manage health emergency risks is mentioned. In preparation for TICAD VIII to be held in August 2022, "strengthening Africa's capacity to respond to COVID-19" and "Building resilient and inclusive health and medical system" are being promoted as specific initiatives by Japan. Therefore, the expected strengthening of KEMRI's research function and emergency response capacity through the implementation of the Project is consistent with Japan's assistance policy.

3-4-2 Effectiveness

The following are effectiveness indicators related to the direct effects (outputs) of the implementation of the Project and the effects (outcomes) expected to be achieved in the future through the implementation of the entire Project. The base year for the indicators is 2022, and the target year is 2028, three years after 2025. The construction of facilities and provision of equipment are scheduled to be completed in 2025.

(1) Quantitative effectiveness

As quantitative indicators, “The number of research projects using BSL3 laboratories” and “The number of newly introduced research methods and/or techniques out of those six made possible by the inputs of the Project” and those baseline values and target values will be set as shown in the Table 3-1.

Table 3-1 Indicators of quantitative effectiveness

Quantitative Indicators	Value of indicators		Target value (FY 2028) (3 years after completion of the Project)
	Year of baseline	Baseline value	
The number of research projects using BSL3 laboratories	2022	4 projects	Planned value by KEMRI 10 projects
The number of newly introduced research methods and/or techniques out of those made possible by the inputs of the Project below. ① Preclinical studies by animal experiments in BSL3 laboratory ② Pathophysiological studies for BSL3 pathogens by animal experiments ③ Mass spectrometric and molecular structure analyses of unknown chemical compounds ④ Nanotechnology ⑤ Ultrastructural morphological analyses of tissues and cells including pathogens	2022	0/6 methods and/or techniques	Planned value by KEMRI 6/6 methods and/or techniques

Quantitative Indicators	Value of indicators		Target value (FY 2028) (3 years after completion of the Project)
	Year of baseline	Baseline value	
⑥ Proteomic analyses (comprehensive analysis of proteins)			

Source Survey team

The number of research projects using BSL3 laboratories: The number of BSL3 laboratories in KEMRI will be three because two BSL3 laboratories will be newly added to existing one. The number of research projects using BSL3 laboratories can be simply expected to increase about three times compared to the current number. KEMRI set the expected number of research projects at 10 at the time of the first field survey, therefore, accordingly set a target of 10 projects. It is appropriate to measure the effect of the additional BSL3 laboratories by the Project because the cramped space with only one BSL3 laboratory is the most critical issue for KEMRI.

The number of newly introduced research methods and/or techniques out of those six made possible by the inputs of the Project: Among six research methods and techniques listed in Table 6-1, for ① and ②, animal experiments are currently being conducted for low-risk pathogens and can be introduced once the BSL3 laboratories are completed. Although some research projects have begun on ③, ⑤, and ⑥, the experiments cannot be completed within KEMRI because the necessary equipment is not available. As soon as the Project is completed, those methods and techniques will be introduced, and the entire experimental process can be carried out. ④ can also be introduced with the installation of an electron microscope. The target value is set as six methods and/or techniques because KEMRI expects to be able to introduce all the methods and techniques in three years after the completion of the Project.

(2) Qualitative Effectiveness

1) Advanced surveillance of infectious disease trends with molecular epidemiological techniques utilizing the BSL laboratories is being performed.

The project will enable the isolation and cell culture of pathogens including BSL3 and will enhance the ability to perform neutralization tests and genome analysis of pathogens, which will greatly improve the investigative and research functions in the area of molecular epidemiology. By utilizing these technologies and facilities, it will be possible to estimate risk factors for the spread of infection and transmission routes, and it is expected that more advanced molecular epidemiological surveillance of infectious disease trends will continue, and specific measures will be proposed based on scientific evidence.

2) The virtual laboratory is being used for nurturing personnel and academic exchange with sufficient capacity for responding infectious diseases outbreaks and pandemics.

The virtual laboratory will serve as a venue for online meetings and training, e-Learning, and information sharing. It will be possible to conduct online training, including simulations of new diagnostic methods for infectious diseases and specimen handling, for domestic and

overseas laboratories. By providing advanced training to Kenya and neighbouring countries, it is expected to strengthen human resource development for infectious disease control in the target regions. In addition, online communications with a large number of scientists and students from home and abroad will be facilitated. As a result, sharing the latest information and academic exchange about outbreaks and pandemics of infectious diseases in Kenya and abroad can be expected

Appendix-1 Member List of the Survey Team

Name	Assignment	Organization
Miwa ITO	Team Leader	JICA
Mitsuo ISONO	Technical Advisor	JICA
Tomoki MIYANO	Chief Consultant / Facility Planning 1	Oriental Consultants Global Co., Ltd.
Takatsugu SHIMADA	Deputy Chief Consultant / Facility Planning 2	Oriental Consultants Global Co., Ltd.
Naoko MIYATAKE	Architectural Design / Site Conditions Survey	Oriental Consultants Global Co., Ltd.
Shunzo GOTO	Structural Design	Oriental Consultants Global Co., Ltd.
Masahiko SUZUKI	Utilities Design	Oriental Consultants Global Co., Ltd.
Yasushi KAMOGAWA	Construction Planning / Cost Estimate (Facility)	Oriental Consultants Global Co., Ltd.
Akio KANEKO	Equipment Planning / Operation and Maintenance Planning	Fujita Planning Co., Ltd.
Toshiyasu MURAI	Equipment Procurement Planning / Cost Estimate (Equipment)	Fujita Planning Co., Ltd.
Akiko TAKAMIYA	Research Planning	Oriental Consultants Global Co., Ltd.
Yoichi INOUE	Research Planning	Oriental Consultants Global Co., Ltd.
Naoto SHIBUI	Environmental and Social Considerations	Oriental Consultants Global Co., Ltd.
Toma MIYASHITA	Project Coordinator/ Construction Planning and Cost Estimate Support	Oriental Consultants Global Co., Ltd.

Source: JICA Study Team

Appendix-2 Survey Schedule

The 1st Field Survey was Tue. 18 January - Tue. 7 February 2022.

Table 1 First Field Survey Period of Each Study Team Member

Name	Assignment	Local travel period
Miwa ITO	Team Leader	January 22, 2022 to January 30, 2022
Mitsuo ISONO	Technical Advisor	January 22, 2022 to January 30, 2022
Tomoki MIYANO	Chief Consultant / Facility Planning 1	January 18, 2022 to February 7, 2022
Takatsugu SHIMADA	Deputy Chief Consultant / Facility Planning 2	January 18, 2022 to February 7, 2022
Naoko MIYATAKE	Architectural Design / Site Conditions Survey	January 18, 2022 to February 7, 2022
Masahiko SUZUKI	Utilities Design	January 22, 2022 to February 5, 2022
Yasushi KAMOGAWA	Construction Planning / Cost Estimate (Facility)	January 21, 2022 to February 5, 2022
Akio KANEKO	Equipment Planning / Operation and Maintenance Planning	January 18, 2022 to February 7, 2022
Toshiyasu MURAI	Equipment Procurement Planning / Cost Estimate (Equipment)	January 21, 2022 to February 5, 2022
Akiko TAKAMIYA	Research Planning	January 18, 2022 to February 7, 2022
Naoto SHIBUI	Environmental and Social Considerations	Residing in Nairobi
Toma MIYASHITA	Project Coordinator/ Construction Planning and Cost Estimate Support	January 18, 2022 to February 7, 2022

Source: JICA Study Team

The first field survey schedule is as follows.

Table 2 First Field Survey Schedule

Day	Itinerary	Location
18 Jan (Tue) – 19 Jan (Wed)	Departure from Nairobi, arrival in Narita	(7 people) Tokyo → Nairobi
20 Jan (Thu)	Inception report briefing, existing facilities, and site visit at KEMRI	(8people) Nairobi
21 Jan (Fri)	Survey of existing facilities, visit to JICA Kenya office	(8people) Nairobi (2people) Tokyo → Nairobi
22 Jan (Sat)	Organization of documents, internal discussions, interviews with local subcontractors (environmental and social impact)	(10people) Nairobi (1people) Tokyo → Nairobi
23 Jan (Sun)	Organization of documents, hearing of construction situation from local constructors, interviews with local subcontractors (site condition survey)	(11people) Nairobi (2people) Tokyo → Nairobi
24 Jan (Mon)	Survey of existing facilities, confirming borehole locations	Nairobi
25 Jan (Tue)	Interviews on research plans, visit to the Institute of Tropical Medicine, Nagasaki University	Nairobi
26 Jan (Wed)	M/D discussions, interviews on local construction conditions	Nairobi
27 Jan (Thu)	M/D signing	Nairobi
28 Jan (Fri)	Collection of construction unit prices, interviews on equipment procurement	Nairobi
29 Jan (Sat)	Organization of documents, Internal discussions	(11people) Nairobi (2people) Nairobi → Tokyo

Day	Itinerary	Location
30 Jan (Sun)	Organization of documents, Internal discussions	(10people) Nairobi
31 Jan (Mon)	Study of facilities, equipment, and research plans, collection of construction unit prices, interviews on equipment procurement circumstances	(10people) Nairobi
1 Feb (Tue)	Review of facilities, equipment, and research plan, visit to the Institute of Tropical Medicine, Nagasaki University	(10people) Nairobi
2 Feb (Wed)	Online meeting with JICA HQ to discuss facilities, equipment, and research plans	(10people) Nairobi
3 Feb (Thu)	Visit to local data center, conduct workshop, T/N discussion	(10people) Nairobi
4 Feb (Fri)	T/N signing, PCR testing	(7people) Nairobi (3people) Nairobi → Tokyo
5 Feb (Sat)	Isolation after PCR test	(6people) Nairobi
6 Feb (Sun) – 7 Feb (Mon)	Departure from Nairobi, arrival in Narita	(6people) Nairobi → Tokyo

Source: JICA Study Team

The Second Field Survey was Fri. 22 July - Sun. 31 July 2022

Table 3 Second Field Survey Period of Each Study Team Member

Name	Assignment	Local travel period
Miwa ITO	Team Leader	July 22, 2022 to July 31, 2022
Mitsuo ISONO	Technical Advisor	July 22, 2022 to July 31, 2022
Tomoki MIYANO	Chief Consultant / Facility Planning 1	July 22, 2022 to July 31, 2022
Naoko MIYATAKE	Architectural Design / Site Conditions Survey	July 22, 2022 to July 31, 2022
Akio KANEKO	Equipment Planning / Operation and Maintenance Planning	July 22, 2022 to July 31, 2022

Source: JICA Study Team

The first field survey schedule is as follows.

Table 4 Second Field Survey Schedule

Day	Itinerary	Location
22 Jul (Fri) - 23 Jul (Sat)	Departure from Nairobi, arrival in Narita	Tokyo → Nairobi
24 Jul (Sun)	Internal discussions	Nairobi
25 Jul (Mon)	JICA Office, KEMRI Discussion	Nairobi
26 Jul (Tue)	M/D Discussion	Nairobi
27 Jul (Wed)	M/D Discussion	Nairobi
28 Jul (Thu)	M/D Discussion	Nairobi
29 Jul (Fri) – 31 Jul (Sun)	Departure from Nairobi, arrival in Narita	Nairobi → Tokyo

Source: JICA Study Team

Appendix-3 List of the Person concerned in the Recipient Country

1. JICA Kenya Office
Yumiko Yoshii : Deputy Director

2. KEMRI
 Prof. Sam Kariuki : Ag. Director General
 Dr. Evans Amukoye : Ag. Director Research and Development
 Anthony S Wachira : Ag. Director Corporate Services
 Prof. Elijah M Songok : Director Research and Capacity Building
 Dr. Kizito M Lubano : Ag. Director Scientific Programs, Partnerships, and Grants Management

 Dr. Muuo Nzou : Assistant Principal Research Scientist
 Ms. Grace Munoru : Deputy Director Engineering & Maintenance
 Mr. Nicolas Mwikwabe : Assistant Principal Research Scientist
 Mr. Safari Agure : Senior Research Scientist
 Dr. Damaris Matoke : Principal Research Scientist
 Dr. Evans Chadeka : Research Scientist
 Dr. Ernest Wandera : Research Scientist
 Mr. Milkah Mwangi : Senior Research Scientist
 Mr. Sharon Gatwiri : Grants Management Officer
 Mr. Patricia Nzioki : Human Resource Management Officer
 Mr. Edwin Webala : Principal Engineering Technologist
 Ms. Jesse M Waitherero : Bio-medical Engineer
 Mr. Elizabeth W Mbugua : Senior Engineer

3. Local Contractor
SEYANI BROTHERS & CO (K) Ltd
 Mr. Hirji Seyani : Managing Director
 Mr. Micheal O. Kosuri : Cost Estimator

AFCON AFRICA LIMITED
 Mr. Ravi M. Vekaria

CEMENTERS
 Mr. Ramesh Vishram : Managing Director
 Mr. Ashish Vishram : Project Manager

EpcO
 Mr Mayur R. Varasani : MEng. (Civil) Director

4. Local Consultant
Batch Consulting Engineers
 Mr. Michael O. Ogola : Managing Director

Kenya National Cleaner Production Center
 Dr. Jane B. Nyakango'o : Director
 Mr. Nyamori Steve Onserio : Deputy Director

Clean Tech East Africa Ltd

Mr. Andrew Moseti : Project Director

Avenir Engineering & Associates Consulting Ltd

Mr. John Munene MDUMIA : Project Engineer

Mr. Joemark Mureithi Gichuki : Staff

Ms. Scholasthica Wambui Wangamwa : Staff

Mr. Ian Migwi Mwangi : Staff

5. Related Equipment

Chemoquip Ltd

Mr. Franklin Wekesa : Sales representative/ Medical Tech

Ultralab East Africa Ltd

Ms. Caroline Nyaga : Staff

Sam-Tech Diagnostics Co Ltd

Mr. Samson Maina : Director

Crown Healthcare Kenya Ltd

Mr. Benson Kuria : Head of Lab Department

Mr. James Masitsah : Service Manager

Hass Scientific and Medical Supplies Ltd

Mr. Benjamin Njeru : Business Development Manager

Mr. Kiprop Timothy Taxus : Diagnostic Sales Executive

Bioscope Laboratory Supplies Ltd

Ms. Gladys Mwangi : Marketing Consultant

ApicalMed Ltd

Mr. Willis Kimani : Managing Director

Meditec Systems Ltd

Mr. Johnson Charanah : Staff

Ms. Mary Mbete : Staff

Bioquest Kenya Ltd

Mr. Philip Talamson : General Manager

Biotec Laboratories Ltd

Mr. Moses C. O. Lorre : Business Director

Sciencescope Ltd

Mr. Joackim Marring : Staff

Mr. Wyclife Odhiambo : Staff

Mr. Bruce Mutua : Staff

Mr. Sachin Bakrauia : Staff

Toda Medical Supplies Ltd

Mr. Mwita David : Director

Endeavour Instrument Africa Ltd

Mr. Sharad Kothari : Technical Strategy Manager

Faram East Africa Ltd

Mr. Erastus Momanyi : Managing Director

Ms. Loise Mnyambu : Business Development

Mr. Peter Malika : Operations Manager

Biozeq Kenya Ltd

Mr. Mahmoud Ng'ang'a : Director

Mr. Shamim Wambui : Marketing Manager

Nairobi X-Ray Supplies Ltd

Mr. Mohammed Asfak : Application Specialist

Africa Biosystems Ltd

Ms. Amy Wahome : Field Application and Sales Specialist

Mr. William Chege Kiaie : Field Application Specialist

Appendix-4 List of collected Documents

No.	Summary	Name of Documents	Issuing Authority	Form	Collected Date
1	FY2020 Financial Report	Kenya Medical Research Institute Annual Report and Financial Statements for the Financial year ending 30th June 2021	KEMRI	Digital media	21/01/2022
2	FY2019 Financial Report	Kenya Medical Research Institute Annual Report and Financial Statements for the Financial year ending 30th June 2020	KEMRI	Digital media	21/01/2022
3	FY2018 Financial Report	Kenya Medical Research Institute (KEMRI) Annual Report and Financial Statements for the Financial year Ended June 30, 2019	KEMRI	Digital media	21/01/2022
4	Master Plan prepared by KEMRI in 2012	2011_KEMRI Master_Plan	KEMRI	Digital media	27/01/2022
5	Documents related to KEMRI Graduate School	KEMRI Graduate School -Profile and Future Perspectives-	KEMRI	Digital media	25/01/2022
6	Request from Research Capacity Building	Requests by KEMRI Graduate School/DRCB on the Proposed new Training Facility supported by JICA	KEMRI	Digital media	25/01/2022
7	CPHR departmental briefing materials	CPHR Personnel and Staffing needs	KEMRI	Digital media	25/01/2022
8	Handouts at the DRCB presentation	Request by KGS_DRCB	KEMRI	Digital media	25/01/2022
9	Draft equipment specification list for the Institute of Tropical Medicine, Nagasaki University	P3 Laboratory Specification (Draft)	Nagasaki University	Digital media	25/01/2022
10	Final draft of equipment specification list for Institute of Tropical Medicine, Nagasaki University	P3 Laboratory Specification (Final)	Nagasaki University	Digital media	25/01/2022
11	Maintenance procedure manual for the BSL3 laboratory at the Institute of Tropical Medicine, Nagasaki University	NUITM-P3 Lab., Design and maintenance 2017 presentation{20220125}	KEMRI	Digital media	25/01/2022
12	WHO Biosafety Manual, 4th edition, on laboratory design and maintenance	WHO _ LABORATORY DESIGN _ 2020.pdf	KEMRI	Digital media	27/01/2022
13	WHO Biosafety and Biosecurity Guidelines	WHO GUIDANCE - Biosafety and Biosecurity _ 2022	KEMRI	Digital media	27/01/2022
14	International Society for Biosafety Guidelines for Biorisk Management	IFBA-Certification-Candidate-Handbook-2020v3	KEMRI	Digital media	27/01/2022
15	Laboratory biorisk management regulations as defined in ISO 35001	ISO 35001 -2020 _ Biorisk Management	KEMRI	Digital media	27/01/2022
16	KEMRI's Bio-Risk Management Manual	KEMRI Biorisk Manual _ V2016 _ Rev	KEMRI	Digital media	27/01/2022
17	KEMRI's checklist for biorisk management	Kenya Laboratory Biorisk Management Checklist_2021	KEMRI	Digital media	27/01/2022
18	Biosecurity and biosecurity guidelines jointly prepared by IFBA and Sandia National Laboratories	Laboratory-Biosafety-and-Biosecurity-Risk-Assessment	KEMRI	Digital media	27/01/2022
19	Biorisk Management Procedures prepared by the Kenyan Ministry of Health	MOH Final_Kenya Laboratory Biorisk Management Curriculum_Nov 2019	KEMRI	Digital media	27/01/2022
20	Safety Management Guidelines for Health Care Workers prepared by the Ministry of Health, Kenya	OCCUPATIONAL HEALTH AND SAFETY POLICY GUIDELINES _ HEALTH SECTOR IN KENYA	KEMRI	Digital media	27/01/2022
21	Monitoring Checklist for International Health Regulations prepared by WHO	WHO _ IHR_Monitoring_Framework_Checklist_and_Indicators	KEMRI	Digital media	27/01/2022

No.	Summary	Name of Documents	Issuing Authority	Form	Collected Date
22	Biosafety Manual prepared by WHO Biosafety Manual 4th edition	WHO Biosafety Manual _ 4th Edition 2018	KEMRI	Digital media	27/01/2022
23	FY2017 Financial Report	Kenya Medical Research Institute Annual Report and Financial Statements for the Financial year ended June 30, 2018	KEMRI	Digital media	27/01/2022
24	FY2016 Financial Report	Kenya Medical Research Institute Annual Report and Financial Statements for the Financial year ended June 30, 2017	KEMRI	Digital media	27/01/2022
25	FY2015 Financial Report	Kenya Medical Research Institute Annual Report and Financial Statements for the Financial year ended June 30, 2016	KEMRI	Digital media	27/01/2022
26	KEMRI's Personnel Plan	Human Resource Plan-2019 Appendix1	KEMRI	Digital media	31/01/2022
27	Rules and Regulations for the Use of KEMRI's BSL3 Laboratory	BSL3 Facility Manual_July 2020	KEMRI	Digital media	31/01/2022
28	Number of staff belonging to each department of KEMRI as of 2021	Human Resorce_Number of Staff	KEMRI	Digital media	03/02/2022
29	Certified copy of KEMRI's registry	The Land Registration Act No.3 of 2012 _78302	KEMRI	Digital media	02/02/2022
30	Certified copy of KEMRI's registry	The Land Registration Act No.3 of 2012 _82774	KEMRI	Digital media	02/02/2022

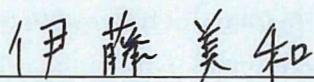
Source: JICA Study Team

Appendix-5 Minutes of Discussions

Minutes of Discussions on the Preparatory Survey for the Project for Strengthening the Research Capacity of Kenya Medical Research Institute

Based on the series of preliminary discussions between the relevant authorities of the Government of the Republic of Kenya (hereinafter referred to as “Kenya”) and Japan International Cooperation Agency (hereinafter referred to as “JICA”), with reference to the Final Report on Data Collection Survey on Capacity Development for Infectious Diseases including COVID-19 in Kenya in 2021, JICA dispatched the Preparatory Survey Team for the Outline Design (hereinafter referred to as “the Team”) of the Project for Strengthening the Research Capacity of Kenya Medical Research Institute (hereinafter referred to as “the Project”) to Kenya. The Team held a series of discussions with the officials of the Government of Kenya and conducted a field survey. In the course of the discussions, both sides have confirmed the main items described in the attached sheets.

Nairobi, 27th January 2022



Ms. Ito Miwa

Leader

Preparatory Survey Team

Japan International Cooperation Agency

Japan



Prof. Sam Kariuki

Director General & CEO

Kenya Medical Research Institute

The Republic of Kenya

ATTACHMENT

1. Objective of the Project

The objective of the Project is to strengthen the research capacity of Kenya Medical Research Institute (hereinafter referred to as "KEMRI") for infectious diseases including COVID-19 by constructing additional laboratories at KEMRI and providing equipment for those laboratories, thereby contributing to strengthening of response capacity to health crises in Kenya and East Africa.

2. Title of the Preparatory Survey

Both sides confirmed the title of the Preparatory Survey as "the Preparatory Survey for the Project for Strengthening the Research Capacity of Kenya Medical Research Institute".

3. Project site

Both sides confirmed that the site of the Project is on the grounds of KEMRI, which is shown in Annex 1.

4. Responsible authority for the Project

Both sides confirmed the authorities responsible for the Project are as follows:

4-1. KEMRI will be the executing agency for the Project (hereinafter referred to as "the Executing Agency"). The Executing Agency shall coordinate with all the relevant authorities to ensure smooth implementation of the Project and ensure that the undertakings for the Project shall be properly managed in a timely manner by relevant authorities. The organization charts are shown in Annex 2.

4-2. The line ministry of the Executing Agency is the Ministry of Health. Ministry of Health shall be responsible for supervising the Executing Agency on behalf of the Government of Kenya.

5. Items requested by the Government of Kenya

5-1. As a result of discussions, both sides confirmed that the items requested by the Government of Kenya are described in Annex 3 and Annex 4.

5-2. JICA will assess the feasibility of the requested items through the survey and will report the findings to the Government of Japan. The final scope of the Project will be decided by the Government of Japan.

5-3. The Government of Kenya shall submit an official request to the Government of

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Japan through diplomatic channel before the appraisal of the Project, which is scheduled in July 2022.

6. Procedures and Basic Principles of Japanese Grant

6-1. The Kenyan side agreed that the procedures and basic principles of Japanese Grant (hereinafter referred to as “the Grant”) as described in Annex 5 shall be applied to the Project.

As for the monitoring of the implementation of the Project, JICA requires the Kenyan side to submit the Project Monitoring Report in the form as attached in Annex 6.

6-2. The Kenyan side agreed to take the necessary measures, as described in Annex 7, for smooth implementation of the Project. The contents of measures described in Annex 7 will be elaborated and refined during the Preparatory Survey and be agreed during the mission dispatched for explanation of the Draft Preparatory Survey Report.

The contents of Annex 7 will be updated as the Preparatory Survey progresses, and eventually, will be used as an attachment to the Grant Agreement.

7. Schedule of the Survey

7-1. The Team will proceed with further survey in Kenya until November 2022.

7-2. An official request to the Government of Japan will be submitted before May 2022.

7-3. JICA will prepare a draft Preparatory Survey Report in English and dispatch a mission to Kenya in order to explain its contents around July 2022.

7-4. If the contents of the draft Preparatory Survey Report are accepted and the undertakings for the Project are fully agreed by the Kenyan side, JICA will finalize the Preparatory Survey Report and send it to Kenya around November 2022.

7-5. The schedule as described is tentative and subject to change.

8. Environmental and Social Considerations

8-1. The Kenyan side confirmed and agreed to give due environmental and social considerations before and during implementation, and after completion of the Project, in accordance with the JICA Guidelines for Environmental and Social Considerations (April, 2010).

8-2. The Project is categorized as “B” from the following considerations:

The project is not located in a sensitive area, nor has sensitive characteristics, nor

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falls into sensitive sectors under the JICA guidelines for environmental and social considerations (April 2010), and its potential adverse impacts on the environment are not likely to be significant.

The Kenyan side confirmed to conduct the necessary procedures concerning the environmental assessment (including stakeholder meetings, Environmental Impact Assessment (EIA) / Initial Environmental Examination (IEE) and information disclosure, etc.) and prepare the EIA/IEE report of the Project, if the EIA/IEE of the Project is necessary in Kenya. The EIA/IEE approval shall be received from the responsible authorities and submitted by KEMRI to JICA by June 2022.

9. Other Relevant Issues

9-1. Maintenance of Facilities and Equipment

The Kenyan side agreed to secure and allocate the necessary staff and budget to properly and effectively operate and maintain the facilities and the equipment to be provided under the Project.

9-2. Maintenance Services

The team explained the importance of the routine maintenance and periodical maintenance service of some major equipment. Keeping this in mind, both sides agreed to consider inclusion of maintenance service contract to the major equipment that need frequent maintenance into the Project.

The Kenyan side also agreed to secure maintenance cost after expiry of the maintenance contract and/or manufacturer guarantee to be covered by the Grant. The period of maintenance contract and /or manufacturer guarantee depends on the equipment, therefore, JICA will inform the result of the maintenance service of each equipment to be covered by the Grant at the mission dispatched for explanation of the Draft Preparatory Survey Report.

9-3. Soft Components

The Kenyan side took note of the importance of operational training for equipment and requested to consider incorporating soft components into the Project. The team agreed to plan to include operational trainings as soft components. The concrete content would be considered continuously.

9-4. Tax Exemption

The Japanese side explained that Customs duties, internal taxes and other fiscal levies which may be imposed in Kenya with respect to the purchase of the products and/or the services shall be exempted, and, Value Added Tax (VAT) shall be borne by its designated authority without using the Grant. And the Kenyan side agreed with that



KEMRI shall apply for necessary procedure for tax exemption. The detailed procedure for tax exemption shall be provided by the Kenyan side by June 2022.

9-5 Gender Mainstreaming

Both sides confirmed that following gender elements shall be duly reflected in the scope of Preparatory Survey.

- (a) Collection of information and gender disaggregated data for assessment of gender needs, including disease burden and access to health services.
- (b) Examination of gender-responsive measures based on the assessment, such as:
 - ✓ Facility design that reflects gender-specific needs.
 - ✓ Selection of equipment that reflects gender-specific needs and ensure usability by women.

Annex 1 Project Site

Annex 2 Organization Chart

Annex 3 Facility List

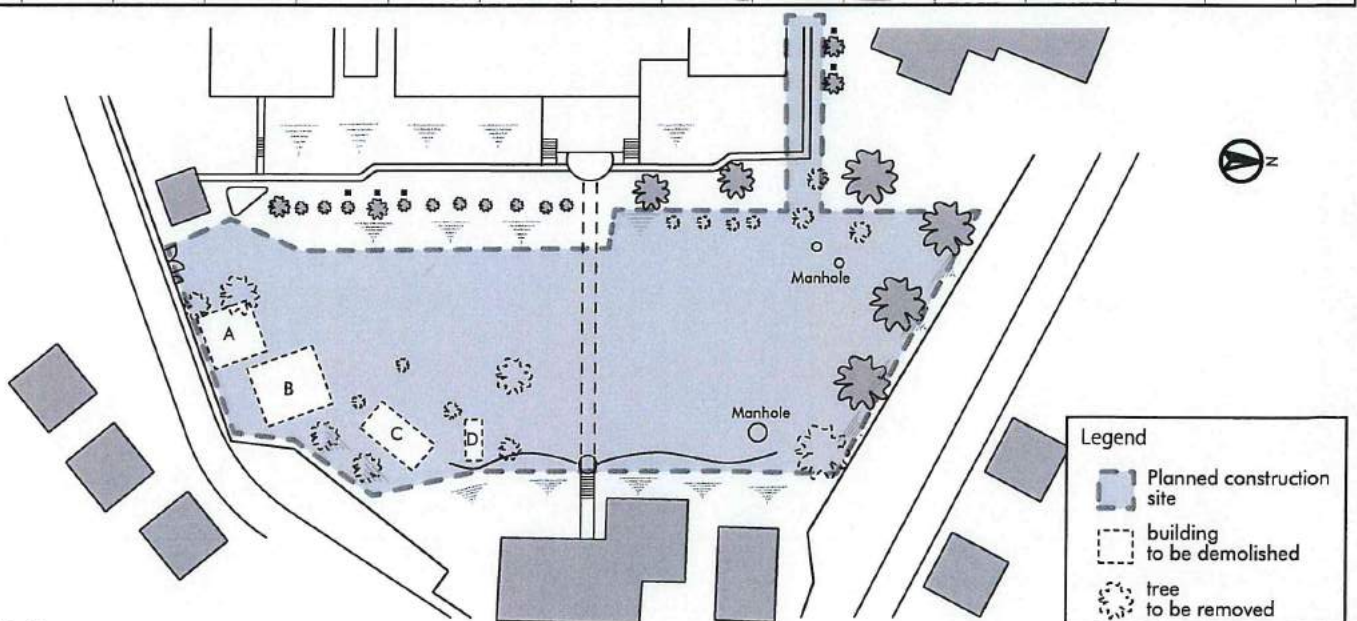
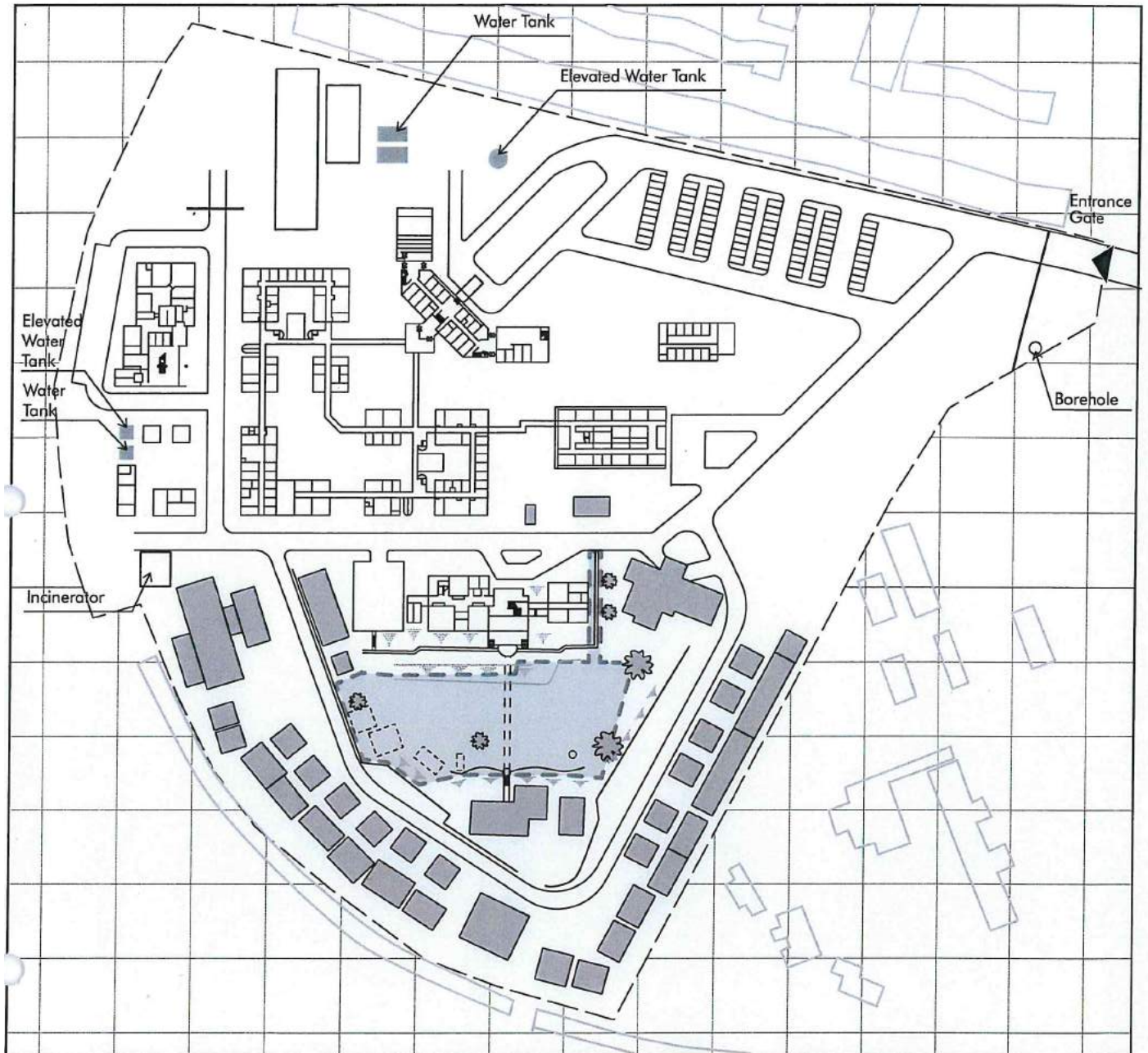
Annex 4 Equipment List

Annex 5 Japanese Grant

Annex 6 Project Monitoring Report (template)

Annex 7 Major Undertakings to be taken by the Government of Kenya



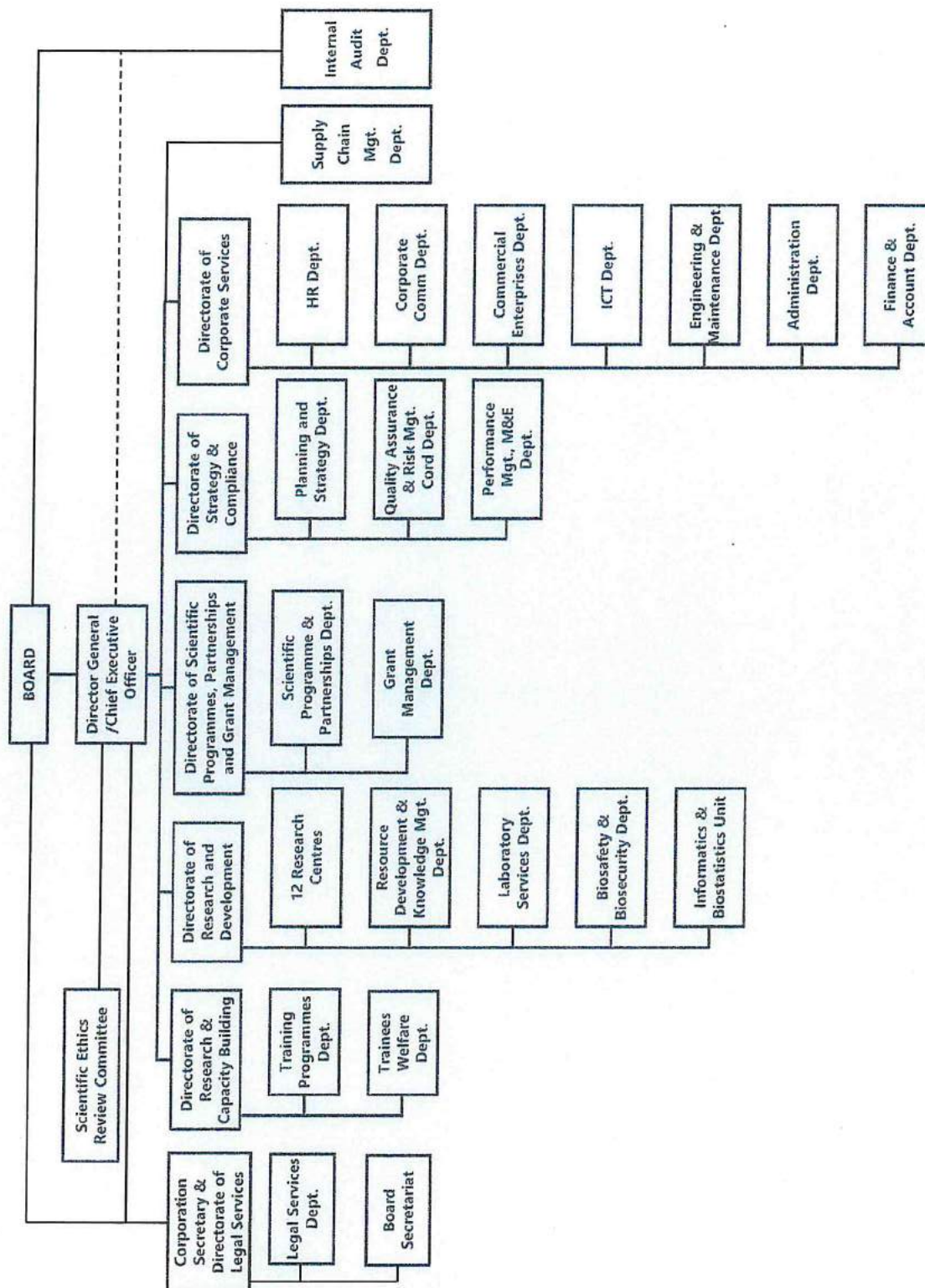


Site Plan

Preparatory Survey
The Project for Strengthening the Research Capacity of Kenya Medical Research Institute

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Annex 2 Organization Chart



(DRAFT) Facility List

Components (in order of priority)		Rationale
1	P3 laboratory (one lab)	Allows research on L3 lethal pathogens & unknown pandemics (e.g., SARS-COV-2); expected to have high interdependence with studies in molecular laboratory
2	P2 Central laboratory	Fosters access to high-end, multidisciplinary equipment to be shared KEMRI-wide, enhancing scientific collaboration
3	P2 Molecular laboratory	Enables analysis of cell cultures, combination DNA, gene analysis, molecular cloning, and proteomics for accelerated discovery & drug testing; high interdependence expected with P3 lab
4	P2 Immunology laboratory	Increases immune profiling to detect infectious diseases; also helps researchers examine mechanisms of autoimmune diseases and cancers, and develop models for immunotherapy
5	Offices	Provides space to work for scientists whose work is in the facility as well as host visiting scientists or senior visiting stakeholders due to proximity to HQ and high-end facilities
6	Virtual lab & conference center	Convenes scientists for knowledge transfer (e.g., training) and discussions (e.g., SOPs) in a virtual and physical space; high interdependence with data centre, particularly for virtual lab
7	Equipment service center	Conducts routine checks, maintains, and calibrates scientific equipment received by KEMRI, ensuring sustainability & credibility of research output
8	Machine room	Ensures proper storage of equipment not dedicated to a particular laboratory such as freezers and liquid nitrogen tanks. It supports ideal conditions for samples collected for scientific research
9	Data centre	Enables centralization of KEMRI's R&D data with adequate security measures, facilitating access to data for analysis and informed decision making
10	P2 Clinical laboratory	Analyzes samples from clinical studies and trials treatments on local populations to validate safety and efficacy in local settings
11	Cold room	Experiments requiring cold temperatures
12	Warehouse	Short storage of consumables, reagents, equipment and supplies

No1-10 were listed, based on 'Data Collection Survey on Capacity Development for Infectious Diseases including COVID-19 in Kenya Final Report, April 2021'.

No11 and 12 were added by KEMRI in December 2021.




(DRAFT)Equipment List

1 P2 and P3 laboratory equipment**Cross-cutting equipment (across P3 lab and P2 labs)**

- Thermocyclers
- Ultracentrifuges
- Biosafety cabinets
- Freezers – different temperatures
- Shakers and balances
- CO2 incubators & incubators
- Autoclave
- Microscopes and accessories
- PCR workstations and clean bench
- Gel documentation systems
- Water purification and deionizing
- Pipettes and Pipette aids
- Thermostatic chamber
- PH meters
- Microplate washers and readers
- Multi item automatic haemocytometer
- Life and death cell count system
- Liquid Nitrogen tanks
- Bead crushers and accessories

P2 Central lab equipment

- Mass spectrophotometer
- Electron microscopes
- Sequencing machines
- Bio Analyzer
- Qubit machine
- Ice machine

P2 Immunology lab equipment

- Flow cytometer
- Eliza machine

P2 Molecular lab equipment

- Aluminium block
- Florescence and chemiluminescence imaging
- Electroporation system
- Water bath
- E-gel precast agarose electro-mulmering system
- Ultrasonic homogenizer
- Ultra-trace ultra-violet visible photometer
- Nucleic acid extraction and purification system
- Mini-gel electro swimming device

P3 laboratory equipment

- Low speed moisture proof staller
- Trace high speed centreline
- Low and high-speed cooling centriser

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2 Cross-cutting equipment

- Air conditioning systems
- Stand-by power generators
- Water reservoir system
- Access systems e.g., biometrics
- Calibration equipment

3 Data centre equipment

- Computers
- Data servers
- UPS
- Voltage stabilizers (AVR)

4 P2 Clinical laboratory equipment

- Biochemistry analyzer
- Full hemogram analyzer
- Freezers (-30)
- Refrigerators (+4)
- Microscopes
- Real time PCR
- Conventional PCR
- Autoclaves
- Hoods
- Blood culture machines
- Centrifuges
- Biosafety cabinetsIncubators
- Vortex
- Hot air oven
- Water baths
- Flow cytometry
- Gene expert
- ESR analyzer
- Prothrombin time index (PTI) / Activated partial thrombin time (APTT) machine
- Hormonal profile analyzer
- ELISA machines
- HBA1C machine
- Urinalysis analyzer
- Weighing scales
- Measuring cylinders
- Drug testing biochemistry analyzer

5 Cold room equipment

- Tables
- Shelves
- Shakers

6 Warehouse/ Consumable/supplies room equipment

- -30°C Freezers
- -80°C Freezers
- Refrigerators (+4)
- Shelves
- Cabinets
- Desks

No1-3 were listed, based on 'Data Collection Survey on Capacity Development for Infectious Diseases including COVID-19 in Kenya Final Report, April 2021'.

No4-6 were added by KEMRI in December 2021.

JAPANESE GRANT

The Japanese Grant is non-reimbursable fund provided to a recipient country (hereinafter referred to as “the Recipient”) to purchase the products and/or services (engineering services and transportation of the products, etc.) for its economic and social development in accordance with the relevant laws and regulations of Japan. Followings are the basic features of the project grants operated by JICA (hereinafter referred to as “Project Grants”).

1. Procedures of Project Grants

Project Grants are conducted through following procedures (See “PROCEDURES OF JAPANESE GRANT” for details):

(1) Preparation

- The Preparatory Survey (hereinafter referred to as “the Survey”) conducted by JICA

(2) Appraisal

- Appraisal by the government of Japan (hereinafter referred to as “GOJ”) and JICA, and Approval by the Japanese Cabinet

(3) Implementation

Exchange of Notes

- The Notes exchanged between the GOJ and the government of the Recipient

Grant Agreement (hereinafter referred to as “the G/A”)

- Agreement concluded between JICA and the Recipient

Banking Arrangement (hereinafter referred to as “the B/A”)

- Opening of bank account by the Recipient in a bank in Japan (hereinafter referred to as “the Bank”) to receive the grant

Construction works/procurement

- Implementation of the project (hereinafter referred to as “the Project”) on the basis of the G/A

(4) Ex-post Monitoring and Evaluation

- Monitoring and evaluation at post-implementation stage

2. Preparatory Survey

(1) Contents of the Survey

The aim of the Survey is to provide basic documents necessary for the appraisal of the the Project made by the GOJ and JICA. The contents of the Survey are as follows:

- Confirmation of the background, objectives, and benefits of the Project and also institutional capacity of




relevant agencies of the Recipient necessary for the implementation of the Project.

- Evaluation of the feasibility of the Project to be implemented under the Japanese Grant from a technical, financial, social and economic point of view.
- Confirmation of items agreed between both parties concerning the basic concept of the Project.
- Preparation of an outline design of the Project.
- Estimation of costs of the Project.
- Confirmation of Environmental and Social Considerations

The contents of the original request by the Recipient are not necessarily approved in their initial form. The Outline Design of the Project is confirmed based on the guidelines of the Japanese Grant.

JICA requests the Recipient to take measures necessary to achieve its self-reliance in the implementation of the Project. Such measures must be guaranteed even though they may fall outside of the jurisdiction of the executing agency of the Project. Therefore, the contents of the Project are confirmed by all relevant organizations of the Recipient based on the Minutes of Discussions.

(2) Selection of Consultants

For smooth implementation of the Survey, JICA contracts with (a) consulting firm(s). JICA selects (a) firm(s) based on proposals submitted by interested firms.

(3) Result of the Survey

JICA reviews the report on the results of the Survey and recommends the GOJ to appraise the implementation of the Project after confirming the feasibility of the Project.

3. Basic Principles of Project Grants

(1) Implementation Stage

1) The E/N and the G/A

After the Project is approved by the Cabinet of Japan, the Exchange of Notes (hereinafter referred to as “the E/N”) will be signed between the GOJ and the Government of the Recipient to make a pledge for assistance, which is followed by the conclusion of the G/A between JICA and the Recipient to define the necessary articles, in accordance with the E/N, to implement the Project, such as conditions of disbursement, responsibilities of the Recipient, and procurement conditions. The terms and conditions generally applicable to the Japanese Grant are stipulated in the “General Terms and Conditions for Japanese Grant (January 2016).”



2) Banking Arrangements (B/A) (See “Financial Flow of Japanese Grant (A/P Type)” for details)

- a) The Recipient shall open an account or shall cause its designated authority to open an account under the name of the Recipient in the Bank, in principle. JICA will disburse the Japanese Grant in Japanese yen for the Recipient to cover the obligations incurred by the Recipient under the verified contracts.
- b) The Japanese Grant will be disbursed when payment requests are submitted by the Bank to JICA under an Authorization to Pay (A/P) issued by the Recipient.

3) Procurement Procedure

The products and/or services necessary for the implementation of the Project shall be procured in accordance with JICA's procurement guidelines as stipulated in the G/A.

4) Selection of Consultants

In order to maintain technical consistency, the consulting firm(s) which conducted the Survey will be recommended by JICA to the Recipient to continue to work on the Project's implementation after the E/N and G/A.

5) Eligible source country

In using the Japanese Grant disbursed by JICA for the purchase of products and/or services, the eligible source countries of such products and/or services shall be Japan and/or the Recipient. The Japanese Grant may be used for the purchase of the products and/or services of a third country as eligible, if necessary, taking into account the quality, competitiveness and economic rationality of products and/or services necessary for achieving the objective of the Project. However, the prime contractors, namely, constructing and procurement firms, and the prime consulting firm, which enter into contracts with the Recipient, are limited to "Japanese nationals", in principle.

6) Contracts and Concurrence by JICA

The Recipient will conclude contracts denominated in Japanese yen with Japanese nationals. Those contracts shall be concurred by JICA in order to be verified as eligible for using the Japanese Grant.

7) Monitoring

The Recipient is required to take their initiative to carefully monitor the progress of the Project in order to ensure its smooth implementation as part of their responsibility in the G/A, and to regularly report to JICA about its status by using the Project Monitoring Report (PMR).

8) Safety Measures

The Recipient must ensure that the safety is highly observed during the implementation of the Project.

9) Construction Quality Control Meeting

Construction Quality Control Meeting (hereinafter referred to as the “Meeting”) will be held for quality assurance and smooth implementation of the Works at each stage of the Works. The member of the Meeting will be composed by the



Recipient (or executing agency), the Consultant, the Contractor and JICA. The functions of the Meeting are as follows:

- a) Sharing information on the objective, concept and conditions of design from the Contractor, before start of construction.
- b) Discussing the issues affecting the Works such as modification of the design, test, inspection, safety control and the Client's obligation, during of construction.

(2) Ex-post Monitoring and Evaluation Stage

- 1) After the project completion, JICA will continue to keep in close contact with the Recipient in order to monitor that the outputs of the Project is used and maintained properly to attain its expected outcomes.
- 2) In principle, JICA will conduct ex-post evaluation of the Project after three years from the completion. It is required for the Recipient to furnish any necessary information as JICA may reasonably request.

(3) Others

1) Environmental and Social Considerations

The Recipient shall carefully consider environmental and social impacts by the Project and must comply with the environmental regulations of the Recipient and JICA Guidelines for Environmental and Social Considerations (April, 2010).

2) Major undertakings to be taken by the Government of the Recipient

For the smooth and proper implementation of the Project, the Recipient is required to undertake necessary measures including land acquisition, and bear an advising commission of the A/P and payment commissions paid to the Bank as agreed with the GOJ and/or JICA. The Government of the Recipient shall ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the Recipient with respect to the purchase of the Products and/or the Services be exempted or be borne by its designated authority without using the Grant and its accrued interest, since the grant fund comes from the Japanese taxpayers.

3) Proper Use

The Recipient is required to maintain and use properly and effectively the products and/or services under the Project (including the facilities constructed and the equipment purchased), to assign staff necessary for this operation and maintenance and to bear all the expenses other than those covered by the Japanese Grant.



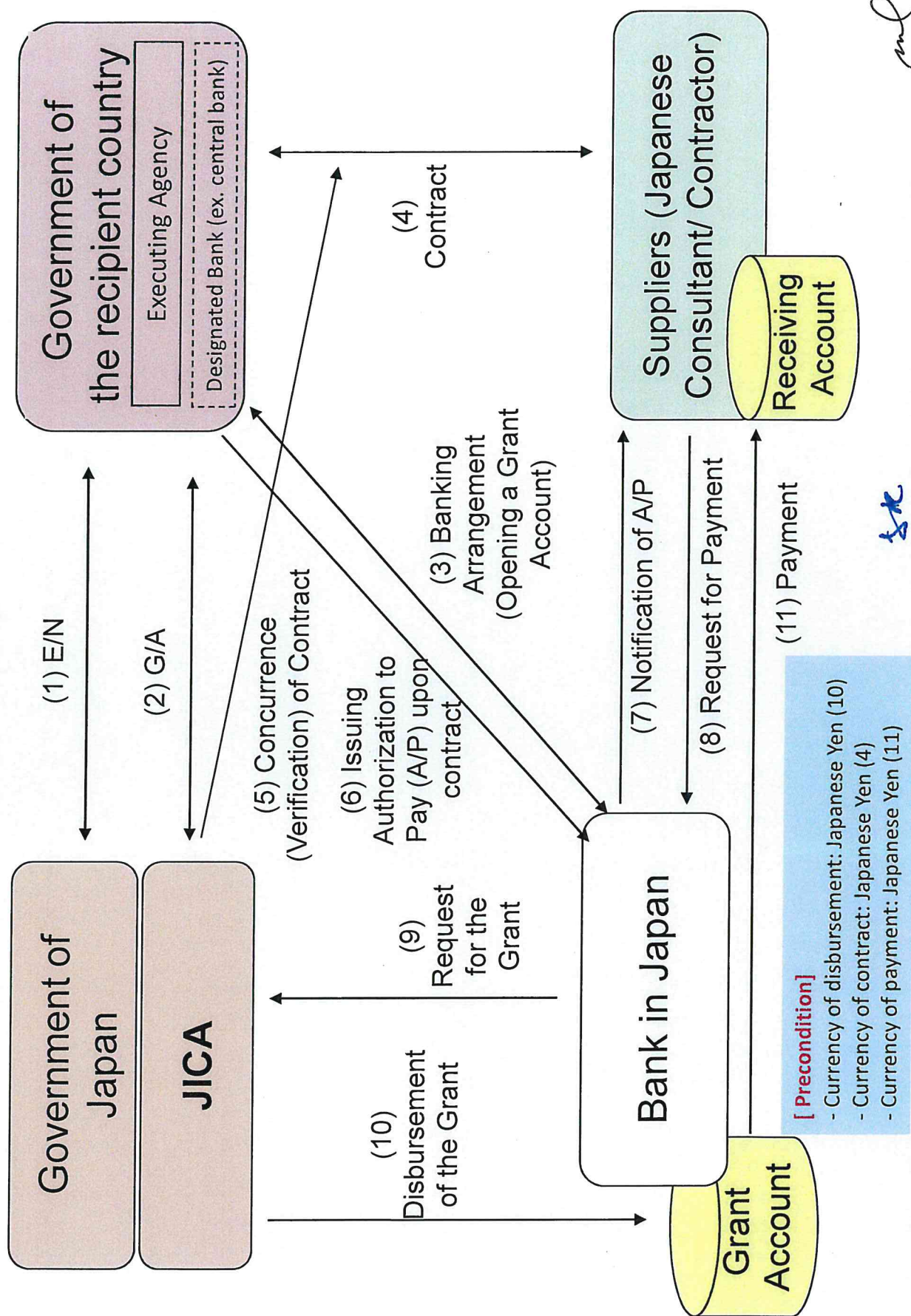
4) Export and Re-export

The products purchased under the Japanese Grant should not be exported or re-exported from the Recipient.

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Financial Flow of Japanese Grant (A/P Type)



PROCEDURES OF JAPANESE GRANT

Stage	Procedures	Remarks	Recipient Government	Japanese Government	JICA	Consultants	Contractors	Agent Bank
Official Request	Request for grants through diplomatic channel	Request shall be submitted before appraisal stage.	x	x				
1. Preparation	(1) Preparatory Survey Preparation of outline design and cost estimate		x		x	x		
2. Appraisal	(2) Preparatory Survey Explanation of draft outline design, including cost estimate, undertakings, etc.		x		x	x		
	(3) Agreement on conditions for implementation	Conditions will be explained with the draft notes (E/N) and Grant Agreement (G/A) which will be signed before approval by Japanese government.	x	x (E/N)	x (G/A)			
	(4) Approval by the Japanese cabinet			x				
3. Implementation	(5) Exchange of Notes (E/N)		x	x				
	(6) Signing of Grant Agreement (G/A)		x		x			
	(7) Banking Arrangement (B/A)	Need to be informed to JICA	x					x
	(8) Contracting with consultant and issuance of Authorization to Pay (A/P)	Concurrence by JICA is required	x			x		x
	(9) Detail design (D/D)		x			x		
	(10) Preparation of bidding documents	Concurrence by JICA is required	x			x		
	(11) Bidding	Concurrence by JICA is required	x			x	x	
	(12) Contracting with contractor/supplier and issuance of A/P	Concurrence by JICA is required	x				x	x
	(13) Construction works/procurement	Concurrence by JICA is required for major modification of design and amendment of contracts.	x			x	x	
	(14) Completion certificate		x			x	x	
4. Ex-post monitoring & evaluation	(15) Ex-post monitoring	To be implemented generally after 1, 3, 10 years of completion, subject to change	x		x			
	(16) Ex-post evaluation	To be implemented basically after 3 years of completion	x		x			

notes:

1. Project Monitoring Report and Report for Project Completion shall be submitted to JICA as agreed in the G/A.
2. Concurrence by JICA is required for allocation of grant for remaining amount and/or contingencies as agreed in the G/A.

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Project Monitoring Report
on
Project Name
Grant Agreement No. XXXXXXXX
20XX, Month

Organizational Information

Signer of the G/A (Recipient)	Person in Charge <u>(Designation)</u> _____ Contacts <u>Address:</u> _____ _____ <u>Phone/FAX:</u> _____ <u>Email:</u> _____
Executing Agency	Person in Charge <u>(Designation)</u> _____ Contacts <u>Address:</u> _____ _____ <u>Phone/FAX:</u> _____ <u>Email:</u> _____
Line Ministry	Person in Charge <u>(Designation)</u> _____ Contacts <u>Address:</u> _____ _____ <u>Phone/FAX:</u> _____ <u>Email:</u> _____

General Information:

Project Title	
E/N	Signed date: Duration:
G/A	Signed date: Duration:
Source of Finance	Government of Japan: Not exceeding JPY _____ mil. Government of (): _____





1: Project Description

1-1 Project Objective

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1-2 Project Rationale

- Higher-level objectives to which the project contributes (national/regional/sectoral policies and strategies)
- Situation of the target groups to which the project addresses

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1-3 Indicators for measurement of "Effectiveness"

Quantitative indicators to measure the attainment of project objectives		
Indicators	Original (Yr)	Target (Yr)
Qualitative indicators to measure the attainment of project objectives		

2: Details of the Project

2-1 Location

Components	Original (proposed in the outline design)	Actual
1.		

2-2 Scope of the work

Components	Original* (proposed in the outline design)	Actual*
1.		

Reasons for modification of scope (if any).

(PMR)

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2-3 Implementation Schedule

Items	Original		Actual
	(proposed in the outline design)	(at the time of signing the Grant Agreement)	

Reasons for any changes of the schedule, and their effects on the project (if any)

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2-4 Obligations by the Recipient

2-4-1 Progress of Specific Obligations

See Attachment 2.

2-4-2 Activities

See Attachment 3.

2-4-3 Report on RD

See Attachment 11.

2-5 Project Cost

2-5-1 Cost borne by the Grant(Confidential until the Bidding)

Components			Cost (Million Yen)	
	Original (proposed in the outline design)	Actual (in case of any modification)	Original ^{1),2)} (proposed in the outline design)	Actual
	1.			
Total				

Note: 1) Date of estimation:

2) Exchange rate: 1 US Dollar = Yen

2-5-2 Cost borne by the Recipient

Components			Cost (1,000 Taka)	
	Original (proposed in the outline design)	Actual (in case of any modification)	Original ^{1),2)} (proposed in the outline design)	Actual
	1.			

Note: 1) Date of estimation:
2) Exchange rate: 1 US Dollar =

Reasons for the remarkable gaps between the original and actual cost, and the countermeasures (if any)

(PMR)

2-6 Executing Agency

- Organization's role, financial position, capacity, cost recovery etc,
- Organization Chart including the unit in charge of the implementation and number of employees.

Original (at the time of outline design) name: role: financial situation: institutional and organizational arrangement (organogram): human resources (number and ability of staff):
Actual (PMR)

2-7 Environmental and Social Impacts

- The results of environmental monitoring based on Attachment 5 (in accordance with Schedule 4 of the Grant Agreement).
- The results of social monitoring based on in Attachment 5 (in accordance with Schedule 4 of the Grant Agreement).
- Disclosed information related to results of environmental and social monitoring to local stakeholders (whenever applicable).

3: Operation and Maintenance (O&M)

3-1 Physical Arrangement

- Plan for O&M (number and skills of the staff in the responsible division or section, availability of manuals and guidelines, availability of spareparts, etc.)

Original (at the time of outline design)
Actual (PMR)

3-2 Budgetary Arrangement

- Required O&M cost and actual budget allocation for O&M

Original (at the time of outline design)

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Actual (PMR)

4: Potential Risks and Mitigation Measures

- Potential risks which may affect the project implementation, attainment of objectives, sustainability
- Mitigation measures corresponding to the potential risks

Assessment of Potential Risks (at the time of outline design)

Potential Risks	Assessment
1. (Description of Risk)	Probability: High/Moderate/Low
	Impact: High/Moderate/Low
	Analysis of Probability and Impact:
	Mitigation Measures:
	Action required during the implementation stage:
2. (Description of Risk)	Probability: High/Moderate/Low
	Impact: High/Moderate/Low
	Analysis of Probability and Impact:
	Mitigation Measures:
	Action required during the implementation stage:
3. (Description of Risk)	Probability: High/Moderate/Low
	Impact: High/Moderate/Low
	Analysis of Probability and Impact:
	Mitigation Measures:
	Action required during the implementation stage:

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	Contingency Plan (if applicable):
Actual Situation and Countermeasures (PMR)	

5: Evaluation and Monitoring Plan (after the work completion)

5-1 Overall evaluation

Please describe your overall evaluation on the project.

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5-2 Lessons Learnt and Recommendations

Please raise any lessons learned from the project experience, which might be valuable for the future assistance or similar type of projects, as well as any recommendations, which might be beneficial for better realization of the project effect, impact and assurance of sustainability.

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5-3 Monitoring Plan of the Indicators for Post-Evaluation

Please describe monitoring methods, section(s)/department(s) in charge of monitoring, frequency, the term to monitor the indicators stipulated in 1-3.

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Attachment

1. Project Location Map
2. Specific obligations of the Recipient which will not be funded with the Grant
3. Monthly Report submitted by the Consultant
- Appendix - Photocopy of Contractor's Progress Report (if any)
 - Consultant Member List
 - Contractor's Main Staff List
4. Check list for the Contract (including Record of Amendment of the Contract/Agreement and Schedule of Payment)
5. Environmental Monitoring Form / Social Monitoring Form
6. Monitoring sheet on price of specified materials (Quarterly)
7. Report on Proportion of Procurement (Recipient Country, Japan and Third Countries) (PMR (final) only)
8. Pictures (by JPEG style by CD-R) (PMR (final) only)
9. Equipment List (PMR (final) only)
10. Drawing (PMR (final) only)
11. Report on RD (After project)

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1. Initial Conditions (Confirmed)

Items of Specified Materials		Initial Volume A	Initial Unit Price (¥) B	Initial total Price C=A×B	1% of Contract Price D	Condition of payment	
						Price (Decreased) E=C-D	Price (Increased) F=C+D
1	Item 1.	●●t	●	●	●	●	●
2	Item 2	●●t	●	●	●		
3	Item 3						
4	Item 4						
5	Item 5						

2. Monitoring of the Unit Price of Specified Materials

(1) Method of Monitoring : ●●

(2) Result of the Monitoring Survey on Unit Price for each specified materials

Items of Specified Materials		1st month, 2015	2nd month, 2015	3rd month, 2015	4th	5th	6th
1	Item 1						
2	Item 2						
3	Item 3						
4	Item 4						
5	Item 5						

(3) Summary of Discussion with Contractor (if necessary)

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Report on Proportion of Procurement (Recipient Country, Japan and Third Countries)
(Actual Expenditure by Construction and Equipment each)

	Domestic Procurement (Recipient Country) A	Foreign Procurement (Japan) B	Foreign Procurement (Third Countries) C	Total D
Construction Cost	(A/D%)	(B/D%)	(C/D%)	
Direct Construction Cost	(A/D%)	(B/D%)	(C/D%)	
others	(A/D%)	(B/D%)	(C/D%)	
Equipment Cost	(A/D%)	(B/D%)	(C/D%)	
Design and Supervision Cost	(A/D%)	(B/D%)	(C/D%)	
Total	(A/D%)	(B/D%)	(C/D%)	

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Major Undertakings to be taken by the Government of Kenya

1. Specific obligations of the Government of Kenya which will not be funded with the Grant**(1) Before the Tender**

NO	Items	Deadline	In charge	Estimated Cost	Ref.
1	To sign the banking arrangement (B/A) with a bank in Japan (the Agent Bank) to open bank account for the Grant	within 1 month after the signing of the G/A	KEMRI	Nil	
2	To issue A/P to the Agent Bank for the payment to the consultant	within 1 month after the signing of the contract(s)	KEMRI		
3	To bear the following commissions to the Agent Bank for the banking services based upon B/A				
	1) Advising commission of A/P	within 1 month after the signing of the contract(s)	KEMRI		
	2) Payment commission for A/P	every payment	KEMRI		
4	To approve IEE/EIA(Conditions of approval should be fulfilled, if any) and secure the necessary budget for implementation for EMP and EMoP (and fulfilling conditions of approval, if any).	within 1 month after the signing of the G/A	KEMRI		
5	To secure the necessary budget and implement land acquisition and resettlement (including preparation of resettlement sites), and compensation with full replacement cost in accordance with RAP	before notice of the bidding documents	KEMRI		
6	To secure and clear the following lands	before notice of the bidding documents	KEMRI		
	1) project sites for Multi Laboratory Facility				
7	To obtain the planning, zoning, building permit	before notice of the bidding documents	KEMRI		
8	To clear the following sites	before notice of the bidding documents	KEMRI		
	1) existing facilities (including buildings A, B, C and D shown in Annex 1)				
	2) trees shown in Annex 1)				
9	To submit Project Monitoring Report (with the result of Detailed Design)	before preparation of the bidding documents	KEMRI		

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(2) During the Project Implementation

NO	Items	Deadline	In charge	Estimated Cost	Ref.
1	To issue A/P to the Agent Bank for the payment to the supplier and the contractor	within 1 month after the signing of the contract(s)	KEMRI		
2	To bear the following commissions to the Agent Bank for the banking services based upon the B/A				
	1) Advising commission of A/P	within 1 month after the signing of the contract(s)	KEMRI		
	2) Payment commission for A/P	every payment	KEMRI		
3	to ensure prompt unloading and customs clearance at ports of disembarkation in the country of the Recipient and to assist the Supplier(s) with internal transportation therein	during the Project	KEMRI		
4	To accord Japanese physical persons and/or physical persons of third countries whose services may be required in connection with the supply of the products and the services such facilities as may be necessary for their entry into the country of the Recipient and stay therein for the performance of their work	during the Project	KEMRI		
5	To ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the country of the Recipient with respect to the purchase of the products and/or the services be exempted as follows, - Custom duty - Corporation tax - Income tax The following shall be borne by its designated authority without using the Grant] - Value Added Tax (VAT)	during the Project	KEMRI		
6	To bear all the expenses, other than those covered by the Grant, necessary for the implementation of the Project	during the Project	KEMRI		
7	To notify JICA promptly of any incident or accident, which has, or is likely to have, a significant adverse effect on the environment, the affected communities, the public or workers.	during the construction	KEMRI		
8	To submit Project Monitoring Report				
	1) To submit Project Monitoring Report	every month	KEMRI		
	2) To submit Project Monitoring Report (final) (including as-built drawings, equipment list, photographs, etc.)	within 1 month after issuance of Certificate of Completion for the works under the contract(s)	KEMRI		
9	To submit a report concerning completion of the Project	within 6 months after completion of the Project	KEMRI		
10	To provide facilities for distribution of electricity, water supply and drainage and other incidental facilities necessary for the implementation of the Project outside the site(s)				
	1) Electricity The distributing line to the facility	before start of the construction	KEMRI		
	2) Water Supply The city water distribution main to the facility	before start of the construction	KEMRI		

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	3) Drainage The city drainage main (for storm, sewer and others) to the facility	6 months before completion of the construction	KEMRI		
11	To provide equipment, furniture, facilities necessary for the implementation of the Project in the site(s)	during the Project	KEMRI		
12	To ensure the safety of persons engaged in the implementation of the Project	during the Project	KEMRI		
13	To take necessary measures for security and safety of the Project site (measures for security) 1)Security facilities 2)Deployment of security guard at the Project site 3)Proper gate control of the Project site (measures for safety) 4) maintaining the safety of workers and the general public by thorough implementation of safety measures and immediate action in the case of accident 5)installation of fences around the site(s)	during the construction	KEMRI		
14	To implement EMP and EMoP	during the construction	KEMRI		
15	To submit results of environmental monitoring to JICA, by using the monitoring form, on a quarterly basis as a part of Project Monitoring Report	during the construction	KEMRI		

(3) After the Project

NO	Items	Deadline	In charge	Estimated Cost	Ref.
1	To implement EMP and EMoP	for a period based on EMP and EMoP	KEMRI		
2	To submit results of environmental monitoring to JICA, by using the monitoring form, semiannually - The period of environmental monitoring may be extended if any significant negative impacts on the environment are found. The extension of environmental monitoring will be decided based on the agreement between KEMRI and JICA.	for 3 years after the Project	KEMRI		
3	To maintain and use properly and effectively the facilities constructed and equipment provided under the Grant Aid 1) Allocation of maintenance cost 2) Operation and maintenance structure Routine check/Periodic inspection	After completion of the construction	KEMRI		

Minutes of Discussions
on the Preparatory Survey for the Project for
Strengthening the Research Capacity of Kenya Medical Research Institute
(Explanation on Draft Preparatory Survey Report)

With reference to the minutes of discussions signed between Kenya Medical Research Institute (hereinafter referred to as "KEMRI") and the Japan International Cooperation Agency (hereinafter referred to as "JICA") on 27th January, 2022 and in response to the request from the Government of the Republic of Kenya (hereinafter referred to as "Kenya") dated 21st June, 2022, JICA dispatched the Preparatory Survey Team (hereinafter referred to as "the Team") for the explanation of Draft Preparatory Survey Report (hereinafter referred to as "the Draft Report") for the Project for Strengthening the Research Capacity of Kenya Medical Research Institute (hereinafter referred to as "the Project").

As a result of the discussions, both sides agreed on the main items described in the attached sheets.

Nairobi, 28th July, 2022



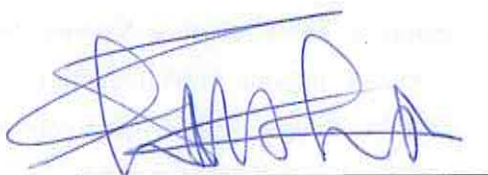
Ms. Ito Miwa

Leader

Preparatory Survey Team

Japan International Cooperation Agency

Japan



Prof. Sam Kariuki

Director General & CEO

Kenya Medical Research Institute

The Republic of Kenya

ATTACHEMENT

1. Objective of the Project

The objective of the Project is to strengthen the research capacity of KEMRI for infectious diseases including COVID-19 by constructing additional laboratories at KEMRI and providing equipment for those laboratories, thereby contributing to strengthening capacity for response to health crises in Kenya and East Africa.

2. Title of the Preparatory Survey

Both sides confirmed the title of the Preparatory Survey as “the Preparatory Survey for the Project for Strengthening the Research Capacity of Kenya Medical Research Institute”.

3. Project site

Both sides confirmed that the site of the Project is on the grounds of KEMRI, as shown in Annex 1.

4. Responsible authority for the Project

Both sides confirmed the authorities responsible for the Project are as follows:

4-1. KEMRI will be the executing agency for the Project (hereinafter referred to as “the Executing Agency”). The Executing Agency shall coordinate with all the relevant authorities to ensure smooth implementation of the Project and ensure that the undertakings for the Project shall be taken care by relevant authorities properly and on time. The organization charts are shown in Annex 2.

4-2. The line ministry of the Executing Agency is the Ministry of Health. The Ministry of Health shall be responsible for supervising the Executing Agency on behalf of the Government of Kenya.

5. Contents of the Draft Report

After the explanation of the contents of the Draft Report by the Team, the Kenyan side agreed to its contents. JICA will finalize the Preparatory Survey Report based on the confirmed items. The final report will be sent to the Kenyan side around December 2022.

6. Cost estimate

Both sides confirmed that the cost estimate including the contingency explained by

the Team is provisional and will be examined further by the Government of Japan for its approval. The contingency would cover the additional cost against natural disaster, unexpected natural conditions, etc.

7. Confidentiality of the cost estimate and technical specifications

Both sides confirmed that the cost estimate and technical specifications of the Project should never be disclosed to any third parties until all the contracts under the Project are concluded.

8. Timeline for the project implementation

The Team explained to the Kenyan side that the expected timeline for the project implementation is as attached in Annex 3 .

9. Expected outcomes and indicators

Both sides agreed that key indicators for expected outcomes are indicated in the following table. The Kenyan side will be responsible for the achievement of agreed key indicators targeted in year 2028 and shall monitor the progress for Ex-Post Evaluation based on those indicators.

[Quantitative indicators]

Quantitative Indicators	Value of indicators		Target value (FY 2028) (3 years later of completion of the Project)
	Year of baseline	Baseline value	
The number of research projects using BSL3 laboratories (per year)	2022	4 projects	Planned value by KEMRI 10 projects
The number of newly introduced research methods and/or techniques out of those made possible by the inputs of the Project below. ① Preclinical studies by animal experiments in BSL3 laboratory ② Pathophysiological studies for BSL3 pathogens by animal experiments ③ Development of new candidate markers for vaccine and diagnosis agents against high risk pathogen ④ Microbiological and immunological basic researches in low temperature setting ⑤ De novo assembly	2022	0/5 methods and/or techniques	Planned value by KEMRI 5/5 methods and/or techniques

[Qualitative indicators]

- 1) Advanced surveillance of infectious disease trends with molecular epidemiological techniques utilizing the BSL laboratories is being performed.
- 2) The virtual laboratory is being used for nurturing personnel and academic



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exchange with sufficient capacity for responding to outbreaks of infectious diseases and pandemics.

10. Ex-Post Evaluation

JICA will conduct ex-post evaluation after three (3) years from the project completion, in principle, with respect to six evaluation criteria (Relevance, Coherence, Effectiveness, Efficiency, Impact, Sustainability). The result of the evaluation will be publicized. The Kenyan side is required to provide necessary support for the data collection.

11. Technical assistance ("Soft Component" of the Project)

Considering the sustainable operation and maintenance of the products and services granted through the Project, the following technical assistance is planned under the Project. The Kenyan side confirmed to deploy necessary number of counterparts who are appropriate and competent in terms of its purpose of the technical assistance as described in the Draft Report.

- 1) Operation and maintenance for air conditioning, ventilation, negative pressure equipment for the BSL2 and BSL3 laboratories
- 2) Operation and maintenance for the infectious medical effluent treatment facilities for the BSL2 and BSL3 laboratories
- 3) Operation and maintenance for the double door autoclave for the BSL3 laboratories

12. Undertakings of the Project

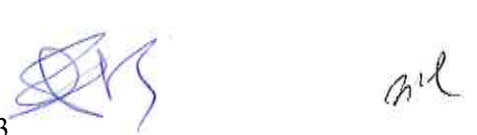
1) Necessary budget for the Project

The Kenyan side assured to take the necessary measures and coordination including allocation of the necessary budget which are preconditions of implementation of the Project. It is further agreed that the costs are indicative, i.e. at Outline Design level. More accurate costs will be calculated at the Detailed Design stage.

Both sides also confirmed that the Annex 4 (major undertakings by the Government of Kenya) will be used as an attachment of the Grant Agreement (G/A).

2) Tax exemption issue

Both sides confirmed the undertakings of the Project as described in Annex 4. With regard to exemption of customs duties, internal taxes and other fiscal levies as stipulated in 1. (2) 5 of Annex 4, both sides confirmed that such customs duties, internal taxes and other fiscal levies shall be clarified in the bid documents by



KEMRI during the implementation stage of the Project.

JICA explained that the tax exemption issue for corporate tax and income tax is being discussed between the Governments of Japan and the Government of Kenya, and is expected to be concluded by the end of August 2022 in order for the Project to be approved by the cabinet of the Japanese Government on the anticipated schedule. And both sides confirmed to review the situation of the tax exemption issue before proceeding to the next step.

If the cabinet approval of the Japanese Government is postponed, the cost estimation will be reconsidered and possibly component revisions may be made, because there is a risk of cost fluctuation/rising.

13. Change of Scope

The project cost could increase depending on the foreign exchange rate being used for the cabinet approval. Considering such a case, both sides agreed with the possible reduction options for facilities and equipment as indicated in Annex 5. And both sides confirmed that KEMRI would secure the budget and procure the equipment that shall be deleted from the Project, in order to maximize the project outcome. The scope will be finalized in accordance with the project cost approved by the Japanese Government, based on the Annex 5.

14. Monitoring during the implementation

The Project will be monitored by the Executing Agency and reported to JICA by using the form of Project Monitoring Report (PMR) attached as Annex 6. The timing of submission of the PMR is described in Annex 4.

15. Project completion

Both sides confirmed that the project completes when all the facilities constructed and equipment procured by the Grant are in operation. The completion of the Project will be reported to JICA promptly by the Executing Agency, but in any event not later than six months after completion of the Project.

16. Environmental and Social Considerations

16-1 General Issues

16-1-1 Environmental Guidelines and Environmental Category

The Team explained that 'JICA Guidelines for Environmental and Social Considerations (April 2010)' (hereinafter referred to as "the Guidelines") is



applicable for the Project. The Project is categorized as B because the Project is not located in a sensitive area, nor has sensitive characteristics, nor falls into sensitive sectors under the JICA guidelines for environmental and social considerations (April 2010), and its potential adverse impacts on the environment are not likely to be significant.

16-1-2 Environmental Checklist

The environmental and social considerations including major impacts and mitigation measures for the Project are summarized in the Environmental Checklist attached as Annex 7. Both sides confirmed that in case of major modification of the content of the Environmental Checklist, the Kenyan side shall submit the modified version to JICA in a timely manner.

16-2 Environmental Issues

16-2-1 Environmental Impact Assessment (EIA)

Both sides confirmed that the EIA report prepared by KEMRI will be approved by National Environment Management Authority (NEMA) in November, 2022.

16-2-2 Environmental Management Plan and Environmental Monitoring Plan

Both sides confirmed Environmental Management Plan (EMP) and Environmental Monitoring Plan (EMoP) of the Project is as Annex 8, respectively. Both side agreed that environmental mitigation measures and monitoring shall be conducted based on the EMP and EMoP, which may be updated during the detailed design stage.

16-3 Environmental Monitoring

16-3-1 Environmental Monitoring

Both sides agreed that the Kenyan side will submit results of environmental monitoring to JICA with PMR by using the monitoring form attached as Annex 9. The timing of submission of the monitoring form is described in Annex 4.

16-3-2 Information Disclosure of Monitoring Results

Both sides confirmed that the Kenyan side will disclose results of environmental monitoring to local stakeholders through their website / in their field offices.

The Kenyan side agreed JICA will disclose results of environmental monitoring submitted by the Kenyan side as the monitoring forms attached as Annex 9 on its website.

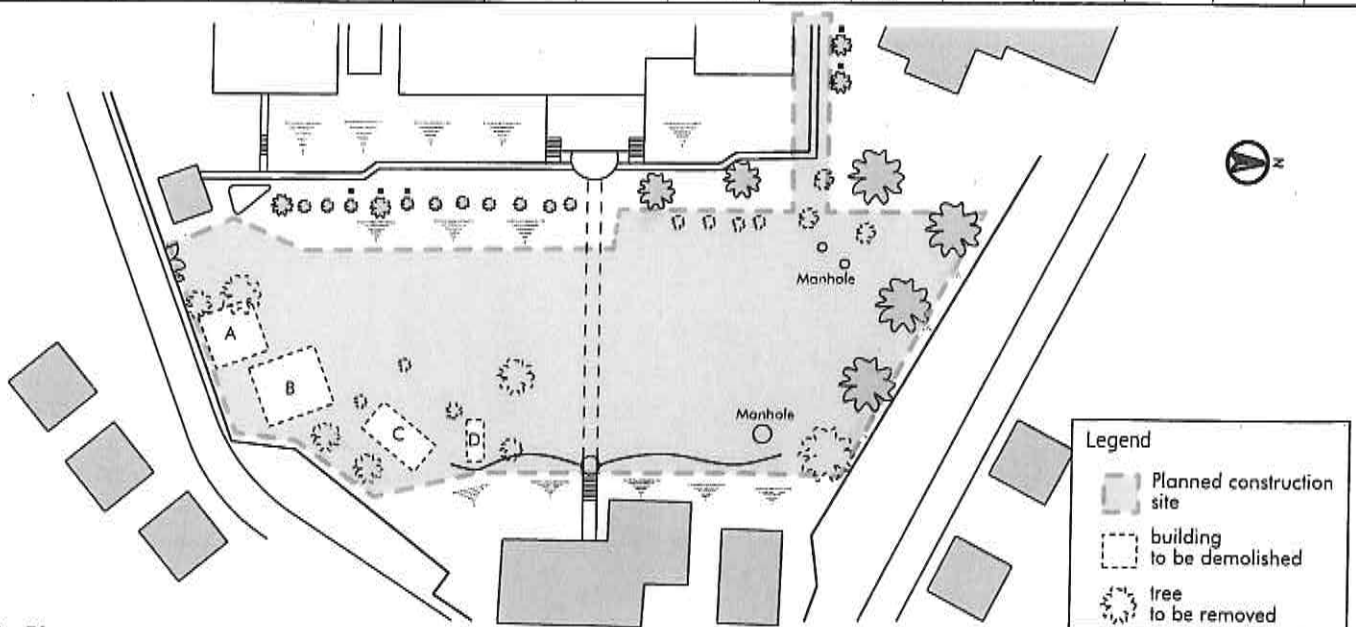
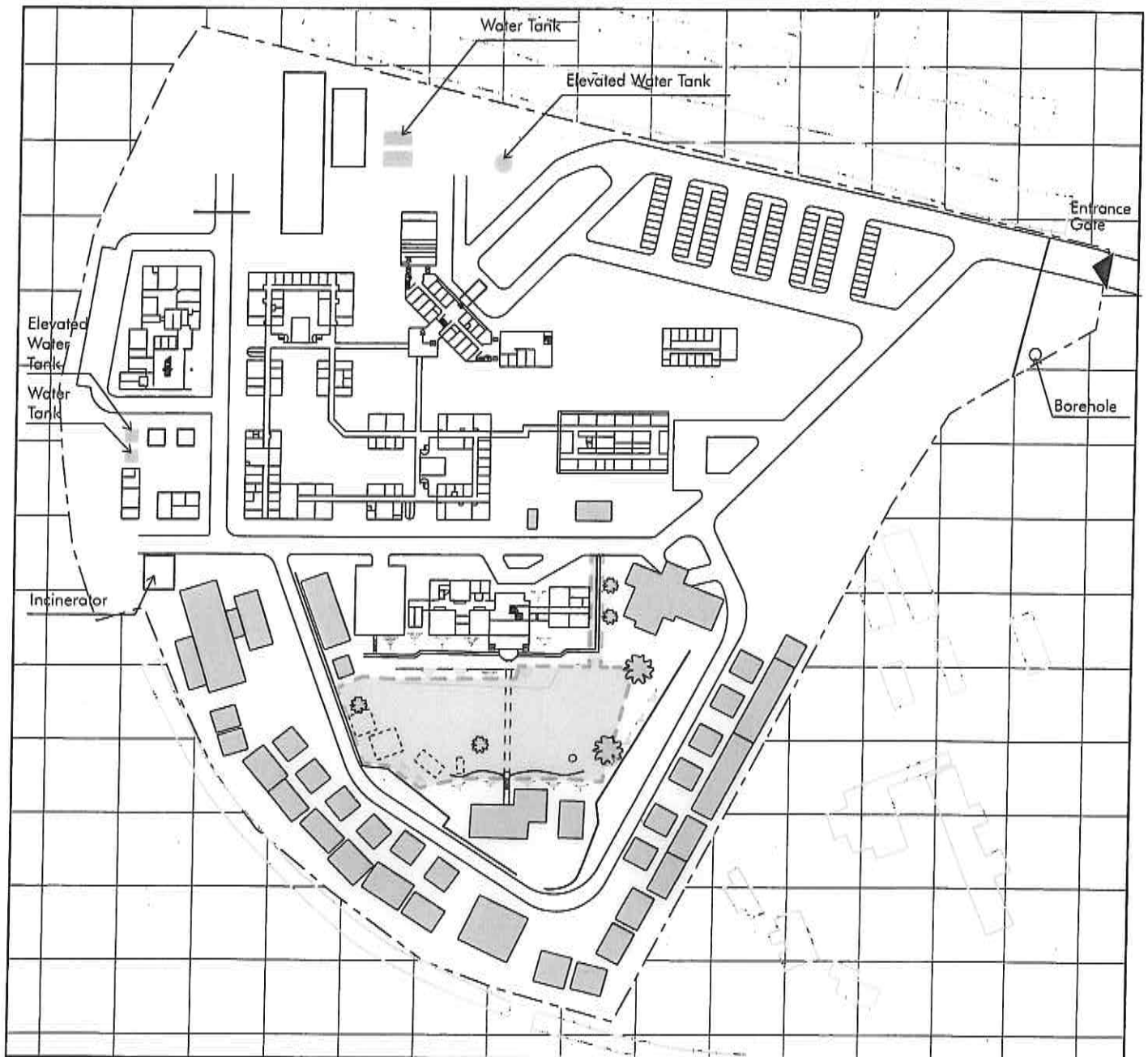
Other Relevant Issues

17-1. Disclosure of Information

Both sides confirmed that the Preparatory Survey Report from which project cost is excluded will be disclosed to the public after completion of the Preparatory Survey. The comprehensive report including the project cost will be disclosed to the public after all the contracts under the Project are concluded.

Annex 1 Project Site
Annex 2 Organization Chart
Annex 3 Project Implementation Schedule
Annex 4 Major Undertakings to be taken by the Government of Kenya
Annex 5 Possible Reduction Option
Annex 6 Project Monitoring Report (template)
Annex 7 Environmental Check List
Annex 8 Environmental Management Plan/Environmental Monitoring Plan
Annex 9 Environmental and Social Monitoring Form

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Site Plan

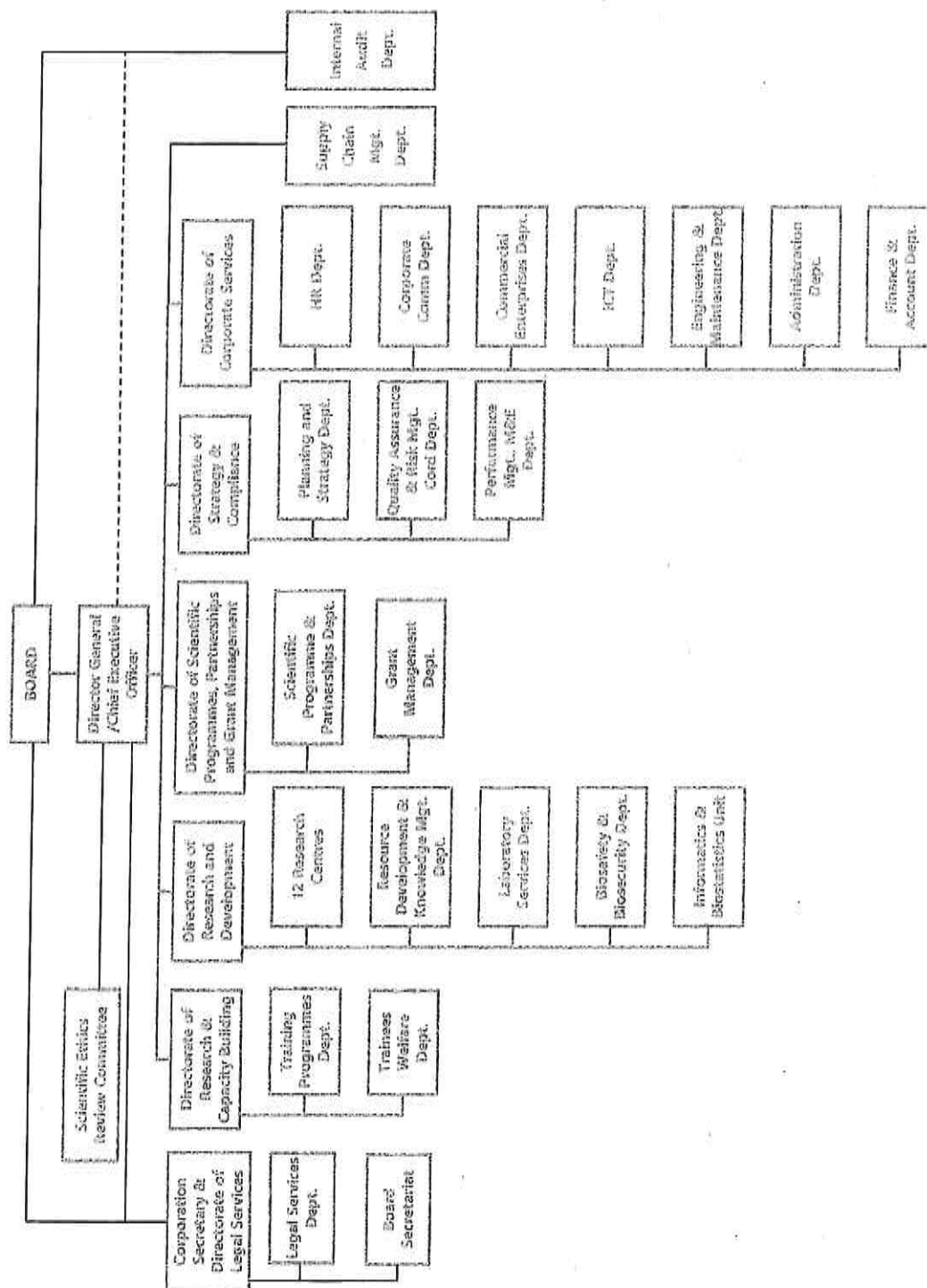
Preparatory Survey

The Project for Strengthening the Research Capacity of Kenya Medical Research Institute

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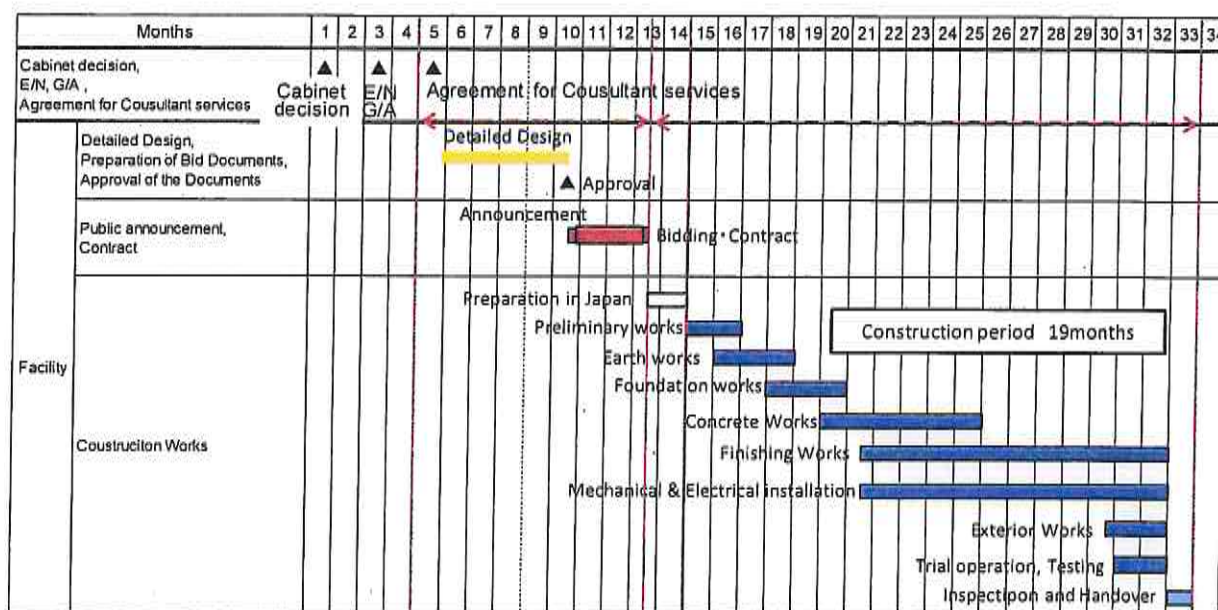
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Annex 2 Organization Chart



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Project Implementation Schedule



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Major Undertakings to be taken by the Government of Kenya

1. Specific obligations of the Government of Kenya which will not be funded with the Grant

(1) Before the Tender

NO	Items	Deadline	In charge	Estimated Cost	Ref.
1	To sign the banking arrangement (B/A) with a bank in Japan (the Agent Bank) to open bank account for the Grant	within 1 month after the signing of the G/A	KEMRI	N/A	
2	To issue A/P to the Agent Bank for the payment to the consultant	within 1 month after the signing of the contract(s)	KEMRI	N/A	
3	To bear the following commissions to the Agent Bank for the banking services based upon B/A				
	1) Advising commission of A/P	within 1 month after the signing of the contract(s)	KEMRI	KES 3,000,000	
	2) Payment commission for A/P	every payment	KEMRI	KES 63,000	
4	To approve IEE/EIA (Conditions of approval should be fulfilled, if any) and secure the necessary budget for implementation for EMP and EMoP (and fulfilling conditions of approval, if any).	November 2022	KEMRI	KES 3,000,000	
5	To secure the necessary budget and implement land acquisition and resettlement (including preparation of resettlement sites), and compensation with full replacement cost in accordance with RAP	before notice of the bidding documents	KEMRI	N/A	
6	To secure and clear the following lands	before notice of the bidding documents	KEMRI	N/A	
	1) project sites for Multi Laboratory Facility				
7	To obtain the planning, zoning, building permit	before notice of the bidding documents	KEMRI	KES 676,000	
8	To clear the following sites	before notice of the bidding documents	KEMRI	KES 1,750,000	
	1) existing facilities (including buildings A, B, C and D shown in Annex 1)				
	2) trees shown in Annex 1)				
9	To submit Project Monitoring Report (with the result of Detailed Design)	before preparation of the bidding documents	KEMRI	N/A	

(2) During the Project Implementation

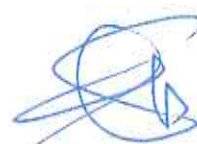
NO	Items	Deadline	In charge	Estimated Cost	Ref.
1	To issue A/P to the Agent Bank for the payment to the supplier and the contractor	within 1 month after the signing of the contract(s)	KEMRI	N/A	
2	To bear the following commissions to the Agent Bank for the banking services based upon the B/A				
	1) Advising commission of A/P	within 1 month after the signing of the contract(s)	KEMRI	KES 3,000,000	
	2) Payment commission for A/P	every payment	KEMRI	KES	

NO	Items	Deadline	In charge	Estimated Cost	Ref.
				63,000	
3	to ensure prompt unloading and customs clearance at ports of disembarkation in the country of the Recipient and to assist the Supplier(s) with internal transportation therein	during the Project	KEMRI	N/A	
4	To accord Japanese physical persons and/or physical persons of third countries whose services may be required in connection with the supply of the products and the services such facilities as may be necessary for their entry into the country of the Recipient and stay therein for the performance of their work	during the Project	KEMRI	N/A	
5	To ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the country of the Recipient with respect to the purchase of the products and/or the services be exempted. The tax exemption issue for corporate tax and income tax is being discussed between the Governments of Japan and the Government of Kenya, and supposed to be concluded by the end of August 2022 in order for the Project to be approved by the cabinet on the anticipated schedule. If the cabinet approval of the Japanese Government is postponed, the cost estimation will be reconsidered and possibly component revisions may occur, because there is a risk of cost fluctuation/rising.	during the Project	KEMRI	To be confirmed	
6	To bear all the expenses, other than those covered by the Grant, necessary for the implementation of the Project	during the Project	KEMRI	Not determined	
7	To notify JICA promptly of any incident or accident, which has, or is likely to have, a significant adverse effect on the environment, the affected communities, the public or workers.	during the construction	KEMRI	N/A	
8	To submit Project Monitoring Report				
	1) To submit Project Monitoring Report	every month	KEMRI	N/A	
	2) To submit Project Monitoring Report (final) (including as-built drawings, equipment list, photographs, etc.)	within 1 month after issuance of Certificate of Completion for the works under the contract(s)	KEMRI	N/A	
9	To submit a report concerning completion of the Project	within 6 months after completion of the Project	KEMRI	N/A	
10	To provide facilities for distribution of electricity, water supply and drainage and other incidental facilities necessary for the implementation of the Project outside the site(s)				
	1) Electricity The distributing line to the facility	before start of the construction	KEMRI	KES 1,500,000	
	2) Water Supply The city water distribution main to the facility	before start of the construction	KEMRI	KES 1,000,000	

NO	Items	Deadline	In charge	Estimated Cost	Ref.
	3) Drainage The city drainage main (for storm, sewer and others) to the facility	6 months before completion of the construction	KEMRI	N/A	
11	To provide equipment, furniture, facilities necessary for the implementation of the Project in the site(s)	during the Project	KEMRI	KES 2,324,000	
12	To ensure the safety of persons engaged in the implementation of the Project	during the Project	KEMRI	N/A	
13	To take necessary measures for security and safety of the Project site (measures for security) 1)Security facilities 2)Deployment of security guard at the Project site 3)Proper gate control of the Project site (measures for safety) 4) maintaining the safety of workers and the general public by thorough implementation of safety measures and immediate action in the case of accident 5)installation of fences around the site(s)	during the construction	KEMRI	N/A	
14	To implement EMP and EMoP	during the construction	KEMRI	N/A	
15	To submit results of environmental monitoring to JICA, by using the monitoring form, on a quarterly basis as a part of Project Monitoring Report	during the construction	KEMRI	N/A	

(3) After the Project

NO	Items	Deadline	In charge	Estimated Cost	Ref.
1	To implement EMP and EMoP	for a period based on EMP and EMoP	KEMRI	USD 9,500/year	
2	To submit results of environmental monitoring to JICA, by using the monitoring form, semiannually - The period of environmental monitoring may be extended if any significant negative impacts on the environment are found. The extension of environmental monitoring will be decided based on the agreement between KEMRI and JICA.	for 3 years after the Project	KEMRI	N/A	
3	To maintain and use properly and effectively the facilities constructed and equipment provided under the Grant Aid 1) Allocation of maintenance cost 2) Operation and maintenance structure Routine check/Periodic inspection	After completion of the construction	KEMRI	KES 66M/year	



Possible Reduction Option

Facility

- Change in the Specification of Coping
- Change in the Courtyard Floor finishing from Tile to Concrete
- Cancellation of the Perimeter Floor Finishing except the Entrance
- Change in the Main Entrance Ceiling from Aluminium to Rockwool Acoustic Board
- Change in the Parking Lots/Driveway Finishing from Asphalt Concrete to Interlocking Pavement
- Change in the Roof Handrail from Stainless Steel to Concrete

Equipment

- Autoclave, vertical
- Centrifuge, high speed
- Biosafety cabinet A
- Clean bench, tabletop
- Draft chamber
- Electron microscope
- LCMS
- Table A
- Table B
- Chair A
- Chair B



<u>Project Monitoring Report</u> on <u>Project Name</u> Grant Agreement No. <u>XXXXXXXX</u> 20XX, Month
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Organizational Information

Signer of the G/A (Recipient)	Person in Charge (Designation) _____ Contacts _____ Address: _____ Phone/FAX: _____ Email: _____
Executing Agency	Person in Charge (Designation) _____ Contacts _____ Address: _____ Phone/FAX: _____ Email: _____
Line Ministry	Person in Charge (Designation) _____ Contacts _____ Address: _____ Phone/FAX: _____ Email: _____

General Information:

Project Title	
E/N	Signed date: Duration:
G/A	Signed date: Duration:
Source of Finance	Government of Japan: Not exceeding JPY _____ mil. Government of (): _____




1: Project Description

1-1 Project Objective

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1-2 Project Rationale

- Higher-level objectives to which the project contributes (national/regional/sectoral policies and strategies)
- Situation of the target groups to which the project addresses

--

1-3 Indicators for measurement of "Effectiveness"

Quantitative indicators to measure the attainment of project objectives		
Indicators	Original (Yr)	Target (Yr)
Qualitative indicators to measure the attainment of project objectives		

2: Details of the Project

2-1 Location

Components	Original (proposed in the outline design)	Actual
1.		

2-2 Scope of the work

Components	Original* (proposed in the outline design)	Actual*
1.		

Reasons for modification of scope (if any).

(PMR)

--

2-3 Implementation Schedule

Items	Original		Actual
	(proposed in the outline design)	(at the time of signing the Grant Agreement)	

Reasons for any changes of the schedule, and their effects on the project (if any)

--

2-4 Obligations by the Recipient

2-4-1 Progress of Specific Obligations

See Attachment 2.

2-4-2 Activities

See Attachment 3.

2-4-3 Report on RD

See Attachment 11.

2-5 Project Cost

2-5-1 Cost borne by the Grant(Confidential until the Bidding)

Components			Cost (Million Yen)	
	Original (proposed in the outline design)	Actual (in case of any modification)	Original ^{1),2)} (proposed in the outline design)	Actual
	1.			
Total				

Note: 1) Date of estimation:

2) Exchange rate: 1 US Dollar = Yen

2-5-2 Cost borne by the Recipient

Components			Cost (1,000 Taka)	
	Original (proposed in the outline design)	Actual (in case of any modification)	Original ^{1),2)} (proposed in the outline design)	Actual
	1.			



ml

Note: 1) Date of estimation:
2) Exchange rate: 1 US Dollar =

Reasons for the remarkable gaps between the original and actual cost, and the countermeasures (if any)

(PMR)

2-6 Executing Agency

- Organization's role, financial position, capacity, cost recovery etc,
- Organization Chart including the unit in charge of the implementation and number of employees.

Original (at the time of outline design)

name:

role:

financial situation:

institutional and organizational arrangement (organogram):

human resources (number and ability of staff):

Actual (PMR)

2-7 Environmental and Social Impacts

- The results of environmental monitoring based on Attachment 5 (in accordance with Schedule 4 of the Grant Agreement).
- The results of social monitoring based on in Attachment 5 (in accordance with Schedule 4 of the Grant Agreement).
- Disclosed information related to results of environmental and social monitoring to local stakeholders (whenever applicable).

3: Operation and Maintenance (O&M)

3-1 Physical Arrangement

- Plan for O&M (number and skills of the staff in the responsible division or section, availability of manuals and guidelines, availability of spareparts, etc.)

Original (at the time of outline design)

Actual (PMR)

3-2 Budgetary Arrangement

- Required O&M cost and actual budget allocation for O&M

Original (at the time of outline design)



Actual (PMR)

4: Potential Risks and Mitigation Measures

- Potential risks which may affect the project implementation, attainment of objectives, sustainability
- Mitigation measures corresponding to the potential risks

Assessment of Potential Risks (at the time of outline design)

Potential Risks	Assessment
1. (Description of Risk)	Probability: High/Moderate/Low
	Impact: High/Moderate/Low
	Analysis of Probability and Impact:
	Mitigation Measures:
	Action required during the implementation stage:
2. (Description of Risk)	Probability: High/Moderate/Low
	Impact: High/Moderate/Low
	Analysis of Probability and Impact:
	Mitigation Measures:
	Action required during the implementation stage:
3. (Description of Risk)	Probability: High/Moderate/Low
	Impact: High/Moderate/Low
	Analysis of Probability and Impact:
	Mitigation Measures:
	Action required during the implementation stage:

	Contingency Plan (if applicable):
Actual Situation and Countermeasures (PMR)	

5: Evaluation and Monitoring Plan (after the work completion)

5-1 Overall evaluation

Please describe your overall evaluation on the project.

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5-2 Lessons Learnt and Recommendations

Please raise any lessons learned from the project experience, which might be valuable for the future assistance or similar type of projects, as well as any recommendations, which might be beneficial for better realization of the project effect, impact and assurance of sustainability.

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5-3 Monitoring Plan of the Indicators for Post-Evaluation

Please describe monitoring methods, section(s)/department(s) in charge of monitoring, frequency, the term to monitor the indicators stipulated in 1-3.

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Attachment

1. Project Location Map
 2. Specific obligations of the Recipient which will not be funded with the Grant
 3. Monthly Report submitted by the Consultant
- Appendix - Photocopy of Contractor's Progress Report (if any)
- Consultant Member List
 - Contractor's Main Staff List
4. Check list for the Contract (including Record of Amendment of the Contract/ Agreement and Schedule of Payment)
 5. Environmental Monitoring Form / Social Monitoring Form
 6. Monitoring sheet on price of specified materials (Quarterly)
 7. Report on Proportion of Procurement (Recipient Country, Japan and Third Countries) (PMR (final) only)
 8. Pictures (by JPEG style by CD-R) (PMR (final) only)
 9. Equipment List (PMR (final) only)
 10. Drawing (PMR (final) only)
 11. Report on RD (After project)




Monitoring sheet on price of specified materials

1. Initial Conditions (Confirmed)

Items of Specified Materials	Initial Volume A	Initial Unit Price (¥) B	Initial total Price C=A×B	1% of Contract Price D	Condition of payment Price (Decreased) E=C-D	Price (Increased) F=C+D
Item 1	●●t	●	●	●	●	●
Item 2	●●t	●	●	●		
Item 3						
Item 4						
Item 5						

2. Monitoring of the Unit Price of Specified Materials

(1) Method of Monitoring : ●●

(2) Result of the Monitoring Survey on Unit Price for each specified materials

Items of Specified Materials	1st month, 2015	2nd month, 2015	3rd month, 2015	4th	5th	6th
Item 1	●	●	●			
Item 2						
Item 3						
Item 4						
Item 5						

(3) Summary of Discussion with Contractor (if necessary)

Report on Proportion of Procurement (Recipient Country, Japan and Third Countries)
(Actual Expenditure by Construction and Equipment each)

	Domestic Procurement (Recipient Country) A	Foreign Procurement (Japan) B	Foreign Procurement (Third Countries) C	Total D
Construction Cost	(A/D%)	(B/D%)	(C/D%)	
Direct Construction Cost	(A/D%)	(B/D%)	(C/D%)	
others	(A/D%)	(B/D%)	(C/D%)	
Equipment Cost	(A/D%)	(B/D%)	(C/D%)	
Design and Supervision Cost	(A/D%)	(B/D%)	(C/D%)	
Total	(A/D%)	(B/D%)	(C/D%)	



Annex 7. Environmental Check List

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
1 Permits and Explanation	(1) EIA and Environmental Permits	(a) Have EIA reports been already prepared in official process? (b) Have EIA reports been approved by authorities of the host country's government? (c) Have EIA reports been unconditionally approved? If conditions are imposed on the approval of EIA reports, are the conditions satisfied? (d) In addition to the above approvals, have other required environmental permits been obtained from the appropriate regulatory authorities of the host country's government?	(a) N (b) N (c) N (d) N	(a) Not completed as of 25 July 2022. Scheduled to be completed by 31 July 2022. (b) After submitting the ESIA report and project cost estimation documents to NEMA and paying a fee of 0.1% of the project cost, the approval procedure will be carried out. About 6 weeks is a guideline for approval procedures. (c) It will become clear after the NEMA's review of the ESIA report. (d) No other approvals related to the environmental and social considerations will be likely required under the assumption that KEMRI holds appropriate licenses / permits for wastewater treatment equipment and onsite incinerator.
	(2) Explanation to the Local Stakeholders	(a) Have contents of the project and the potential impacts been adequately explained to the local stakeholders based on appropriate procedures, including information disclosure? Is understanding obtained from the local stakeholders? (b) Have the comment from the stakeholders (such as local residents) been reflected to the project design?	(a) Y (b) Y	(a) In Kenya, a qualified environmental and social consideration consultant (certified by NEMA) commissioned by the project implementation organization holds stakeholder meetings, and it was reported that the understanding was obtained from the local stakeholders. (b) There were no significant comments on the environmental and social impacts that would require changes to the project. Other comments were reflected in the EMP and EMoP.
	(3) Examination of Alternatives	(a) Have alternative plans of the project been examined with social and environmental considerations?	(a) Y	(a) Multiple alternatives were considered including a zero option.
2 Pollution Control	(1) Air Quality	(a) Do air pollutants, (such as sulfur oxides (SOx), nitrogen oxides (NOx), and soot and dust) emitted from the proposed infrastructure facilities and ancillary facilities comply with the country's emission standards and ambient air quality standards? Are any mitigating measures taken? (b) Are electric and heat source at accommodation used fuel which emission factor is low?	(a) Y (b) N	(a) Air pollutants emitted from the research facility comply with the country's emission standards and ambient air quality. During the operational phase, laboratory exhaust will be filtered by HEPA filter. (b) Electricity is used as the power source and heat source, and no power generation is planned at the laboratory facilities.
	(2) Water Quality	(a) Do effluents or leachates from various facilities, such as infrastructure facilities and the ancillary facilities comply with the country's effluent standards and ambient water quality standards?	(a) Y	(a) Wastewater from the research facility is sterilized under high pressure and neutralized before being discharged into public sewage. Environmental audit is understood to be conducted every year. General miscellaneous wastewater is discharged directly into public sewage.
	(3) Wastes	(a) Are wastes from the infrastructure facilities and ancillary facilities properly treated and disposed of in accordance with the country's regulations?	(a) Y	(a) Waste from the research facility is treated at the onsite incinerator. Environmental audit is understood to be conducted every year. Audit items include analysis of incinerator ash and exhaust gas.
	(4) Soil Contamination	(a) Are adequate measures taken to prevent contamination of soil and groundwater by the effluents or leachates from the infrastructure facilities and the ancillary facilities?	(a) Y	(a) Wastewater from the research facility is sterilized under high pressure and discharged into public sewage. Environmental audit will be conducted by NEMA every year.

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
3 Natural Environment	(5) Noise and Vibration	(a) Do noise and vibrations comply with the country's standards?	(a) Y	(a) Noise and vibrations comply with the country's standards. During the construction, the noise and vibration will unlikely be serious. No noise or vibration effects during operation are expected.
	(6) Subsidence	(a) In the case of extraction of a large volume of groundwater, is there a possibility that the extraction of groundwater will cause subsidence?	(a) N	(a) No extreme use of groundwater is expected for this project. Thus, the subsidence is not anticipated.
	(7) Odor	(a) Are there any odor sources? Are adequate odor control measures taken?	(a) N	(a) No odor sources were identified.
	(1) Protected Areas	(a) Is the project site or discharge area located in protected areas designated by the country's laws or international treaties and conventions? Is there a possibility that the project will affect the protected areas?	(a) N	(a) The project site or discharge area is not located in protected areas designated by the country's laws or international treaties and conventions. There is highly unlikely that the project will affect the protected areas.
	(2) Ecosystem	(a) Does the project site encompass primeval forests, tropical rain forests, ecologically valuable habitats (e.g., coral reefs, mangroves, or tidal flats)? (b) Does the project site encompass the protected habitats of endangered species designated by the country's laws or international treaties and conventions? (c) Is there a possibility that changes in localized micro-meteorological conditions, such as solar radiation, temperature, and humidity due to a large-scale timber harvesting will affect the surrounding vegetation? (d) Is there a possibility that the amount of water (e.g., surface water, groundwater) used by the project will adversely affect aquatic environments, such as rivers? Are adequate measures taken to reduce the impacts on aquatic environments, such as aquatic organisms?	(a) N (b) N (c) N (d) N	(a) - (d) The project site is located within the existing medical research institute premises surrounded by urbanized areas.
	(3) Hydrology	(a) Is there a possibility that hydrologic changes due to the project will adversely affect surface water and groundwater flows?	(a) N	(a) This project will not bring any changes in the water system at the site.
	(4) Topography and Geology	(a) Is there a possibility the project will cause large-scale alteration of the topographic features and geologic structures in the project site and surrounding areas?	(a) N	(a) The topography and geological structure will not be significantly altered by this project.
	(1) Resettlement	(a) Is involuntary resettlement caused by project implementation? If involuntary resettlement is caused, are efforts made to minimize the impacts caused by the resettlement? (b) Is adequate explanation on compensation and resettlement assistance given to affected people prior to resettlement?	(a) N (b) N (c) N (d) N (e) N (f) N	(a) - (f) This project will be held within the existing medical research institute premises. Because of that, there is no resettlement.
4 Social Environment				

Annex 7. Environmental Check List

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
4 Social Environment		(c) Is the resettlement plan, including compensation with full replacement costs, restoration of livelihoods and living standards developed based on socioeconomic studies on resettlement? (d) Is the compensations going to be paid prior to the resettlement? (e) Is the compensation policies prepared in document? (f) Does the resettlement plan pay particular attention to vulnerable groups or people, including women, children, the elderly, people below the poverty line, ethnic minorities, and indigenous peoples? (g) Are agreements with the affected people obtained prior to resettlement? (h) Is the organizational framework established to properly implement resettlement? Are the capacity and budget secured to implement the plan? (i) Are any plans developed to monitor the impacts of resettlement? (j) Is the grievance redress mechanism established?	(g) N (h) N (i) N (j) N	
	(2) Living and Livelihood	(a) Is there a possibility that the project will adversely affect the living conditions of inhabitants? Are adequate measures considered to reduce the impacts, if necessary?	(a) N	(a) There is a no possibility that the project will adversely affect the living conditions of inhabitants.
	(3) Heritage	(a) Is there a possibility that the project will damage the local archaeological, historical, cultural, and religious heritage? Are adequate measures considered to protect these sites in accordance with the country's laws?	(a) N	(a) There is no possibility that the project will damage the local archaeological, historical, cultural, and religious heritage as none of those exists at or near the project site.
	(4) Landscape	(a) Is there a possibility that the project will adversely affect the local landscape? Are necessary measures taken? (b) Is there a possibility that landscape is spoiled by construction of high-rise buildings such as huge hotels?	(a) N (b) N	(a) There is no possibility that the project will adversely affect the local landscape. (b) The research facility in this project is two stories, which can spoil the local landscape.
	(5) Ethnic Minorities and Indigenous Peoples	(a) Are considerations given to reduce impacts on the culture and lifestyle of ethnic minorities and indigenous peoples? (b) Are all of the rights of ethnic minorities and indigenous peoples in relation to land and resources respected?	(a) N (b) N	(a) - (b) There is no negative impacts on the culture and lifestyle of ethnic minorities and indigenous peoples.
	(6) Working Conditions	(a) Is the project proponent not violating any laws and ordinances associated with the working conditions of the country which the project proponent should observe in the project? (b) Are tangible safety considerations in place for individuals involved in the project, such as the installation of safety	(a) N (b) Y (c) Y (d) Y	(a) Project proponent is not violating it. It also plans to observe the relevant Kenyan laws and regulations in the project, too. (b) Tangible safety considerations are planned in the EMP and EMoP of this project. (c) Intangible measures are planned properly in the EMP and EMoP of this project.

Annex 7. Environmental Check List

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
		equipment which prevents industrial accidents, and management of hazardous materials? (c) Are intangible measures being planned and implemented for individuals involved in the project, such as the establishment of a safety and health program, and safety training (including traffic safety and public health) for workers etc.? (d) Are appropriate measures taken to ensure that security guards involved in the project not to violate safety of other individuals involved, or local residents?		(d) Appropriate measures will be taken to ensure that security guards involved in the project will not violate safety of other individuals involved, or local residents.
	(1) Impacts during Construction	(a) Are adequate measures considered to reduce impacts during construction (e.g., noise, vibrations, turbid water, dust, exhaust gases, and wastes)?(b) If construction activities adversely affect the natural environment (ecosystem), are adequate measures considered to reduce impacts?(c) If construction activities adversely affect the social environment, are adequate measures considered to reduce impacts?	(a) Y (b) NA (c) NA	(a) Those measures are included in EMP. (b) This project will highly unlikely cause negative impact to the natural resource and ecosystem. (c) This project will highly unlikely cause negative impact to the social environment.
5 Others	(2) Monitoring	(a) Does the proponent develop and implement monitoring program for the environmental items that are considered to have potential impacts? (b) What are the items, methods and frequencies of the monitoring program? (c) Does the proponent establish an adequate monitoring framework (organization, personnel, equipment, and adequate budget to sustain the monitoring framework)? (d) Are any regulatory requirements pertaining to the monitoring report system identified, such as the format and frequency of reports from the proponent to the regulatory authorities?	(a) Y (b) - (c) Y (d) Y	(a) EMoP will be implemented by the proponent based on Kenya's environmental standards and JICA guidelines. (b) Monitoring items, methods, frequency, etc. are described in the EMoP, but they are based on the Kenyan environment-related standards and JICA guidelines. (c) It is described under EMoP, but the proponent establishes an adequate monitoring framework. (d) The EMoP is based on the Kenyan environment-related standards and JICA guidelines stipulating the format and frequency of reports from the proponent to the regulatory authorities.
6 Note	Reference to Checklist of Other Sectors	(a) Where necessary, pertinent items described in the Roads, Railways and Bridges checklist should also be checked (e.g., projects including access roads to the infrastructure facilities). (b) For projects, such as installation of telecommunication cables, power line towers, and submarine cables, where necessary, pertinent items described in the Power Transmission and Distribution Lines checklists should also be checked.	(a) NA (b) NA	(a) NA (b) NA
	Note on Using Environmental Checklist	(a) If necessary, the impacts to transboundary or global issues should be confirmed (e.g., the project includes factors that may cause problems, such as transboundary waste treatment, acid rain, destruction of the ozone layer, or global warming).	(a) NA	(a) This project will not bring environmental issue for cross border or worldwide.

Note: NA in this table stands for "Not Applicable"

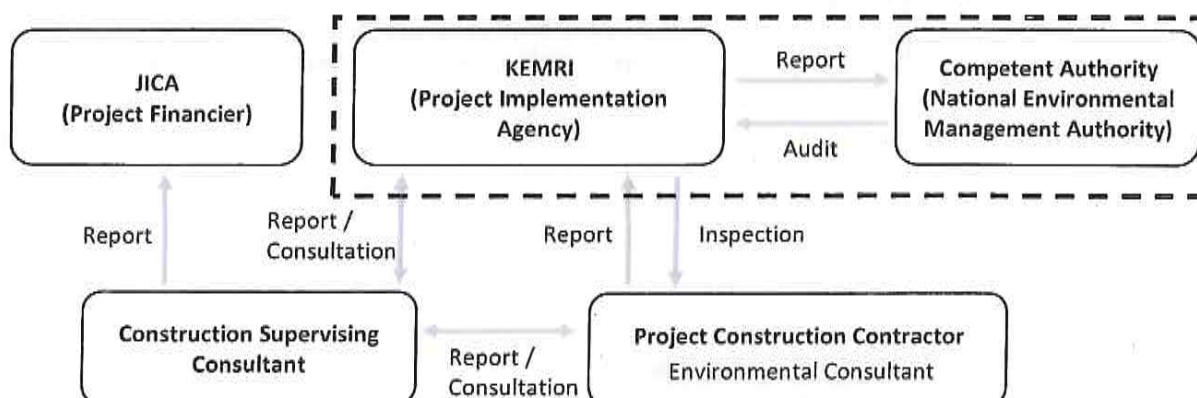
Annex 8 Environmental Management Plan / Environmental Monitoring Program

List of Institutions of Environmental and Social Monitoring Program (Construction Phase)

#	Type of functions / institutions	Name of institution (and/or department)
1	Project implementation Agency (PIA)	KEMRI
2	Project implementation unit for environmental and social management	Division of Health, Safety and Environmental of KEMRI
3	Construction contractor	Project construction contractor (PCC)
4	Construction management	Construction supervising consultant (CSC)
5	Implementation management	Project management consultant (PMC)
6	Environmental management	Environmental consultant (EC)
7	Environmental government agency	National Environmental Management Authority (NEMA)

List of Institutions of Environmental and Social Monitoring Program (Operational Phase)

#	Type of functions / institutions	Name of institution (and/or department)
1	Project implementation Agency (PIA)	KEMRI
2	Project implementation unit for environmental and social management	Division of Health, Safety and Environmental of KEMRI
3	Environmental management	Environmental consultant (EC)
4	Environmental government agency	National Environmental Management Authority (NEMA)



Organizational Chart for Environmental and Social Monitoring Program

(Note: The organizational structure in the dashed box is for the operational phase)

[Signature]

Annex 8 Environmental Management Plan / Environmental Monitoring Program

Roles and Responsibilities of Institutions for Environmental Monitoring Program

Phase	Institution	Role and Responsibility
Before and During Construction Phase	Project Implementing Institutions	
	KEMRI: Project implementation Agency (PIA)	- Overall coordination with all the stakeholders for EMoP. - Supervision of EMoP of Project Construction Contractor (PCC). - Review of environmental monitoring report (EMR) and its submission to NEMA.
	Project management consultant (PMC)	- Supervision of PCC and coordination with environmental consultant (EC). - Preliminary review of EMR.
	Environmental consultant (EC)	- Preparation of EMR after conducting environmental monitoring activities. - Finalization of EMR based on the comments from PIA, PMC and PCC.
	Project Construction Contractor (PCC)	
	Construction firm	- Implementation of EMP and support / facilitation of EMoP for EC. - Weekly / monthly report of all implemented mitigation measures to EC / PMC.
	Government Agency	
	NEMA	- Approval of EIA license (incl. EMP and EMoP) and review of EMR.
Operational Phase (two years)	Project Implementing Institutions	
	KEMRI: Project implementation Agency (PIA)	- Implementation of EMoP through licensed consultant. - Review of environmental monitoring report (EMR) and submission of annual audit reports to NEMA.
	Government Agency	
	NEMA	- Review of EMR and annual audit reports. - Implementation of inspection / audit (when/if necessary).




Annex 3 Environmental Management Plan / Environmental Monitoring Program

Mitigation measures (incl. budgeting and responsible agencies)

Item	No	Impact	Mitigation Measures		Cost per unit / term (USD)	Annual cost (USD)	Agency	
			Construction Phase	Operation Phase			Implementation	Responsibility
Pollution Control	1	Air Quality	[Dust] A. Appropriate training to heavy equipment operators B. Watering on temporary and construction yard C. Dust prevention screens (if needed)	[BSL2&3 exhaust] D. Use of HEPA filter	A. 2,000 once B. 250 per week C. 1,500 once D. 1,000 (Operation cost only) per unit	A. 2,000 B. 12,000 C. 1,500 D. 1,000 per unit	Construction phase: Contractor (Construction firm) Operation phase: KEMRI	KEMRI
	2	Water Quality	A. Temporary rainwater and waste water drainage (and temporary settling sand basin if needed) B. Temporary toilet and filth collection	[BSL2&3 waste water] C. Appropriate operation of on-site wastewater treatment facility with valid license	A. 3,000 once B. 1,000 monthly C. 4,000 (operation and maintenance cost) and annual operation cost	A. 3,000 B. 12,000 C. 4,000	Construction: Contractor (Construction firm) Operation phase: KEMRI	KEMRI
	3	Waste Management	A. Collection of construction waste by a licensed waste handler to avoid illegal dumping. B. Record keeping of the manifest (or similar documents) of the collected construction waste.	C. Collection, segregation and disposal of waste through licensed waste collector D. Infectious and other medical waste to be treated on-site by auto-clave and incinerator at appropriate temperature.	A. 2,000 monthly B. 100 once C. 200 monthly D. 500 monthly	A. 24,000 B. 100 C. 2,400 D. 6,000	Construction: Contractor (Construction firm) Operation phase: KEMRI	KEMRI
	4	Noise and Vibration	A. Use of low noise heavy equipment without night work B. Sound insulation wall (if needed)	N/A	A. - B. 2,000 once	A. 0 B. 2,000	Construction phase: Contractor (Construction firm)	KEMRI
Social Environment	5	Existing Social Infrastructure and Social Services	Traffic management based on construction plan (e.g. development of traffic plan and placement of traffic control staff)	N/A	500 once (if the traffic control staff can be sourced by KEMRI or included in the contractor's budget).	500	Construction phase: Contractor (Construction firm)	KEMRI
	6	Gender	A. Equal employment opportunity and pay between men and women (where possible)	N/A	A. - B. 2,000 once	A. 0 B. 2,000	Construction phase: Contractor	KEMRI

Annex 8 Environmental Management Plan / Environmental Monitoring Program

Item	No	Impact	Mitigation Measures		Cost per unit / term (USD)	Annual cost (USD)	Agency	
			Construction Phase	Operation Phase			Implementation	Responsibility
			B. Establishment of women's toilets				(Construction firm)	
7		Children's rights	Notification of child labour prohibition to the contractor and monitoring the implementation of no child labour practice	N/A	-	0	Construction phase: Contractor (Construction firm)	KEMRI
8		HIV/AIDS and other infection	A. Installation of sanitary facilities such as toilets B. Regular medical check-up C. Awareness-raising events to prevent HIV-AIDS, C19 and other infections.	N/A	A. 2,000 once B. 1,000 quarterly C. 1,000 every six months	A. 2,000 B. 4,000 C. 2,000	Construction phase: Contractor (Construction firm)	KEMRI
9		Working Conditions	A. Supply of personal protective equipment (PPE) and training of the appropriate usage B. Installation of on-site hazard signs / signals C. Compliance with working hours based on the labour law D. Compliance with working environment based on other IFC regulations (PS2 working conditions)	N/A	A. 5,000 once B. 500 once C. - D. -	A. 5,000 B. 500 C. 0 D. 0	Construction phase: Contractor (Construction firm)	KEMRI

Annex 8 Environmental Management Plan / Environmental Monitoring Program

Item	No	Impact	Mitigation Measures		Cost per unit / term (USD)	Annual cost (USD)	Agency	
			Construction Phase	Operation Phase			Implementation	Responsibility
Others	10	Accident	A. Development of (i) emergency response plan and (ii) safety handbook; its announcement; and implementation of training B. Traffic management based on set speed limit on signs and placement of traffic control staff C. Safety sign installation D. Access control to the construction area through fence or sign boards E. Security light at night at construction area F. Parking arrangement for construction vehicles	N/A	A. 1,500 once B. 500 once (if the traffic control staff should be assigned from KEMRI). C. 500 once D. 500 once E. 1,500 once F. -	A. 1,500 B. 500 C. 500 D. 500 E. 1,500 F. 0	Construction phase: Contractor (Construction firm)	KEMRI

Annex 8 Environmental Management Plan / Environmental Monitoring Program

Environmental and Social Monitoring Program (Construction phase)

Category	Monitoring Item	Sampling Point	Frequency	Responsible Agency	Supervising Authority	Annual cost estimate (USD)
Air Quality	Some five parameters: NOx, SOx, CO, PM10 and PM2.5	4 locations (corners of the project site boundary)	Quarterly	Contractor	KEMRI / NEMA	4,000
Water Quality	Some 16 parameters: pH, Turbidity (NTU), Total Suspended Solids (TSS) (mg/l), Total Dissolved Solids (TDS) (mg/l), Fluoride (F) (mg/l), Nitrate (NO3) (mg/l), Ammonia (NH3) (mg/l), Copper (Cu) (mg/l), Zinc (Zn) (mg/l), Nitrite (NO2) (mg/l), Lead (Pb) (mg/l), Cadmium (Cd) (mg/l), Arsenic (As) (mg/l), Selenium (Se) (mg/l), Surfactants, Anionic (mg/l MBAS), and Phenols (mg/L C6H6O)	3 locations like baseline survey	Quarterly	Contractor	KEMRI / NEMA	4,000
Waste	• Inspection of the waste collection contract between KEMRI and its licensed waste handler. • Inspection of the waste collection and on-site incineration records (e.g. volume of infectious and other medical waste being treated on-site by incinerator at appropriate temperature and analysis of ash and exhaust).	Division of Health, Safety and Environmental of KEMRI	Monthly	Contractor	KEMRI / NEMA	1,000
Noise and Vibration	• Ambient noise & vibration levels	4 locations (corners of the project site boundary)	Quarterly	Contractor	KEMRI / NEMA	4,000
Children's rights	• Child used as labour for construction (i.e. checking the ID and staff record of the construction firm).	2 locations (construction site and yard)	Daily by Contractor and monthly by KEMRI's consultant	Contractor	KEMRI / NEMA	1,200
Working Conditions	• Number of personal protective equipment (PPE) availed and used. • On-site hazard signs / signals • Inspection of the working records	2 locations (construction site and yard)	Daily by Contractor and monthly by KEMRI's consultant	Contractor	KEMRI / NEMA	2,400

Annex 8 Environmental Management Plan / Environmental Monitoring Program

Category	Monitoring Item	Sampling Point	Frequency	Responsible Agency	Supervising Authority	Annual cost estimate (USD)
Accident	• Accident records • Inspection of emergency response plan, safety handbook; and safety training record • Signs / signals for speed limit, safety and hazard • Fence and/or signs boards for access control to the construction area. • Security light for night. • Parking arrangement for construction vehicles.	2 locations (construction site and yard)	Daily by Contractor and monthly by KEMRI's consultant	Contractor	KEMRI / NEMA	2,400

Environmental and Social Monitoring Program (Operational phase)

Category	Monitoring Item	Sampling Point	Frequency	Responsible Agency	Supervising Authority	Annual cost estimate (USD)
Air Quality	Some five parameters: NOx, SOx, CO, PM10 and PM2.5	5 locations (corners of the project site boundary and exhaust gas point from BSL2&3 laboratories)	Quarterly for the entire lifetime of the constructed / installed facility	KEMRI (its environmental consultant)	NEMA	4,000
Water Quality	Some 16 parameters for the 3 locations: pH, Turbidity (NTU), Total Suspended Solids (TSS) (mg/l), Total Dissolved Solids (TDS) (mg/l), Fluoride (F) (mg/l), Nitrate (NO3) (mg/l), Ammonia (NH3) (mg/l), Copper (Cu) (mg/l), Zinc (Zn) (mg/l), Nitrite (NO2) (mg/l), Lead (Pb) (mg/l), Cadmium (Cd) (mg/l), Arsenic (As) (mg/l), Selenium (Se) (mg/l), Surfactants, Anionic (mg/l MBAS), and Phenols (mg/L C6H6O) Plus two additional parameters such as biochemical oxygen demand (BOD) and chemical oxygen demand (COD) for the effluent	In total 4 locations incl. 3 locations like baseline survey and 1 location right after the newly installed onsite wastewater treatment facility at the project site.	Quarterly for the entire lifetime of the constructed / installed facility	KEMRI (its environmental consultant)	NEMA	4,500

Annex 8 Environmental Management Plan / Environmental Monitoring Program

Category	Monitoring Item	Sampling Point	Frequency	Responsible Agency	Supervising Authority	Annual cost estimate (USD)
Waste	of the newly installed onsite wastewater treatment facility at the project site. • Inspection of the waste collection contract between KEMRI and its licensed waste handler. • Inspection of the waste collection and on-site incineration records (e.g. volume of infectious and other medical waste being treated on-site by incinerator at appropriate temperature and analysis of ash and exhaust).	Division of Health, Safety and Environmental of KEMRI	Monthly for the entire lifetime of the constructed / installed facility	KEMRI (its environmental consultant)	NEMA	1,000

A. Monitoring Form for Construction Phase**1. Responses/Actions to Comments and Guidance from Government Authorities and the Public**

Monitoring Item	Monitoring Results during Report Period
ex.) Responses / Actions to Comments and Guidance from Government Authorities will be filled here at the time of monitoring.	Monitoring results will be filled here at the time of monitoring.

2. Mitigation Measures**- Air Quality (Ambient Air Quality)**

Item	Unit	Measured Value (Mean)	Measured Value (Max.)	Country's Standards	Referred International Standards	Remarks (Measurement Point, Frequency, Method, etc.)
SO ₂	µg/m ³	To be filled	To be filled	60* and 80**	20**	4 locations (corners of the project site boundary) and quarterly based on the method of the baseline survey.
NO ₂	µg/m ³	To be filled	To be filled	60* and 80**	40*	
CO	mg/m ³	To be filled	To be filled	4***	4***	
PM _{2.5}	µg/m ³	To be filled	To be filled	35* and 75**	-	
PM ₁₀	µg/m ³	To be filled	To be filled	50* and 100**	50**	

* is annual average, ** 24-hour average and *** hour average for residential areas (except for PM_{2.5} for the industrial area, where the residential area standards do not exist).

- Water Quality (Ambient Water Quality)

Item	Unit	Measured Value (Mean)	Measured Value (Max.)	Country's Standards*	Referred International Standards	Remarks (Measurement Point, Frequency, Method, etc.)
pH	-	To be filled	To be filled	6.5-8.5	6-9	3 locations like the baseline survey and quarterly based on the method of the baseline survey.
Turbidity	NTU	To be filled	To be filled	5	-	
Total Suspended Solids (TSS)	mg/l	To be filled	To be filled	30	50	
Total Dissolved Solids (TDS)	mg/l	To be filled	To be filled	1,200	-	
Fluoride (F)	mg/l	To be filled	To be filled	1.5	-	
Nitrate (NO ₃)	mg/l	To be filled	To be filled	10	-	
Ammonia (NH ₃)	mg/l	To be filled	To be filled	0.5	-	
Copper (Cu)	mg/l	To be filled	To be filled	0.05	-	
Zinc (Zn)	mg/l	To be filled	To be filled	1.5	-	
Nitrite (NO ₂)	mg/l	To be filled	To be filled	3	-	
Lead (Pb)	mg/l	To be filled	To be filled	0.05	-	
Cadmium (Cd)	mg/l	To be filled	To be filled	0.01	-	
Arsenic (As)	mg/l	To be filled	To be filled	0.01	-	
Selenium (Se)	mg/l	To be filled	To be filled	0.01	-	
Phenol	mg/l	To be filled	To be filled	BDL	-	
Permanganate Value (PV)	mg/l	To be filled	To be filled	1.0	-	
e. coli	mpn /100ml	To be filled	To be filled	Nil	-	

*: Country's Standards are based on the first schedule of the Environmental Management and Co-Ordination (Water Quality) Regulations, 2006 except for turbidity based on KS05-459 and TSS based on the third schedule.

Note: BDL stands for "below detection limit" and MPN "most probable number".



- Waste

Monitoring Item	Monitoring Results during Report Period
• Inspection of the waste collection contract between KEMRI and its licensed waste handler. • Inspection of the waste collection and on-site incineration records (e.g. volume of infectious and other medical waste being treated on-site by incinerator at appropriate temperature and analysis of ash and exhaust).	To be filled during the monitoring.

- Noise / Vibration

Item	Unit	Measured Value (Mean)	Measured Value (Max.)	Country's Standards	Referred International Standards	Remarks (Measurement Point, Frequency, Method, etc.)
Noise level	dBA	To be filled	To be filled	55	55	4 locations (corners of the project site boundary) and quarterly based on the method of the baseline survey.
Vibration level	mm/s	To be filled	To be filled	5	-	

3. Natural Environment

No monitoring was programmed.

4. Social Environment**- Children's rights**

Monitoring Item	Monitoring Results during Report Period
• Child used as labor for construction (i.e. checking the ID and staff record of the construction firm).	

- Working Conditions

Monitoring Item	Monitoring Results during Report Period
• Number of personal protective equipment (PPE) availed and used. • On-site hazard signs / signals • Inspection of the working records	

- Accident

Monitoring Item	Monitoring Results during Report Period
• Accident records • Inspection of emergency response plan, safety handbook; and safety training record • Signs / signals for speed limit, safety and hazard • Fence and/or signs boards for access control to the construction area. • Security light for night • Parking arrangement for construction vehicles	




B. Monitoring Form for Operational Phase**1. Responses/Actions to Comments and Guidance from Government Authorities and the Public**

Monitoring Item	Monitoring Results during Report Period
ex.) Responses/Actions to Comments and Guidance from Government Authorities will be filled here at the time of monitoring.	Monitoring results will be filled here at the time of monitoring.

2. Mitigation Measures**- Air Quality (Emission Gas / Ambient Air Quality)**

Item	Unit	Measured Value (Mean)	Measured Value (Max.)	Country's Standards	Referred International Standards	Remarks (Measurement Point, Frequency, Method, etc.)
SO ₂	µg/m ³	To be filled	To be filled	60* and 80**	20**	5 locations (corners of the project site boundary and exhaust gas point from BSL2&3 laboratories)
NO ₂	µg/m ³	To be filled	To be filled	60* and 80**	40*	
CO	mg/m ³	To be filled	To be filled	4***	4***	
PM2.5	µg/m ³	To be filled	To be filled	35* and 75**	-	
PM10	µg/m ³	To be filled	To be filled	50* and 100**	50**	

* is annual average, ** 24-hour average and *** hour average for residential areas (except for PM2.5 for the industrial area, where the residential area standards do not exist).

- Water Quality (Ambient Water Quality)

Item	Unit	Measured Value (Mean)	Measured Value (Max.)	Country's Standards*	Referred International Standards	Remarks (Measurement Point, Frequency, Method, etc.)
pH	-	To be filled	To be filled	6.5-8.5	6-9	3 locations like the baseline survey and quarterly based on the method of the baseline survey.
Turbidity	NTU	To be filled	To be filled	5	-	
Total Suspended Solids (TSS)	mg/l	To be filled	To be filled	30	50	
Total Dissolved Solids (TDS)	mg/l	To be filled	To be filled	1,200	-	
Fluoride (F)	mg/l	To be filled	To be filled	1.5	-	
Nitrate (NO ₃)	mg/l	To be filled	To be filled	10	-	
Ammonia (NH ₃)	mg/l	To be filled	To be filled	0.5	-	
Copper (Cu)	mg/l	To be filled	To be filled	0.05	-	
Zinc (Zn)	mg/l	To be filled	To be filled	1.5	-	
Nitrite (NO ₂)	mg/l	To be filled	To be filled	3	-	
Lead (Pb)	mg/l	To be filled	To be filled	0.05	-	
Cadmium (Cd)	mg/l	To be filled	To be filled	0.01	-	
Arsenic (As)	mg/l	To be filled	To be filled	0.01	-	
Selenium (Se)	mg/l	To be filled	To be filled	0.01	-	
Phenol	mg/l	To be filled	To be filled	BDL	-	
Permanganate Value (PV)	mg/l	To be filled	To be filled	1.0	-	
e. coli	mpn /100ml	To be filled	To be filled	Nil	-	

*: Country's Standards are based on the first schedule of the Environmental Management and Co-Ordination (Water Quality) Regulations, 2006 except for turbidity based on KS05-459 and TSS based on the third schedule.

Note: BDL stands for "below detection limit" and MPN "most probable number".




- Water Quality (for Effluent Discharge into Public Sewers)

Item	Unit	Measured Value (Mean)	Measured Value (Max.)	Country's Standards*	Referred International Standards	Remarks (Measure point, Frequency, Method, etc.)
pH	-	To be filled	To be filled	6-9	6-9	1 location right after the newly installed onsite wastewater treatment facility at the project site.
Turbidity	NTU	To be filled	To be filled	50	-	
Total Suspended Solids (TSS)	mg/l	To be filled	To be filled	250	50	
Total Dissolved Solids (TDS)	mg/l	To be filled	To be filled	2,000	-	
Fluoride (F)	mg/l	To be filled	To be filled	1.5	-	
Nitrate (NO ₃)	mg/l	To be filled	To be filled	20	-	
Ammonia (NH ₃)	mg/l	To be filled	To be filled	4	-	
Copper (Cu)	mg/l	To be filled	To be filled	1	-	
Zinc (Zn)	mg/l	To be filled	To be filled	5	-	
Nitrite (NO ₂)	mg/l	To be filled	To be filled	3	-	
Lead (Pb)	mg/l	To be filled	To be filled	1	-	
Cadmium (Cd)	mg/l	To be filled	To be filled	0.5	-	
Arsenic (As)	mg/l	To be filled	To be filled	0.02	-	
Selenium (Se)	mg/l	To be filled	To be filled	0.2	-	
Phenol	mg/l	To be filled	To be filled	10	-	
Permanganate Value (PV)	mg/l	To be filled	To be filled	1.0	-	
e. coli	mpn /100ml	To be filled	To be filled	30	-	
Biochemical oxygen demand (BOD ₅)	mg/l	To be filled	To be filled	500	-	
Chemical oxygen demand (COD)	mg/l	To be filled	To be filled	1,000	-	

*: Country's Standards are based on the fifth schedule of the Environmental Management and Co-Ordination (Water Quality) Regulations, 2006 except for turbidity based on the tenth schedule, fluoride, NO₂, and PV based on the first schedule and e. coli on the third schedule.

Note: BDL stands for "below detection limit" and MPN "most probable number".

- Waste

Monitoring Item	Monitoring Results during Report Period
• Inspection of the waste collection contract between KEMRI and its licensed waste handler. • Inspection of the waste collection and on-site incineration records (e.g. volume of infectious and other medical waste being treated on-site by incinerator at appropriate temperature and analysis of ash and exhaust).	To be filled during the monitoring.




Appendix-6 Technical Notes

Technical Notes on the Preparatory Survey for the Project for Strengthening the Research Capacity of Kenya Medical Research Institute

In addition to the discussion held by the officials of the Government of Kenya and the Preparatory Survey Team (hereinafter referred to as “the Team”) for the Outline Design of the Project for Strengthening the Research Capacity of Kenya Medical Research Institute (hereinafter referred to as “KEMRI”) (hereinafter referred to as “the Project”) dispatched by Japan International Cooperation Agency (hereinafter referred to as “JICA”) which minutes was signed on 27th January 2022, KEMRI and the consultants of the Team (hereinafter referred to as “the Consultant”) have confirmed the technical matters described in the attached sheets.

Nairobi, 4th February 2022



Prof. Sam Kariuki

Director General & CEO

Kenya Medical Research Institute

The Republic of Kenya



Mr. Tomoki Miyano

Chief Consultant

Preparatory Survey Team

Oriental Consultants Global

Japan

ATTACHMENT

1. Project Site

- (1). The Consultant explained the construction site planned for new facilities by the Project as indicated in the **Annex 1**, and KEMRI agreed with the location of construction site.
- (2). The Consultant explained that the obstacles to the construction of new facilities such as existing building, fences and trees indicated in **Annex 1** shall be removed prior to the notice of tender which is expected in the middle of 2023, and KEMRI agreed with it.

2. Utilities for the Project

2.1. Electrical power line

- (1). The Consultant confirmed that KEMRI receives 11 kV electrical power from Kenya Power Lighting Company (KPLC) at the electrical building and distributes to the each buildings in KEMRI site after transforming to lower voltage. According to the power supply regulation, KEMRI can have only one power incoming line so that the power supply line to the new facility shall be diverged from the electrical building through an underground cable. The Consultants proposed that KEMRI shall install an additional Ring Main Unit (RMU) at the electrical building and lay 11kV underground cable up to the new electrical building for the new facility as indicated in **Annex 2**, and KEMRI agreed with it.
- (2). The Consultant explained the scope of works which shall be undertaken by KEMRI, as indicated in the **Annex 3**, and KEMRI agreed with it.
- (3). The Consultants explained that KEMRI shall obtain an estimated cost of electrical work explained in (1) and (2), and secure a budget for it, and KEMRI agreed with it.

2.2. City water supply line

- (1). The Consultant confirmed that the water source of KEMRI is both city water from Nairobi City Water Company and a deep well in KEMRI site since city water is not stable, and KEMRI stores both water in the existing water receiver tank and the elevated water tank. KEMRI requested the Consultant to construct new water receiver tank and the elevated water tank, next to the



existing elevated water tank which site will be provided by KEMRI, to distribute water to the new facility as indicated in **Annex 2**, and the Consultant will consider it.

- (2). The Consultant explained that KEMRI shall obtain an estimated cost of water supply work explained in (1) and secure a budget for it, and KEMRI agreed with it.

2.3. Drainage

- (1). The Consultant confirmed that KEMRI discharges sewage water to the public sewage of Nairobi City Sewerage Company. The Consultant proposed the relocation of sewage line in the project site since the existing sewage line and the manhole is located in the new facility building area as indicated in **Annex 2**, and KEMRI agreed with it.
- (2). The Consultant explained that KEMRI shall obtain an estimated cost of new sewage line explained in (1) and secure a budget for it, and KEMRI agreed with it.

2.4. Telecommunication network

- (1). The Consultant confirmed that KEMRI has a telecommunication incoming line connected at the switching equipment and IT server in the Administration Building and distributes to the each buildings in KEMRI site. KEMRI signed up for internet with SAFARICOM and KENET and the current internet speed is 100Mbps. The Consultant proposed that KEMRI shall lay underground telephone and telecommunication cable to the new facility from the Administration Building as indicated in **Annex 2** and consider an improved internet access for the operation of the new data center to be located in the new facility, and KEMRI agreed with it.
- (2). The Consultant explained that KEMRI shall obtain an estimated cost of telecommunication work explained in (1) and secure a budget for it, and KEMRI agreed with it.

3. Building and Facility Planning

3.1. Architectural planning

The Consultant explained the draft architectural planning including the zoning layout and floor plan as shown in the **Annex 4 and 5** respectively. KEMRI requested



to apply universal design, and the Consultant will consider it.

3.2. Infectious waste management

The Consultant explained the handling flow for the infectious waste disposals as shown in the **Annex 6**, and KEMRI agreed on the explanation.

4. Equipment Planning

- (1). The Consultant explained that the requested equipment was examined and prioritized by KEMRI and the Consultant as indicated in the **Annex 7**, and the Consultant will finalize the equipment list to be procured by the Project based on the priority.
- (2). The Consultant requested that KEMRI shall make the maintenance contract(s) with the external specialized agent(s) for analytical equipment in case they are procured by the Project, and KEMRI acknowledged it.

5. Construction Planning

- (1). The Consultant explained the construction planning on temporary occupation during the construction for the following purposes as indicated in the **Annex 8**, and KEMRI understood the explanation.
 - 1) Site temporary office, toilets, storage etc. for the contractor at the construction area
 - 2) Stock yards and workshop of materials/equipment at the existing open area
 - 3) Temporary enclosure and gates for the construction area with fencing
- (2). The Consultant requested the following considerations during the construction, and KEMRI understood the explanation.
 - 1) The Consultant shall basically be allowed to work at the site office every day of the week and weekend.
 - 2) The Contractor shall be allowed to utilize the existing water supply in KEMRI free of charge on the purpose of the construction. KEMRI Management will discuss about water provision.

6. Soft Component

KEMRI requested, after confirming the importance of operation and maintenance



of the new facilities and equipment to be provided by the Project, a further study on the possibility of the following technical assistance, and the Consultant understood it.

- 1) Training on the operation and maintenance of the air conditioning and ventilation system including negative pressure control for the BSL-2 and 3 laboratory
- 2) Training on the operation and maintenance of the building management system.

7. Other relevant issues

7.1. Land certificate

The Consultant received confirmed a copy of land certificate of KEMRI site as **Annex 9**.

7.2. Building permit

The Consultant explained that the building permit for the construction of new facilities shall be obtained prior to the notice of tender which is expected in the middle of 2023, and KEMRI agreed with it.

- 7.3. The Consultant explained that the occupancy certificate of new facility shall be obtained after the completion of construction, and KEMRI agreed with it.

7.4. Environmental Impact Assessment

The Consultant explained that Environmental Impact Assessment (EIA) report shall be prepared and approved with support from the Consultant with in one month after the Grant Agreement, and KEMRI agreed it.

7.5. Support to sub-consultants

The Consultant requested KEMRI to provide support to the sub-consultants who will undertake the project site survey and the environmental and social considerations survey, and KEMRI agreed it.

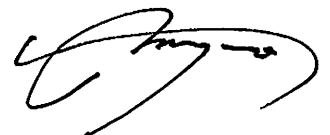
7.6. Operation and Maintenance Cost

The Consultant explained that annual operation and maintenance cost of the new facility will be about KES 80 Million based on the similar project in another country in Africa, and KEMRI acknowledged it.

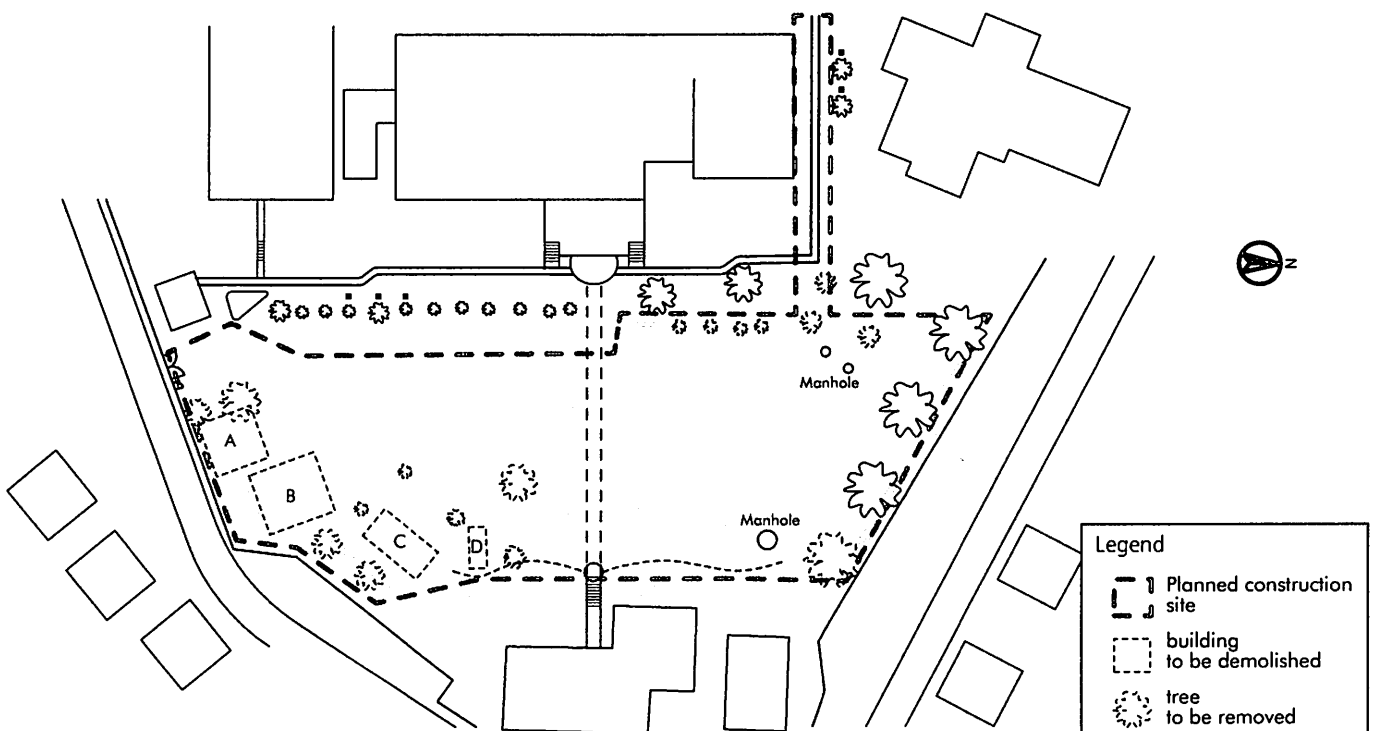
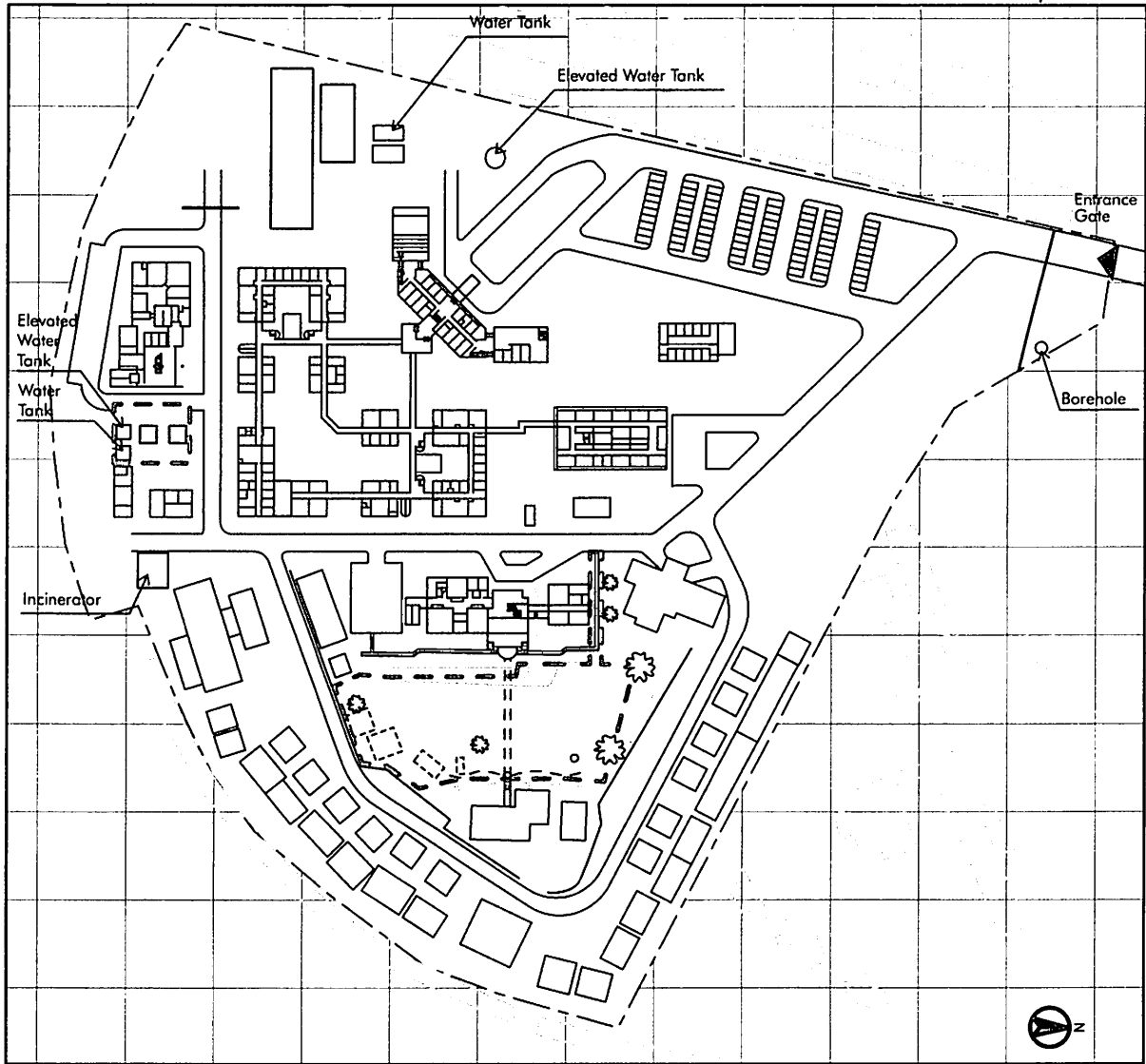


Annex 1: Project Site
Annex 2: Location of the utility connection
Annex 3: Scope of works for the utility connection
Annex 4: Zoning layout
Annex 5: Floor plan
Annex 6: Infectious waste management flow
Annex 7: Equipment list with priority
Annex 8: Construction planning
Annex 9: Land certificate

End.

A handwritten signature in black ink, consisting of a stylized, cursive script that appears to be a name followed by a surname, possibly "Angela".

Annex 1: Project Site

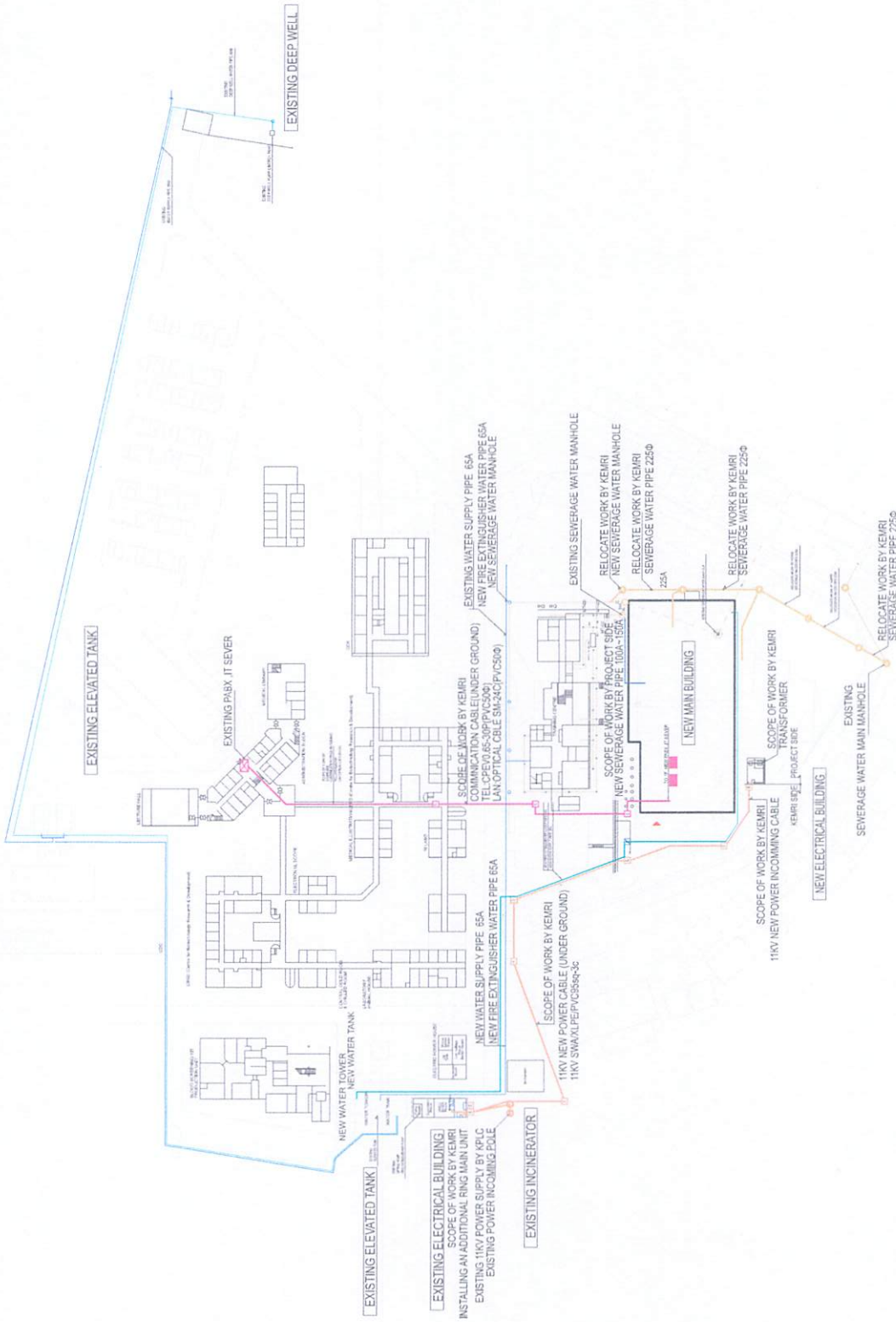


Site Plan

Preparatory Survey
The Project for Strengthening the Research Capacity of Kenya Medical Research Institute

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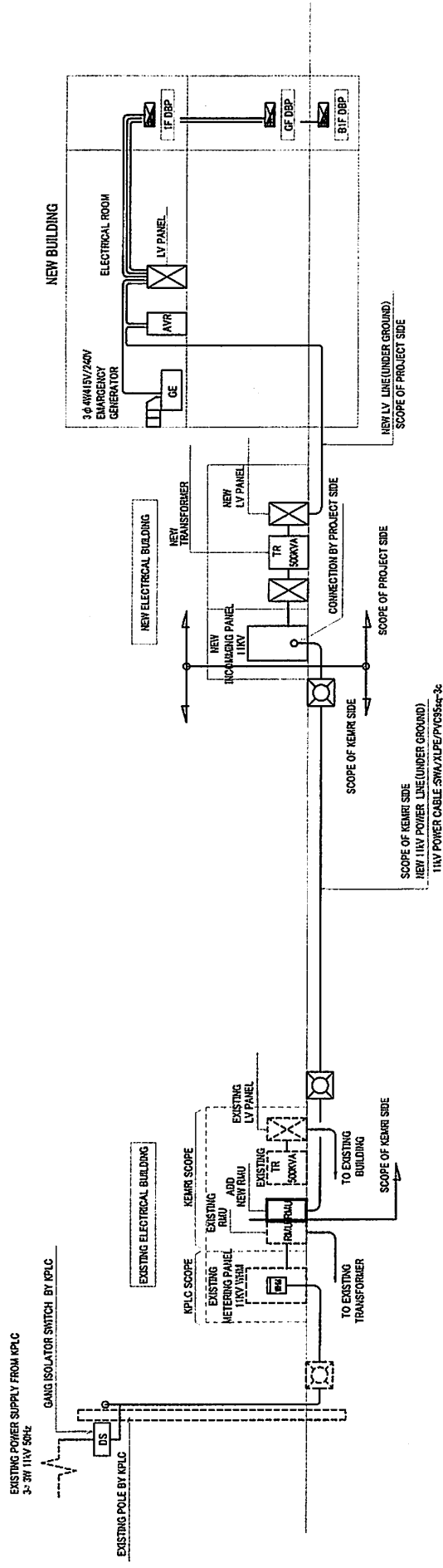


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KEMRI UTILITY SERVICE PLAN FOR SCOPE OF THE WORK

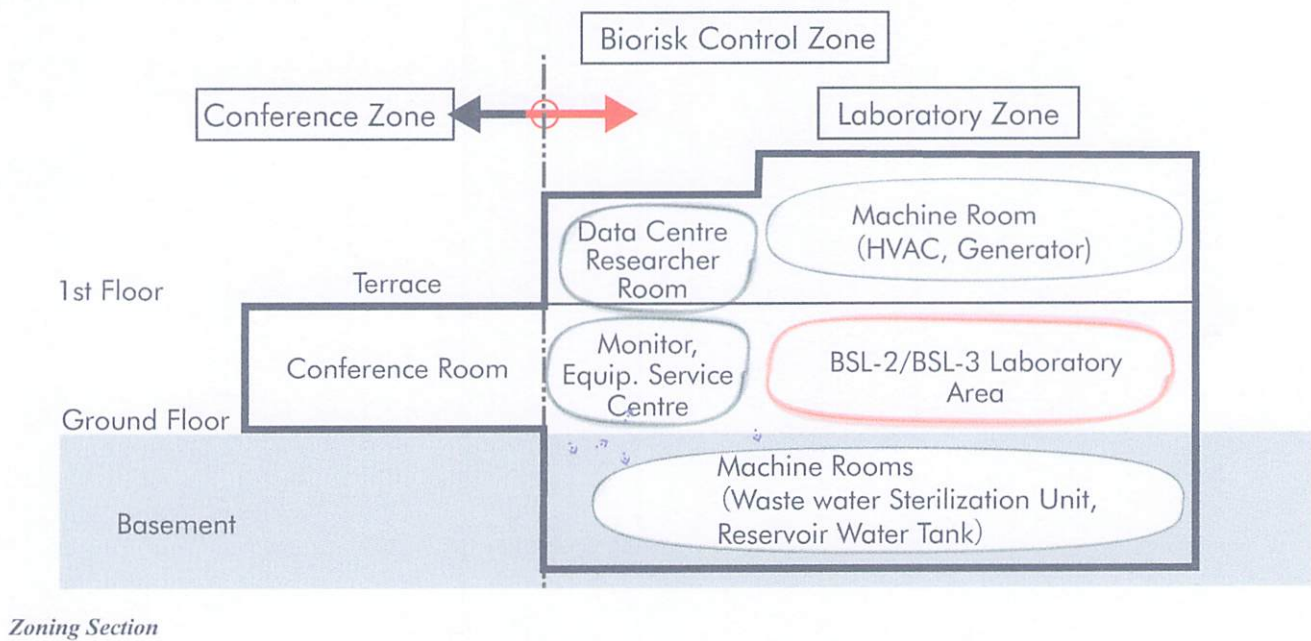
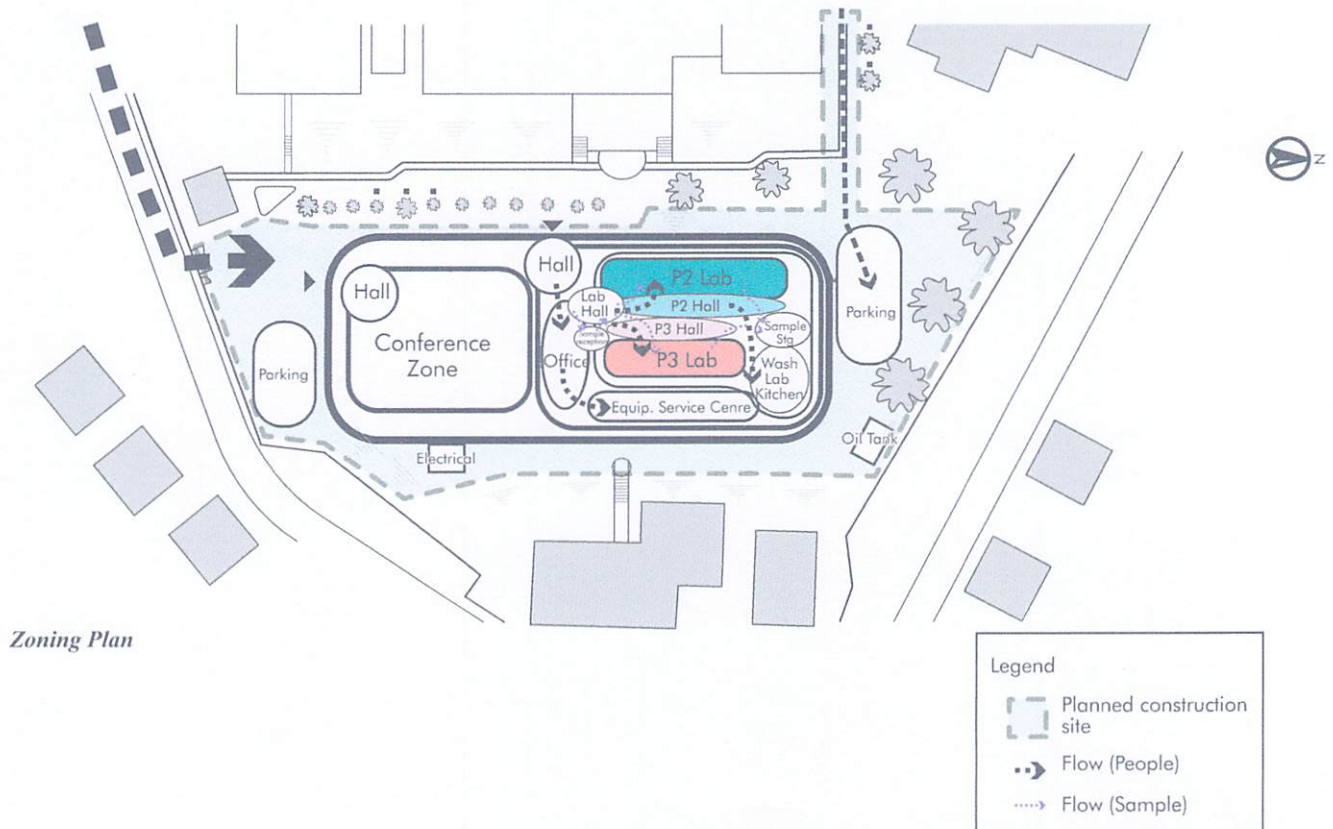
Preparatory Survey

The Project for Strengthening the Research Capacity of Kenya Medical Research Institute

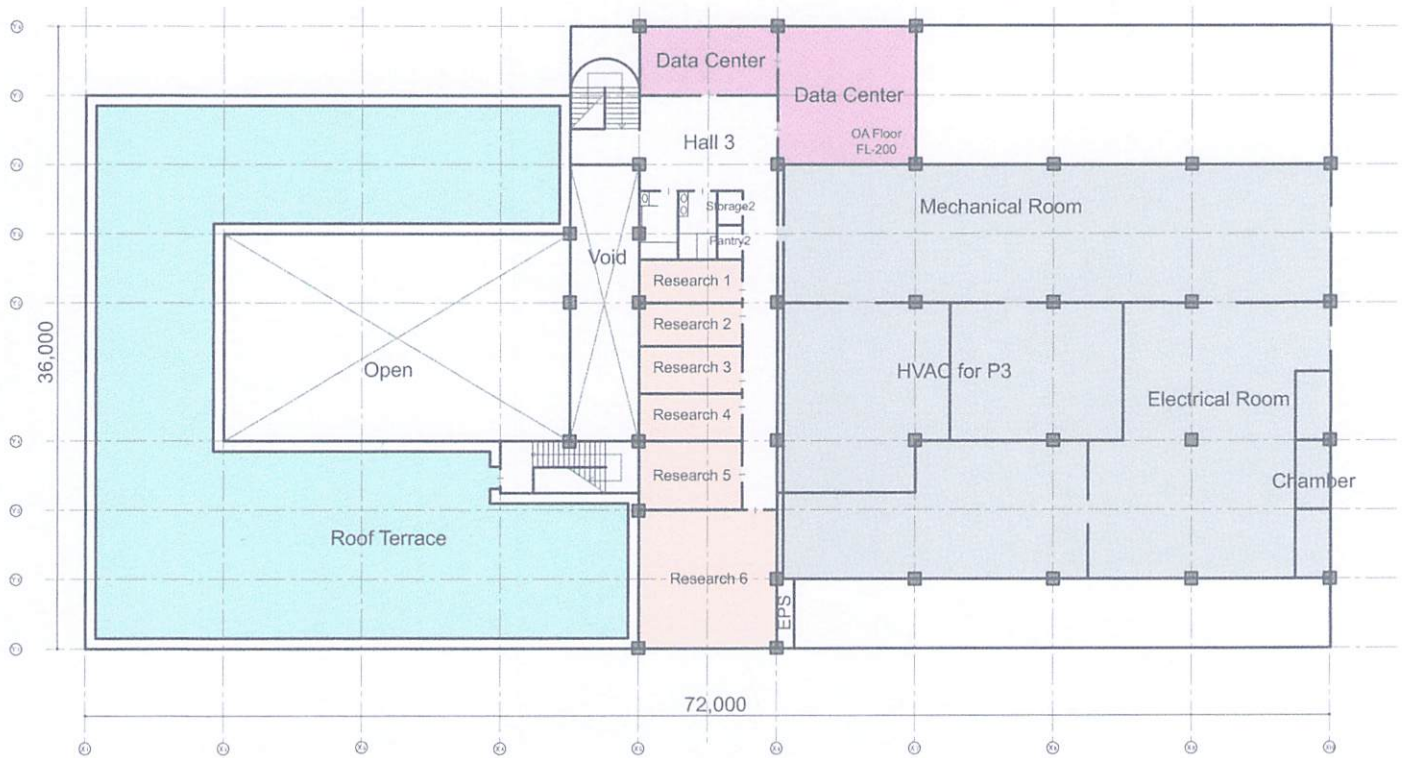


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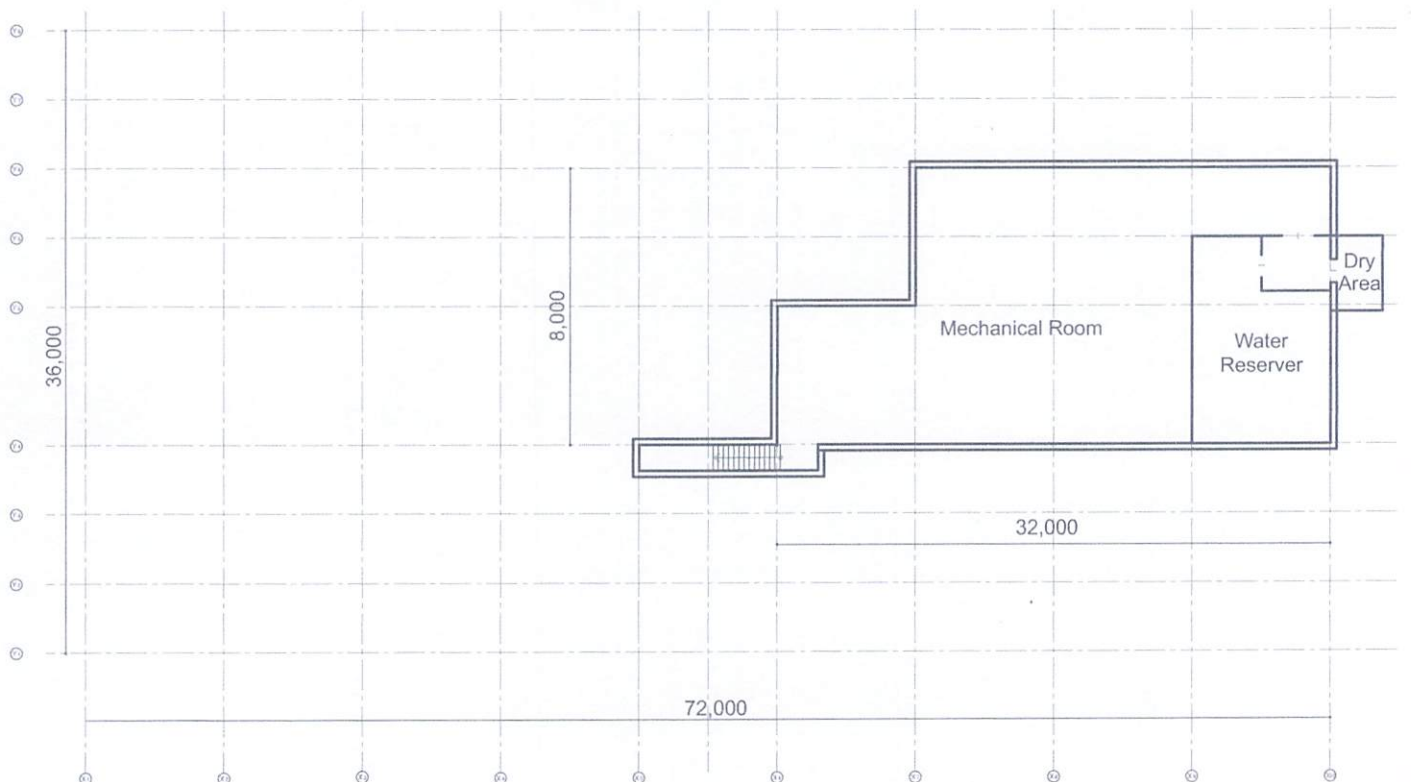
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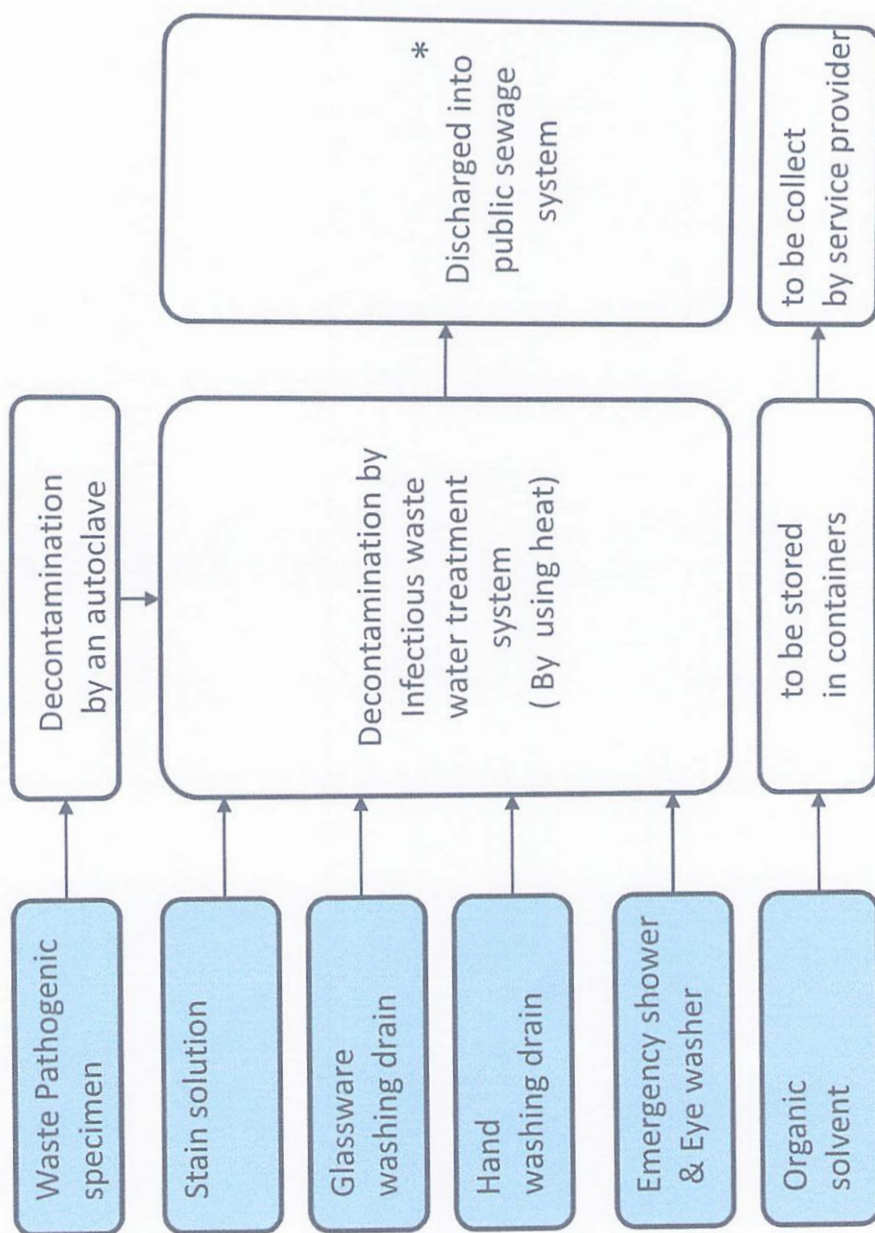
First Floor Plan



Basement Floor Plan

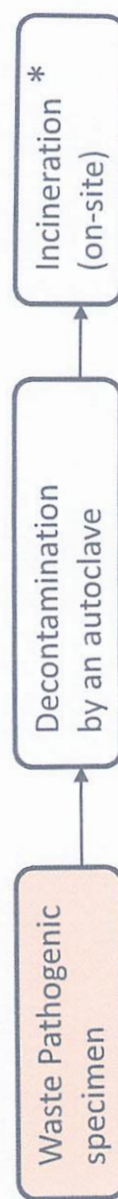
P2, P3 LABORATORY WASTE HANDLING

Liquid waste



* Discharged/ Incinerated waste shall be analyzed and reported to National Environment Management Authority

Solid waste

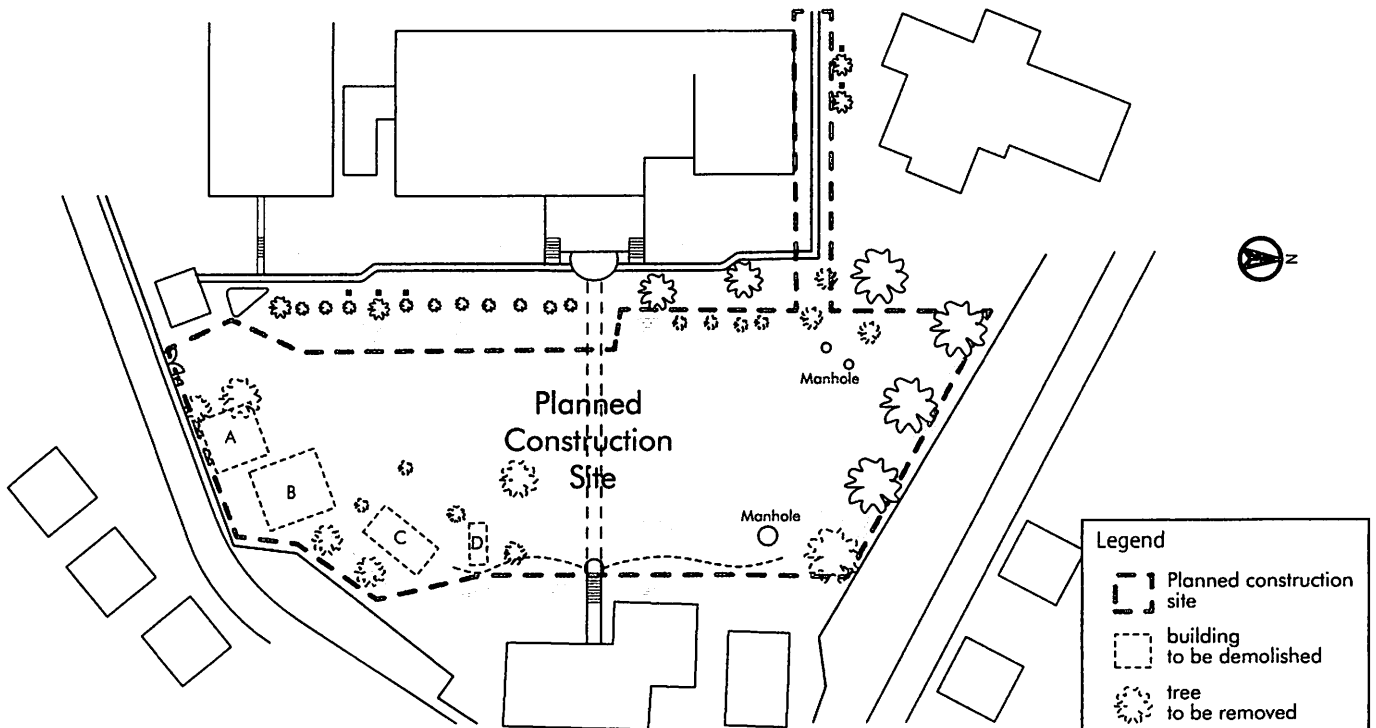
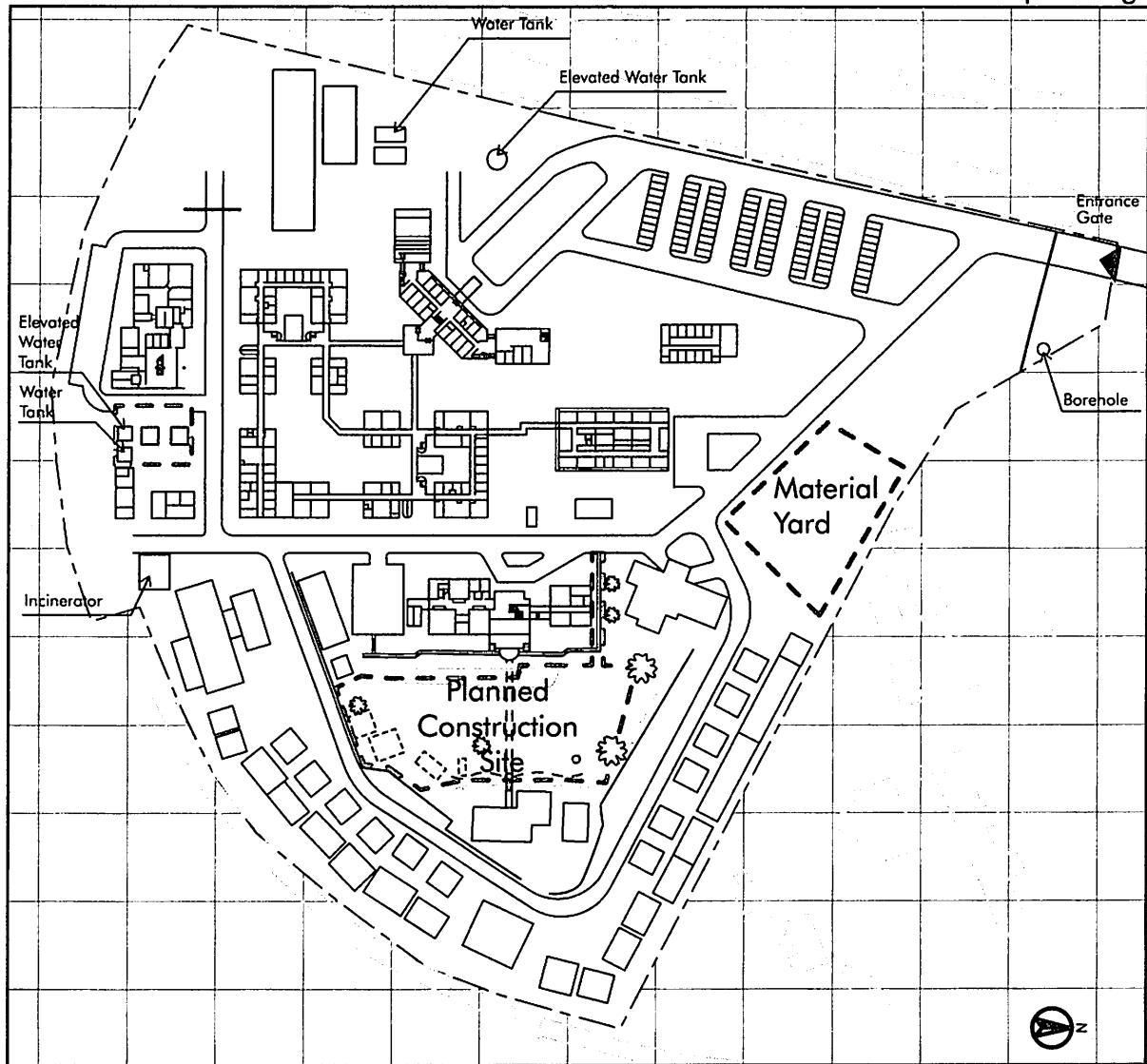


Equipment requested

No.	Equipment	Priority	Total	P3 laboratory A (Animal)	P3 laboratory B (Cell culture)	P2 Central laboratory	P2 Immunology laboratory	P2 Molecular laboratory	P2 Clinical Research laboratory	Laboratory kitchen	Equipment service center	Bio-bank P2/P3	Sample Storage	Cold room	Virtual Lab.	Conference room
1	Autoclave, vertical	1	8	2	2	1	1	1	1							
2	Autoclave, double door A	1	1	1												
3	Autoclave, double door B	1	1		1											
4	Biochemistry analyzer	4	1						1							
5	Biosafety cabinet	1	8	2	2	1	1	1	1							
6	Blood cell counter	4	1						1							
7	Blood culture machine	3	1		1											
8	BSL3 laboratory calibration kit	1	2								2					
9	Centrifuge, high speed	1	6	1	1	1	1	1	1							
10	Centrifuge, low speed	4	6	1	1	1	1	1	1							
11	Centrifuge, spin down	4	6	1	1	1	1	1	1							
12	Clean bench, label top	1	1					1								
13	CO2 incubator	3	2		1	1										
14	Data logger, temperatur	2	30								30					
15	Computer	5	6	1	1	1	1	1	1							
16	DNA/RNA extraction and purification system	4	2		1			1								
17	Draft chamber	1	1						1							
18	Dry heat bath	5	2	1				1								
19	Electric balance 2kg/0.01g	5	4			1	1	1	1							
20	Electric balance 200g/0.0001g	2	1								1					
21	Electron microscope	1	1			1										
22	Electrophoresis	4	1					1								
23	ELISA set	4	1				1									
24	ESR analyzer	4	1						1							
25	Flowcyte meter	3	1				1									
26	Freezer -30°C	4	7	1	1	1	1	1	1				1			
27	Freezer -80°C	3	8	1	1	1	1	1	1			2				
28	Gel documentation system	4	1					1								
29	Globe box A	1	1	1												
30	Globe box B	1	1		1											
31	Hot air oven	5	5			1	1	1	1	1						
32	Ice machine	4	1							1						
33	Incubator	5	6		1	2	1	1	1							
34	Laboratory refrigerator	4	6	1	1	1	1	1	1							
35	LCMS	1	1			1										
36	Microscope, bioncular	2	6	1	1	1	1	1	1							
37	Microscope, fluorescent with camera	2	1			1										
38	Microscope, inverted with camera	2	2		1	1										
39	Microspectrophotometer	4	2			1		1								
40	Nano drug formulation equipment	2	1			1										
41	pH meter	4	4			1	1	1	1							
42	Pipette set, single	5	13	2	2	2	2	2	2		1					
43	Pipette set, multi	5	2				1	1								
44	Protein synthesizer	2	1			1										
45	Real time PCR	4	1					1								
46	Sequencer	4	1					1								
47	Shaker set	4	1											1		
48	Spectrophotometer, UV-VIS	4	2			1			1							
49	Standard thermometer	4	1								1					
50	Standard weight	4	1								1					
51	Thermocycler	4	1					1								
52	Ultracentrifuge	2	3		1	1		1								
53	Ultrasonic homogenizer	4	1			1										
54	Vortex mixer	5	6	1	1	1	1	1	1							
55	Water bath	5	6	1	1	1	1	1	1							
56	Water distiller	4	1			1										
57	Water purification and deionizing system	2	1							1						
58	Laboratory sink	1	5	1	1		1	1	1							
59	Shelf	2	7		2	2								3		
60	Work bench, Central A	1	8	1	1	1	1	1	1		2					
61	Work bench, Side A	1	18	1	1	3	3	4	3		2			1		
62	Work bench, Side B	1	2					2								
63	Work bench, Side C	1	1			1										
64	UPS	1	18													
65	Table A	1	7												7	
66	Table B	1	58													58
67	Chair A	1	14												14	
68	Chair B	1	172													172
Total			500	22	29	38	26	37	28	3	40	2	1	5	21	230

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Site Plan

Preparatory Survey

The Project for Strengthening the Research Capacity of Kenya Medical Research Institute

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REPUBLIC OF KENYA

THE LAND REGISTRATION ACT NO. 3 OF 2012

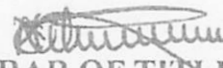
REGISTRATION OF TITLE ACT CHAPTER 281

SECTION 71 (REPEALED)

PROVISIONAL CERTIFICATE OF TITLE IR 78302

I HEREBY CERTIFY THAT by reason of the fact that the **Grant** registered as IR 78302/1 has been lost this Provisional Certificate of Title is issued under Section 71 shall serve and be valid for all purposes in lieu of the lost **Grant**.

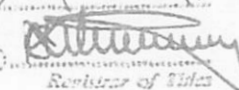
IN WITNESS WHEREOF I have hereunto set my hand and seal this.....^{9th}
Day of.....July.....Two thousand and Fourteen.


REGISTRAR OF TITLES

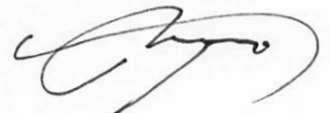
LAND TITLES REGISTRY - NAIROBI
REGISTRATION OF TITLE ACT

REGISTERED AS NO. IR.....78302/2.....

PRESENTED.....9th July 2014.....

TIME.....0900hrs.....
Registrar of Titles

Vmk





REPUBLIC OF KENYA

THE REGISTRATION OF TITLES ACT
(Chapter 281)

GRANT: Number I.R. 78302
ANNUAL RENT: ShS. 72/- (REVISABLE)
TERM: Ninety-nine (99) years from 1-1-1985

KNOW ALL MEN BY THESE PRESENTS that THE PRESIDENT OF THE REPUBLIC OF KENYA
Grants unto KENYA MEDICAL RESEARCH INSTITUTE a body corporate duly established under
the provisions of Chapter 250 of the Laws of Kenya and having its registered office
in Nairobi (Post Office Box Number 54840)

(hereinafter called "The Grantee") ALL that piece of land situate in the City of Nairobi in the Nairobi District containing by measurement Eight decimal eight eight three (8.883) hectares or thereabouts that is to say L.R. 109/10362

which said piece of land with the dimensions abutments and boundaries thereof is delineated on the plan annexed hereto and more particularly on Land Survey Plan Number 220440 deposited in the Survey Records Office at Nairobi

TO HOLD

for the term of Ninety nine (99) years from the
First (1st) Day of September One thousand nine hundred and
eighty five
SUBJECT to (a) the payment in advance on the first day of January in each
year of the annual rent of Shillings Seventy two (ShS. 72/-) (Revisable)

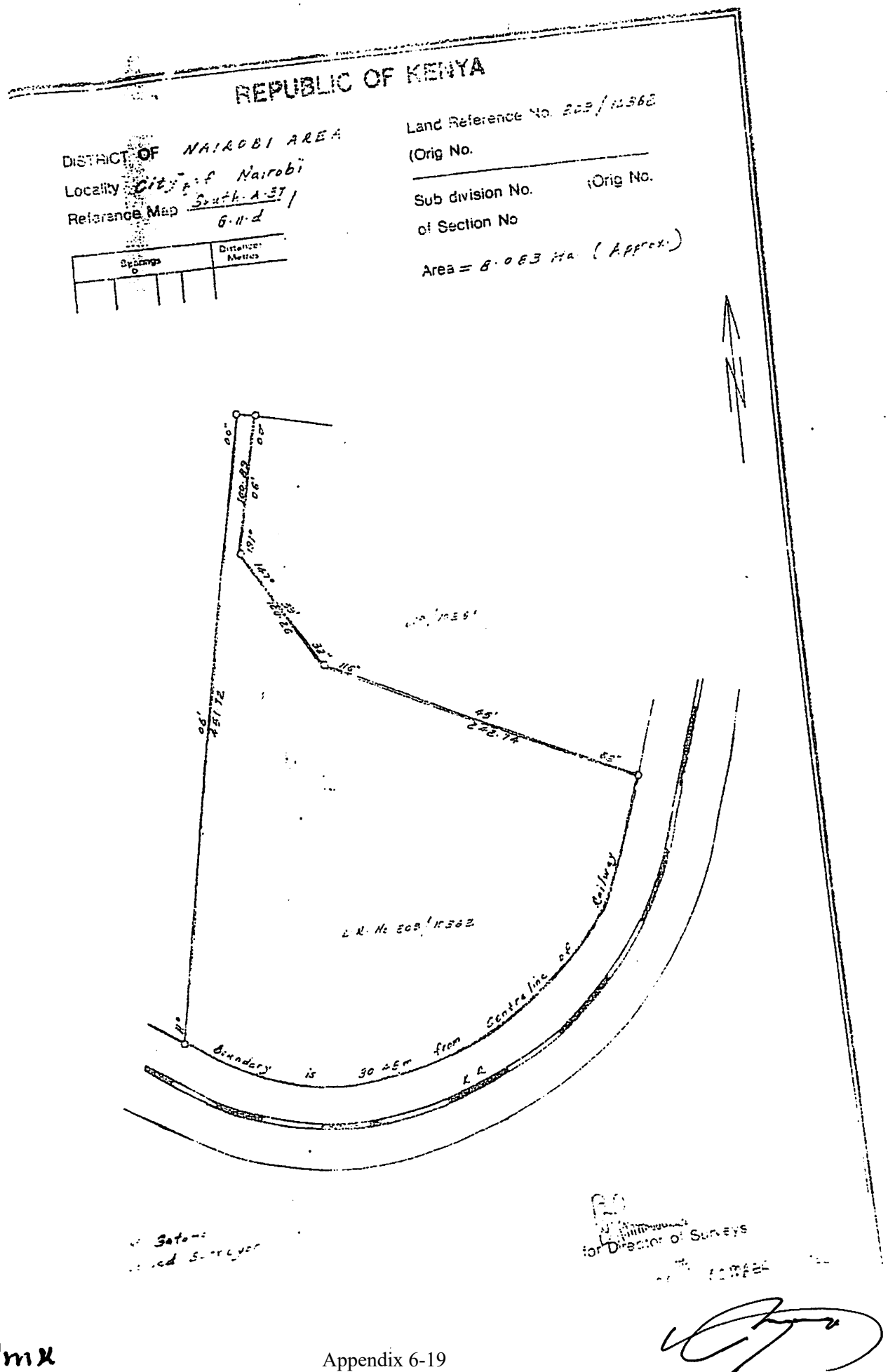
(b) the provisions of the Government Lands Act (Chapter 280) and (c) the following Special Conditions (namely):

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FORM 6 (Residential)

SPECIAL CONDITIONS

1. No buildings shall be erected on the land nor shall additions or external alterations be made to any buildings otherwise than in conformity with plans and specifications previously approved in writing by the Commissioner of Lands and the Local Authority. The Commissioner shall not give his approval unless he is satisfied that the proposals are such as to develop the land adequately and satisfactorily.
2. The Grantee shall within six calendar months of the actual registration of the Grant submit in triplicate to the Local Authority and the Commissioner of Lands plans (including block plans showing the positions of the buildings and a system of drainage for disposing of sewage surface and sullage water) drawings elevations and specifications of the buildings the Grantee proposes to erect on the land and shall within 24 months of the actual registration of the Grant complete the erection of such buildings and the construction of the drainage system in conformity with such plans drawings elevations and specifications as amended (if such be the case) by the Commissioner PROVIDED that notwithstanding anything to the contrary contained in or implied by the Government Lands Act if default shall be made in the performance or observance of any of the requirements of this condition it shall be lawful for the Commissioner of Lands or any person authorized by him on behalf of the President to re-enter into and upon the land or any part thereof in the name of the whole and thereupon the hereby created shall cease but without prejudice to any right of action or remedy of the President or the Commissioner of Lands in respect of any antecedent breach of any condition herein contained.
3. The Grantee shall maintain in good and substantial repair and condition all buildings at all time erected on the land.
4. Should the Grantee give notice in writing to the Commissioner of Lands that it is to complete the buildings within the period aforesaid the Commissioner of Lands shall (at the Grantee's expense) accept a surrender of the land comprised herein:
 - (i) Provided further that if such notice as aforesaid shall be given within 12 months of the actual registration of the Grant term the Commissioner of Lands shall refund to the Grantee 50 per centum of the stand premium paid in respect of the land, or
 - (ii) at any subsequent time prior to the expiration of the said building period the Commissioner of Lands shall refund to the Grantee 25 per centum of the said stand premium. In the event of notice being given after the expiration of the said building period no refund shall be made.
5. The land and the buildings shall only be used for ~~XXXXXX~~ the purposes of a Medical Research Institute with residential accommodation.
6. The buildings shall not cover more than fifty per centum of the area of land or such lesser area as may be laid down by the Local Authority in its by-law.
7. The land shall not be used for any purpose which the Commissioner of Lands considers to be dangerous or offensive.
8. The Grantee shall not subdivide the land, without the prior consent in writing of the Commissioner of Lands.
9. The Grantee shall not sell transfer sublet charge or part with the possession of the land or any part thereof or and buildings thereon except with the prior consent in writing of the Commissioner of Lands. No application for such consent (except in respect of a loan required for building purposes) will be considered until Special Condition No. 2 has been performed.
10. The Grantee shall pay to the Commissioner of Lands on demand such sum as the Commissioner of Lands may estimate to be the proportionate cost of constructing all roads and drains and sewers serving or adjoining the land and the proportionate cost for the supply of both the water and the electric power and shall on completion of such construction and the ascertainment of the actual proportionate cost either pay (within 7 days of demand) or be refunded the amount by which the actual proportionate cost exceeds or falls short of the amount paid as aforesaid.
11. The Grantee shall from time to time pay to the Commissioner of Lands on demand such proportion of the cost of maintaining all roads and drains serving or adjoining the land as the Commissioner may assess.
12. Should the Commissioner of Lands at any time require the said roads to be constructed to a higher standard the Grantee shall pay to the Commissioner on demand such proportion of such construction as the Commissioner may assess.
13. The Grantee shall pay such rates taxes charges duties assessments or outgoings of whatever description as may be imposed charged or assessed by any Government or Local Authority upon the land or the buildings erected thereon including any contribution or other paid by the President in lieu thereof.
14. Notwithstanding anything to the contrary contained herein or implied by the said Government Lands Act (Cap. 133) the Grantee shall on receipt of six months notice in writing in that behalf surrender all or any part of the land required for public purposes without payment of compensation save in respect of such of the approved buildings as may have to be evacuated or demolished. No compensation shall be payable in respect of surrender of part of the land by reason of such evacuation.



14.- If the said land shall not be used for the purpose herein the same shall revert to Government free of cost except the building erected thereon.

15.- ~~15.~~ 14. The President or such person or authority as may be appointed for the purpose shall have the right to enter upon the land and lay and have access to water mains service pipes and drains telephone or telegraph wires and electric mains of all descriptions whether overhead or underground and the Grantee shall not erect any buildings in such a way as to cover or interfere with any existing alignments of main or service pipes or telephone or telegraph wires and electric mains.

~~15.~~ 15. The Commissioner of Lands reserves the right to revise the annual ground rent payable hereunder on the 1st January, 1989 and thereafter at the expiration of every ten years of the term. Such rental shall be at a rate to be determined by the Commissioner of Lands, of the unimproved freehold value of the land as at 31st December, 1988 as assessed by the Commissioner of Lands or at the rate in force on the 31st December, 1988 whichever is the greater.

~~15.~~ 16. The Commissioner of Lands reserves the right to revise the annual ground rent payable hereunder at the expiration of every ten years of the term. Such rental shall be at a rate to be determined by the Commissioner of Lands of the unimproved value of the land as at the end of every tenth year of the term.

16. The Commissioner of Lands reserve the right to revise the annual ground rent payable hereunder on the 31st December, 1996 and thereafter at the expiration of every ten years of the term.

IN WITNESS WHEREOF I WILSON GACANJA
the Commissioner of Lands have by order of
the President hereunto set my hand this 26th
day of October
One thousand nine hundred and ninety eight
in the presence of:

REGISTRAR OF TITLES

REGISTERED AS No. LR 78302/1
PRESENTED 27th October 1998
TIME 11:55 Hrs

THE FOLLOWING INSTRUMENT

IS REGISTERED AGAINST

Provisional Certificate of Title issued vide
Gazette Notice No. 2729 of 25th
April 2014.

Presentation No: 950 of Registration: 09-07-2014

Register

Vmx

INCOME TAX DEPARTMENT

PERSONAL IDENTIFICATION NUMBER CERTIFICATE



PIN:

P051092793H

NAME:

KENYA MEDICAL RESEARCH
INSTITUTE

DATE OF BIRTH:

*

PLACE OF BIRTH:

*

Date:

11.3.93

Signature

FORM PIN 1

Ymk.