THE KINGDOM OF CAMBODIA
MINISTRY OF HEALTH

PREPARATORY SURVEY FOR THE PROJECT FOR THE IMPROVEMENT OF INFECTIOUS WASTE MANAGEMENT IN THE KINGDOM OF CAMBODIA

FINAL REPORT

DECEMBER 2022

JAPAN INTERNATIONAL COOPERATION AGENCY
YACHIYO ENGINEERING CO., LTD.
KOEI RESEARCH & CONSULTING INC.

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Preface

Japan International Cooperation Agency (JICA) decided to conduct the preparatory survey and entrust the survey to the joint venture of Yachiyo Engineering Co., Ltd. and J Koei Research & Consulting Inc..

The survey team held a series of discussions with the officials concerned of the Government of Cambodia, and conducted field investigations. 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 t the Kingdom of Cambodia for their close cooperation extended to the survey team.

December, 2022

SAKUMA Jun

Director General

Human Development Department

Japan International Cooperation Agency

Summary

(1) Outline of the Recipient Country

The Kingdom of Cambodia (hereinafter referred to as "Cambodia") straddles latitudes between 11 and 15 degrees. It has a tropical climate, and is in a monsoon zone with a rainy season from May to October (warm, moist southwest monsoon) and a dry season from November to April, with peak rainfall in September (August for coastal areas). During the rainy season, temperatures drop to 22 degrees due to winds from the Gulf of Thailand, while during the dry season, temperatures rise to 40 degrees due to northeasterly winds.

Cambodia covers an area of 180,000 km^2 (about half the size of Japan) and is bordered by the Kingdom of Thailand to the west, the Lao People's Democratic Republic to the north, and the Socialist Republic of Vietnam to the east. Cambodia's population is approximately 16.95 million (2021 estimate, World Bank). The population growth rate was 1.7% in 2012-2013 and 1.4% in 2020-2021. Although population growth is slowing, Cambodia has the third highest population growth rate (2020-2021) among Southeast Asian countries, after The Democratic Republic of Timor-Leste and the Lao People's Democratic Republic.

Cambodia's economy recorded high economic growth of over 10% for the four years from 2004 to 2007. However, due to the global recession triggered by the subprime mortgage crisis, the economic growth rate dropped to 0.1% in 2009, but recovered to 6.1% in the following year. From 2011 to 2019, the economy has been growing at an annual rate of about 7% due to strong sewing and other export products, construction, services, and foreign direct investment. In 2020, the economy experienced negative growth due to the impact of the novel coronavirus disease (hereinafter referred to as "COVID-19"), but positive growth is expected for 2021.

(2) Background and Outline of the Project

Cambodia has been affected by COVID-19. Since its outbreak in February 2021, the number of infected persons has increased, with the number of new cases per day peaking at approximately 1,000 per day. Under these circumstances, the Government of Cambodia (hereinafter referred to as "GOC") has promoted vaccination, with 87.3% of the population having completed vaccination and 59.9% having received a booster dose (as of 19 August 2022; source: Our World in Data).

Although the public healthcare service in Cambodia is being developed, particularly in the capital city of Phnom Penh, there are significant disparities between the capital and the provinces. In terms of medical waste management, local hospitals have incinerators and waste sterilizers, but some hospitals are not in full operation due to inadequate functions such as temperature control. There are many concrete incinerators and aging incinerators without adequate functions. Where hospitals do not have incinerators or sterilizers for waste, medical waste is transported to nearby hospitals with treatment facilities. Brick-made or aging incinerators are unable to control temperature or properly treat exhaust gases, causing residents in the vicinity to complain about black smoke and odors. The lack of appropriate temperature control measures and high levels of dioxin emissions in many cases lead to health problems for the residents in the vicinity. Under these circumstances, although the amount of medical waste has increased due to the COVID-19 vaccination, medical waste management has not developed. As a result, inappropriate dumping of infectious waste has occurred, leading to hospital staff, patients and neighboring residents facing the risk of exposure to pathogens from improperly managed infectious waste. Moreover, the National Development and Vaccination Plan for COVID-19 Vaccines, published in January 2021, prioritizes development of appropriate medical waste treatment methods at each hospital to handle the increasing amount of medical waste resulting the COVID-19 vaccination campaign as one of the issues to be addressed.

The Project for the Improvement of Infectious Waste Management in the Kingdom of Cambodia (hereinafter referred to as "the Project") aims to ensure proper sterilization and infection control of infectious waste by installing incinerators in the public hospitals at the province and district levels that are responsible for infectious waste treatment. The Project is recognized as a high priority project that is essential for the realization of the above-mentioned plan. The Project targets public hospitals without proper and sufficient infectious waste

treatment equipment in provinces with passed Japanese cooperation in the health sector. In addition, the decision will be made after confirming the avoidance of duplication of support from other development partners and the priorities of the Ministry of Health (hereinafter referred to as "MOH") and provincial health departments.

(3) Results of Survey and Project Contents

JICA conducted a field survey from May 28 to June 26, 2022, to confirm the details of the request related to the Project, understand the actual situation of infectious solid waste management at the hospitals surveyed, and to select equipment. The equipment requested by the Cambodia side for the Project was incinerators and sterilizers for medical waste. After discussions based on the current status of infectious waste management at the 51 hospitals surveyed, the incinerator was selected as the equipment to be procured. After returning to Japan, the team conducted an analysis based on the results of the field survey, produced an outline design, and developed cost estimates for the Project. Based on the results, the explanation of Draft Preparatory Survey Report was conducted online in late August 2022.

Based on the above results, the Project aims to ensure that infectious waste in the target hospitals will be properly treated, and small medical waste incinerators will be installed in 29 hospitals (teaching hospitals and public hospitals at the state and provincial level). The project component is as follows.

Table 1 Project Component

Item	Model	Capacity	Quantity
Small medical waste incinerator	Small model	Around 20kg/h	18
	Middle model	Around 30kg/h	8
	Large model	Around 50kg/h	3

Source : JICA Survey Team

The list of target 29 hospitals and size of the incinerators for the Project is as follows.

Table 2 Target Hospitals for the Project and Size of Incinerators

Province	Hospital	Size of incinerator
BT-Meanchey	Mongkol Borei	medium
BT-Meanchey	Serei Sorphorn	medium
BT-Meanchey	Poy Pet	large
BT-Meanchey	Or Chrouv	small
BT-Meanchey	Malai Santepheap	small
BT-Meanchey	Phnom Srock	small
BT-Meanchey	Thma Puok	small
BT-Meanchey	Svay chek	small
Battambang	Thma Koul	small
Battambang	Mong Russei	medium
Battambang	Rokar	medium
Kg Cham	Batheay	small
Kg Chhnang	Kampong Chhnang	medium
Kampot	Bunrany Hsen Koh Sla	small
Kampot	Kampong Trach	small
Kandal	Takhmau PRH	large
Kandal	Koh Thom	small
Kratie	Kratie PRH	small
Kratie	Chhlong	small
Prey Veng	Prey Veng PRH	small
Prey Veng	Kampong Trabek	small
Prey Veng	Neak Loeung	large

Province	Hospital	Size of incinerator
Prey Veng	Peareang	medium
Siemreap	Ankor Chhum	medium
Siemreap	Pouk	small
Svay Rieng	Svay Chrum	small
Svay Rieng	Chi Phu	small
Svay Rieng	Romeas Hek	medium
Svay Rieng	Svay Teap	small

Source : JICA Survey Team

The Project will also implement the soft components related to the proper operation and maintenance of the incinerator and in-hospital medical waste management. In addition to the results of the soft component, the goals to be achieved through the implementation of continuous efforts by the Cambodia side are as follows:

- Strengthened medical waste management at target hospitals through proper operation and maintenance of the incinerator.
- Improved infection prevention capabilities through proper medical waste management and use of the incinerator.
- Reduced the environmental impact on the surrounding area through proper medical waste management and use of incinerator.

(4) Project Schedule and Project Cost Estimation

The required implementation period for the Project is 21 months from implementation design to delivery. In this implementation period, detailed design and bidding procedures will take 4 months, and equipment procurement will take 17 months.

The Project cost estimates are not disclosed on the premise of confidentiality for one year until final verification of the contract contents with the supplier(s). The main costs to be borne by the Cambodia side include bank charges and refunding of value-added tax.

(5) Project Evaluation

1) Relevance

a) Project Beneficiaries

The beneficiaries of the Project are staff and inpatients of the 29 target hospitals (5 provincial hospitals and 24 district hospitals) and residents in the areas under the jurisdiction of hospitals. The 29 hospitals are located in the 10 targeted provinces: BT-Menchay, Battambang, Kg Cham, Kg Chhnang, Kampot, Kandal, Kratie, Prey Veng, Siemreap and Svay Rieng. The beneficiary population is 541,520 people.

b) Urgency

The public healthcare service delivery system in Cambodia is being developed, particularly in the capital Phnom Penh, but there are large disparities between the capital and the provinces. With regard to medical waste management, many hospitals in the provinces lack incinerators and other treatment equipment, and existing equipment has become obsolete. As a result, even normal medical waste treatment is not being carried out adequately. Furthermore, although the volume of medical waste related to diagnosis, treatment and vaccination has increased as a result of the spread of COVID-19 infection, medical waste management has not been thoroughly implemented. As a result, hospital staff and neighboring residents are at risk of exposure to infectious pathogens due to inappropriate dumping and disposal of infectious waste, and medical waste treatment equipment needs to be urgently developed.

c) Projects Contributing to the Achievement of the Cambodian National Health Policy

The Third Health Strategic Plan (2014-2018), published in May 2016, refers to medical waste management as "improving medical waste management, including the disposal of damaged materials and equipment that pose a high risk to public health in all hospitals" and "preventing health hazards by providing appropriate personnel and protective equipment/materials".

Furthermore, in the National Deployment and Vaccination Plan for COVID-19 Vaccines, published in January 2021, the COVID-19 vaccination campaign, one of the priorities is to create an enabling environment for proper waste treatment at each medical institution in order to cope with increased medical waste generated by the campaign.

Thus, the project is in line with the national health policy and COVID-19 response policy of Cambodia and will contribute to its implementation.

d) Consistency with the Assistance Policies and Strategies of the Government of Japan

In Japan's "Country Development Cooperation Policy for the Kingdom of Cambodia" (July 2017), the healthcare sector is recognized as a priority area for "improving quality of life". In the "JICA Country Analysis Paper to the Kingdom of Cambodia" (March 2014), the promotion of social development such as "improvement of waste management" and "improvement of health and sanitation" was analyzed as a priority issue, and the Project is consistent with these policies and analyses. In addition, JICA's issue-specific project strategy for the health sector promotes the creation of a system to strengthen the response to public health crises such as COVID-19 and to protect the health that forms the basis of people's lives, and the Project is in line with this strategy. Furthermore, as the project contributes to strengthening hospital functions, it is also positioned under the JICA's Initiative for Global Health and Medicine "Strengthening Treatment system".

2) Effectiveness

a) Quantitative Effectiveness

The quantitative indicators resulting from the Project, the current baseline value and the target value in 2027 are shown in Table 3.

Table 3 Quantitative Effectiveness of the Project

Objectively verifiable indicators	Baseline value (actual value in 2022)	Target value (2027) [Three years after project completion]
Amount of medical waste treated properly (kg/day)*	310	1,452

* medical waste amount treated by the environmental friendly equipment, such as incinerator with temperature control and sterilizer for medical waste. Baseline value and target value are medical waste amount treated in the target 29 hospitals.
Source: JICA Survey Team

The baseline value is the actual total amount of medical waste treated properly in the 29 targeted hospitals in 2022. The amount of medical waste treated by brick, aging incinerators, open fires, etc. is not included in the actual value, as it cannot be regarded as the amount of waste properly treated due to its negative environmental impact. The target value is the amount of medical waste that will be properly treated in 2027 in the 29 target hospitals by the incinerators installed by the Project and existing equipment in operation.

b) Qualitative Effectiveness

The implementation of the Project is expected to have the following qualitative effectiveness.

- Reduce damage or the risk of exposure to infectious pathogens
- Reduce negative impact on the surrounding environment (smoke pollution, odors, etc.)

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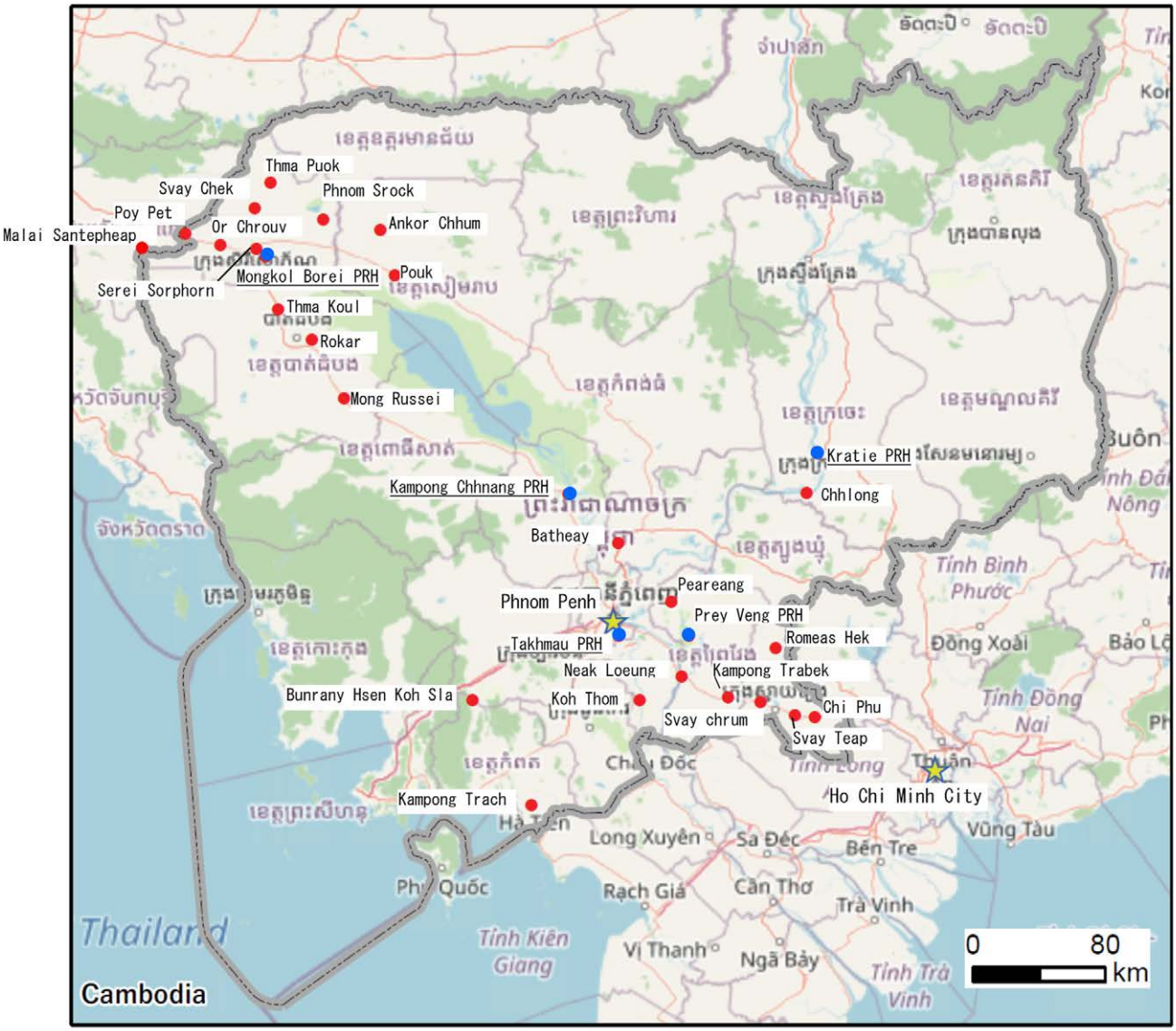
Location Map



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Legend

- Capital City
- Province Referral Hospital
- Hospital

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Abbreviations

ADB	Asian Development Bank
AOP	Annual Operational Plan
A/P	Authorization to pay
BAT	Best Available Techniques
B/A	Banking Arrangement
CDC	Council for Development of Cambodia
CIF	Cost Insurance and Freight
COVID-19	Coronavirus Disease, 2019
CPA	Complementary Package of Activities
DAC	Development Assistance Committee
D&D	Decentralization and Deconcentration
GDT	General Department of Taxation
G/A	Grant Agreement
EIA	Environmental Impact Assessment
EMoP	Environmental Monitoring Plan
EMP	Environmental Management Plan
ESMF	Environmental and Social Management Framework
E/N	Exchange of Notes
FOB	Free on Board
HC	Health Center
HIV	Human Immunodeficiency Virus
HMIS	Health Management Information System
HP	Health Post
HSP3	Health Sector Strategic Plan 2016-2020
IEE	Initial Environmental Examination
IEIA	Initial Environmental Impact Assessment
IPC	Infection Prevention Control
IPCC	Infection Prevention Control Committee
JICA	Japan International Cooperation Agency
JPY	Japanese Yen
KHR	Cambodian Riel
MMR	Maternal Mortality Ratio
MOH	Ministry of Health
MPA	Minimum Package of Activities
NMR	Neonatal Mortality Rate
NSDP	National Strategic Development Plan
OD	Operational District
OECD	Organization for Economic Co-operation and Development
OJT	On-the-Job Training
RAP	Resettlement Action Plan
RH	Referral Hospital
ToT	Training of Trainer
TOR	Terms of Reference
UHC	Universal Health Coverage
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNICEF	United Nations Children's Fund
UNOPS	United Nations Office for Project Services
USD	U.S. dollar
U5MR	Under 5 Mortality Rat
VAT	Value Added Tax

WB	World Bank
WHO	World Health Organization

Chapter 1 Background of the Project

1-1 Background of the Project

The Kingdom of Cambodia (hereinafter referred to as "Cambodia") has been affected by a global novel coronavirus disease (hereinafter referred to as "COVID-19"). Since its outbreak in February 2021, the number of infected persons has increased, with the number of new cases per day peaking at approximately 1,000. Under these circumstances, the Government of Cambodia (hereinafter referred to as "GOC") has promoted vaccination, with 87.3% of the population having completed vaccination and 59.9% having received a booster dose (as of 19 August 2022; source: Our World in Data).

Although the public healthcare service in Cambodia is being developed, particularly in the capital city of Phnom Penh, there are significant disparities between the capital and the provinces. In terms of medical waste management, local hospitals have medical waste incinerators (hereinafter referred to as "incinerators") and waste sterilizers, but some hospitals are not in full operation due to inadequate functions such as temperature control. There are many concrete incinerators and aging incinerators without adequate functions. Where hospitals do not have incinerators or sterilizers for waste, medical waste is transported to nearby hospitals with treatment facilities. Brick-made or aging incinerators are unable to control temperature or properly treat exhaust gases, causing residents in the vicinity to complain about black smoke and odors. The lack of appropriate temperature control measures and high levels of dioxin emissions in many cases lead to health problems for the residents in the vicinity. Under these circumstances, although the amount of medical waste has increased due to the COVID-19 vaccination, medical waste management has not developed. As a result, inappropriate dumping of infectious waste has occurred, leading to hospital staff, patients and neighboring residents facing the risk of exposure to pathogens from improperly managed infectious waste. Moreover,, the National Development and Vaccination Plan for COVID-19 Vaccines, published in January 2021, prioritizes development of appropriate medical waste treatment methods at each hospital to handle the increasing amount of medical waste resulting the COVID-19 vaccination campaign as one of the issues to be addressed.

The Project for the Improvement of Infectious Waste Management in the Kingdom of Cambodia (hereinafter referred to as "the Project") aims to ensure proper sterilization and infection control of infectious waste by installing incinerators in the public hospitals at the province and district levels that are responsible for infectious waste treatment. The Project is recognized as a high priority project that is essential for the realization of the above-mentioned plan. The Project targets public hospitals without proper and sufficient infectious waste treatment equipment in provinces with passed Japanese cooperation in the health sector. In addition, the decision will be made after confirming the avoidance of duplication of support from other development partners and the priorities of the Ministry of Health (hereinafter referred to as "MOH") and provincial health departments.

1-1-1 Target Area for the Survey

The target survey area is 14 provinces of Cambodia (Banteay Meanchey, Battambang, Kampong Cham, Kampong Chhnang, Kampong Thom, Kampot, Kandal, Kratie, Mondulkiri, Prey Veng, Ratanakiri, Siemreap, Svay Rieng, Takeo)[1].

1-1-2 Contents of the Request

The details of the request from Cambodia side for the Project are as follows;

1) Description of equipment and other components: incinerators and sterilizers for medical waste.
2) Description of consultancy services / soft components.
   Detailed design, bidding assistance, procurement supervision, training for operation and maintenance of

[1] Banteay Meanchey, Kampong Cham, Kampong Chhnang and Kampong Thom are hereinafter referred to as " BT-Meanchey, Kg Cham, Kg Chhnang and Kg Thom".

the procured equipment as well as quality management methods for hospital operations and other related duties, and.

3) Target hospitals for the survey: 51 hospitals listed in Table 1-1.

Table 1-1 Target Hospital for the Survey

No.	Province	Hospital	Category[2]
1	BT-Meanchey	Mongkol Borei	CPA3
2	BT-Meanchey	Serei Sorphorn	CPA1
3	BT-Meanchey	Poy Pet	CPA2
4	BT-Meanchey	Or Chrouv	CPA1
5	BT-Meanchey	Malai Santepheap	CPA1
6	BT-Meanchey	Preah Net Preah	CPA2
7	BT-Meanchey	Phnom Srock	CPA1
8	BT-Meanchey	Thma Puok	CPA2
9	BT-Meanchey	Svay Chek	CPA1
10	Battambang	Thma Koul	CPA1
11	Battambang	Mong Russei	CPA2
12	Battambang	Sampov Luon	CPA2
13	Battambang	Norin	CPA1
14	Battambang	Rokar	CPA1
15	Kg Cham	Hunsen Stung Trang	CPA1
16	Kg Cham	Choeung Prey	CPA2
17	Kg Cham	Batheay	CPA2
18	Kg Cham	Prey Chhor	CPA1
19	Kg Cham	Koh Soutin	CPA1
20	Kg Cham	Srei Santhor	CPA2
21	Kg Cham	Chamkar Leu	CPA2
22	Kg Cham	Kung Meas	CPA1
23	Kg Chhnang	Kampong Chhnang	CPA3
24	Kg Thom	Stong	CPA2
25	Kampot	Angkor Chey	CPA2
26	Kampot	Bunrany Hsen Koh Sla	CPA1
27	Kampot	Kampong Trach	CPA2
28	Kandal	Takhmau PRH	CPA3
29	Kandal	Koh Thom	CPA2
30	Kandal	Bunrany HSen Rokarkorng	CPA2
31	Kandal	Ponhea Leu	CPA2
32	Kratie	Kratie PRH	CPA3
33	Kratie	Chhlong	CPA2
34	Mondulkiri	Senmonorum PRH	CPA2
35	Prey Veng	Prey Veng PRH	CPA3
36	Prey Veng	Kampong Trabek	CPA2
37	Prey Veng	Neak Loeung	CPA2
38	Prey Veng	Peareang	CPA2
39	Ratanakiri	Ratanakiri PRH	CPA3
40	Ratanakiri	Bor Keo	CPA2
41	Siemreap	Kralanh	CPA2
42	Siemreap	Sot Nikum	CPA2

[2] Cambodia"s referral structure is a system whereby patients are transferred from health centres and subordinate Complementary Package of Activities (CPA) hospitals, CPA1 and CPA2, to the top referral hospitals in the province (mostly CPA3).

No.	Province	Hospital	Category[2]
43	Siemreap	Ankor Chhum	CPA1
44	Siemreap	Pouk	CPA2
45	Svay Rieng	Svay Chrum	CPA1
46	Svay Rieng	Chi Phu	CPA1
47	Svay Rieng	Romeas Hek	CPA2
48	Svay Rieng	Svay Teap	CPA1
49	Svay Rieng	Samaki Romduol	CPA1
50	Takeo	Kirivong	CPA2
51	Takeo	Prey Kabass	CPA2

Source: JICA Survey Team

Preliminary selection of the candidate hospitals for this survey had been conducted by JICA and MOH in accordance with the following two criterion and 51 hospitals had been selected prior to the commencement of this survey:

The 1st Criteria (34 facility)

(1) CPA 1,2,3 hospital with unconfirmed support from other development partners for Incinerator or Sterilizers for Medical Waste.
(2) Hospitals in the 7 provinces in category CPA1,2,3 where Japan's Grand Aid projects have been conducted in the past (BT-Meanchey, Battambang, Kampong Cham, Phnom Penh, Siemreap, Sihanoukville, and Svay Rieng).
(3) Provinces covered by the "Data Collection Survey on Medical Facilities, Equipment and Human Resources" conducted by JICA, other than the provincial hospitals where information is being collected to study the possibility of future cooperation (Battambang, Kampong Cham, Kampot, Siemreap, Stung Treng, and Svay Rieng).
(4) Exclude 10 hospitals in Phnom Penh where a central waste management system is established and have a lesser need in hospital-based waste management.

The 2nd Criteria (17 facilities)

(1) CPA 1,2,3 hospital with no confirmed support from other development partners for Incinerator or Sterilizers for Medical Waste.
(2) Exclude 34 facilities selected following the 1st criteria.
(3) CPA2 and 3 hospitals in 16 provinces (except Phnom Penh) where incinerators were installed in 2008 Japan's grant aid project[3] (BT-Meanchey, Battambang, Kampong Cham, Kg Chhnang, Kg Thom, Kandal, Kratie, Mondulkiri, Phnom Penh, Preah Vihear, Prey Veng, Pursat, Ratanakiri, Siemreap, Sihanoukville, Svay Rieng, and Takeo).

1-1-3 Assistance for Medical Waste Treatment Equipment from Development Partners

Major achievements of development partners in healthcare waste management include the formulation of the "Technical Guidelines on Healthcare Waste Management" in December 2011 under the guidance of the World Health Organization (hereinafter referred to as "WHO"). In 2020, in response to the outbreak and spread of COVID-19, the World Bank (hereinafter referred to as "WB") and other development partner agencies supported the "Cambodia COVID-19 Emergency Response Project (P173815) Environmental and Social Management Framework (ESMF)". The MOH officials have been visiting each facility to ensure that medical waste is managed and disposed of in accordance with the project framework. In terms of equipment for infectious waste treatment, 54 units of infectious medical waste treatment sterilizers (Steriwave 100, made in France) are being procured from 2020 to 2021 with the support of Asian Development Bank (hereinafter referred to as "ADB") and WB. In addition, Global Fund funding has led to the procurement of an incinerator through United Nations Office for Project Services (hereinafter referred to as "UNOPS") (made in the UK, Adfield MP-100). The same

[3] Reason to exclude CPA1 : The 2nd criteria is only to add some more candidate hospitals for survey since the main selection has been done by the 1st criteria. PCA2 and 3 seems more needs on MWM compare with CPA1.

type of incinerator has been installed in medical facilities in Cambodia since 2017, with 25 units installed as of July 2022. Furthermore, the United Nations Development Program (hereinafter referred to as "UNDP"), in collaboration with other development partners and agencies, is developing the provision of equipment and materials and technical guidance on infectious medical waste management and disposal through the South-South Cooperation Assistance Fund.

1-2 Past Experience of the Japanese Assistance

Japan's aid to Cambodia in FY2019 (OECD/DAC reporting basis) was USD 63.1 million in yen loans, USD 60.3 million in grant aid, and USD 31.5 million in technical cooperation, while the cumulative total through FY2019 (OECD/DAC reporting basis) was USD 425.5 million in yen loans, USD 1,761.3 million in grant aid, and USD 964.5 million in technical cooperation and the grant aid accounting is the largest amount. As of 2018, Japan is the largest development partner in Cambodia, with an estimated 2018 value of USD 169 million, compared to USD 102.8 million from the second largest development partner, the United States. The 2017 Country Assistance Policy sets "Support for further strengthening of economic and social infrastructure to achieve entry into upper-middle-income countries by 2030 " as its main goal, with three priority areas: 1) Industrial Development Support, 2) Quality of life improvement, and 3) Achieving sustainability through strengthened governance. The healthcare sector is positioned for quality of life improvement, and the policy is formulated to support the expansion of the health insurance system with a focus on achieving Universal Health Coverage (hereinafter referred to as "UHC"), while continuing to support the strengthening of healthcare systems, particularly in the area of maternal and child health. The following tables show the results of technical cooperation and grant aid in the field of medical and health care.

Table 1-2 Japan's ODA Technical Cooperation Disbursements (Health Sector)

Year	Project	Summary
1995	the Maternal and Child Health Project	Strengthening of clinical services related to maternal and child health, introduction of a medical fee collection system, training of personnel etc.
1999	National Tuberculosis Control Project	Directly Observed Therapy – Short Course (DOTS) services, conducting national TB prevalence surveys in rural areas, and training
2000	The Maternal and Child Health Project Phase 2	Strengthen maternal and child health centers, establish local maternal and child health services, improve capacity of national medical equipment management
2003	Human Resource Development of Co-medicals	Standardization of basic education for medical technologists (nursing, clinical laboratory, radiology, physical therapy), teacher qualification requirements, establishment of school establishment and management system
2004	National Tuberculosis Control Project Phase 2	Strengthening the function of the National Tuberculosis Control Plan and training medical personnel
2006	Promotion of Medical Equipment Management System (MEDEM-1)	Establish a management system by introducing basic maintenance activities for medical equipment in public medical facilities
2007	Improving Maternal and Child Health Service in Rural Areas	Improvement of local maternal and child health services, including prevention of HIV mother-to-child transmission at the local level
2009	Promotion of Medical Equipment Management System (MEDEM-2)	Strengthen the management system established in MEDEM-1, establish a system for diffusion to lower level hospitals, establish a management network and promote participation
2009	Improving the Capacity of the National TB Control Program through Implementation of the 2nd National Prevalence Survey	Strengthening TB control capacity by conducting a second national TB prevalence survey

Year	Project	Summary
2010	Improving Maternal and Newborn Care through Midwifery Capacity Development	Strengthen the midwifery training system, including capacity building of midwifery trainers in the community
2010	Strengthening Human Resources Development System of Co-medicals	Develop regulations for nurses and midwives; train nursing and midwifery
2016	Improving continuum of care with focus on intrapartum and neonatal care	Strengthening of services for prevention and control of infectious diseases of newborns and reinforcement of systems and management of services
2016	Development of social health insurance for the informal sector	Developed an action plan for the introduction of the proposed health insurance system for the informal sector, a detailed design of the system, and a framework for conducting a demonstration study. Establishment of the structure and system for the introduction of the system.
2021	Strengthening In-Service Training for Health Human Resources	Develop in-service training guidelines, plans, and curricula for nurses

Source: JICA MOFA Japan's ODA Data by Country

Table 1-3 Japan's ODA Loan Aid Disbursements (Health Sector)

Year	Project	Summary
2015	Upgrading Emergency Services	Through the establishment and operation of a private hospital with an emergency center, provide medical services such as disease prevention, treatment, and rehabilitation utilizing Japanese technology and know-how, and contribute to improving the health situation in the country.

Source: JICA MOFA Japan's ODA Data by Country

Table 1-4 Japan's ODA Grand Aid Disbursements (Health Sector)

Year	Project	Amount (M yen)	Summary
1993	Improvement of Medical Equipment of Hospital in Phnom Penh City	5.17	Provision of medical equipment to national medical facilities in Phnom Penh
1995	Expansion of National Maternal and Child Health Center	17.61	Construction of a new ward, central medical department, and other facilities at the National Maternal and Child Health Center
1998	Expansion of National Maternal and Child Health Center	3.63	Procurement of medical equipment for the National Maternal and Child Health Center
1999	Improvement of the National Tuberculosis Center	8.03	Construction of new administrative, outpatient, and technical departments at the National Tuberculosis Center
	Improvement of Medical Equipment of Siem Reap Hospital	1.12	Procurement of medical equipment to Siem Reap Hospital
2001	Reducing Infant and Child Mortality and Morbidity	3.08	Procurement of medical equipment through UNICEF
2003	Infectious Disease Control	3.95	Procurement of vaccines and vaccine cold storage equipment
	Renovation of Technical School for Medical Care	7.74	New construction and existing renovation of the headquarters building of the National School of Medical Technology
2005	Improvement of Mongkul Borey Hospital in Banteay Meanchey Province	6.83	Reconstruction of the Central Medical Department of Provincial Hospital and other facilities and procurement of medical equipment
	Infectious Disease Control	2.78	Procurement of vaccines and vaccine cold storage equipment
2007	Improvement of Kampong Cham Hospital in Kampong Cham Province	0.6	Design for reconstruction of the central medical department and other facilities of the provincial

Year	Project	Amount (M yen)	Summary
			hospital
2008	Improvement of Kampong Cham Hospital in Kampong Cham Province (1/3)	2.16	Reconstruction of the central medical department and other facilities of the provincial hospital and procurement of medical equipment (government bonds 1/3)
	Infectious Disease Control	2.3	Procurement of vaccines and vaccine cold storage equipment
2009	Improvement of Kampong Cham Hospital in Kampong Cham Province (2/3)	4.71	Reconstruction of the central medical department and other facilities of the provincial hospital and procurement of medical equipment (government bonds 2/3)
2010	Improvement of Kampong Cham Hospital in Kampong Cham Province (3/3)	3.52	Reconstruction of the central medical department and other facilities of the provincial hospital and procurement of medical equipment (government bonds 3/3)
2012	Improvement of Medical Equipment in National, Municipal and Provincial Referral Hospitals	3.74	21 Procurement of equipment for basic medical services to hospitals
2012	Improvement of Sihanouk Province Referral Hospital	15.54	Reconstruction of the central medical department and procurement of medical equipment for the provincial hospital
2013	Expansion of National Maternal and Child Health Center	11.93	Construction of a new training building and renovation of existing centers and procurement of medical and training equipment
2014	Improvement of Svay Rieng Provincial Referral Hospital	10.77	Reconstruction of the central medical department and procurement of medical equipment for the provincial hospital
2017	The Project for Improvement of Battambang Provincial Referral Hospital	14.53	Reconstruction of the central medical department and procurement of medical equipment for the provincial hospital
2020	Improvement of Referral Hospitals in Siem Reap Province	21.53	Procurement and maintenance of facilities and medical equipment for Siem Reap Provincial Hospital and four subordinate hospitals in the province

Source: JICA MOFA Japan's ODA Data by Country

1-3 Natural Conditions of the Project Site

1-3-1 Location of the Project Site

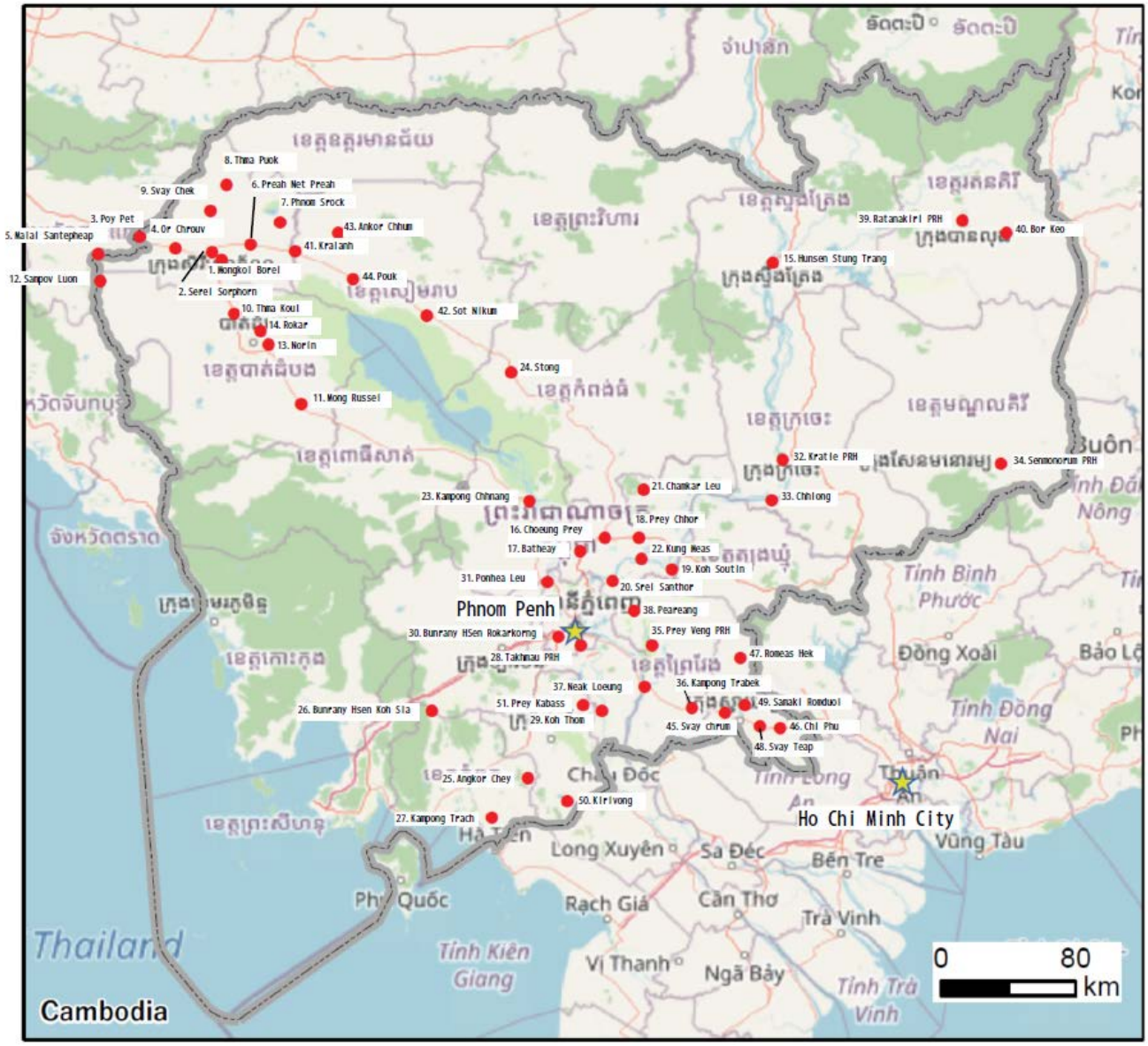
The target hospitals for the survey are 51 hospitals, shown in Table 1-5, located in 14 provinces in Cambodia as shown in Fig. 1-1.

Table 1-5 Targeted Hospital for the Survey

No	Province	Hospital	CPA	No	Province	Hospital	CPA
1	BT-Meanchey	Mongkol Borei	CPA3	28	Kandal	Takhmau PRH	CPA3
2		Serei Sorphorn	CPA1	29		Koh Thom	CPA2
3		Poy Pet	CPA2	30		Bunrany HSen Rokarkorng	CPA2
4		Or Chrouv	CPA1	31		Ponhea Leu	CPA2
5		Malai Santepheap	CPA1	32	Kratie	Kratie PRH	CPA3
6		Preah Net Preah	CPA2	33		Chhlong	CPA2
7		Phnom Srock	CPA1	34	Mondulkiri	Senmonorum PRH	CPA2
8		Thma Puok	CPA2	35	Prey Veng	Prey Veng PRH	CPA3
9		Svay Chek	CPA1	36		Kampong Trabek	CPA2
10	Battambang	Thma Koul	CPA1	37		Neak Loeung	CPA2
11		Mong Russei	CPA2	38		Peareang	CPA2
12		Sampov Luon	CPA2	39	Ratanakiri	Ratanakiri PRH	CPA3

No	Province	Hospital	CPA	No	Province	Hospital	CPA
13		Norin	CPA1	40		Bor Keo	CPA2
14		Rokar	CPA1	41	Siemreap	Kralanh	CPA2
15	Kg Cham	Hunsen Stung Trang	CPA1	42		Sot Nikum	CPA2
16		Choeung Prey	CPA2	43		Ankor Chhum	CPA1
17		Batheay	CPA2	44		Pouk	CPA2
18		Prey Chhor	CPA1	45	Svay Rieng	Svay Chrum	CPA1
19		Koh Soutin	CPA1	46		Chi Phu	CPA1
20		Srei Santhor	CPA2	47		Romeas Hek	CPA2
21		Chamkar Leu	CPA2	48		Svay Teap	CPA1
22		Kung Meas	CPA1	49		Samaki Romduol	CPA1
23	Kg Chhnang	Kampong Chhnang	CPA3	50	Takeo	Kirivong	CPA2
24	Kg Thom	Stong	CPA2	51		Prey Kabass	CPA2
25	Kampot	Angkor Chey	CPA2				
26		Bunrany Hsen Koh Sla	CPA1				
27		Kampong Trach	CPA2				

Source: JICA Survey Team



Source: JICA Survey Team

Fig. 1-1 Location of the Targeted Hospital for the Survey

1-3-2 Geological Condition

A literature review was conducted on the geological conditions of the target hospitals, the type of soil and the soil strength are shown in Table 1-6.

Table 1-6 Geological Conditions

No	Province	Hospital	Type of soil	Soil Strength (Weak, Medium, Strong)		
				0.00m to 5.00m	5.00m to 10.00m	>10.00m
1	BT-Meanchey	Mongkol Borei	Lean CLAY, Lean CLAY with sand, Sandy CLAY soil layer from 0.00m to 35.00m-40.00m, then reach rock layer.	Weak	Medium	Strong
2	BT-Meanchey	Serei Sorphorn	Lean CLAY, Lean CLAY with sand, Sandy CLAY soil layer from 0.00m to 35.00m-40.00m, then reach rock layer.	Weak	Strong	very strong
3	BT-Meanchey	Poy Pet	Lean CLAY with gravel, Sandy CLAY, Gravelly CLAY soil layer from 0.00m to 8.00m- 12.00m, then reach rock layer.	Medium	Strong	very strong
4	BT-Meanchey	Or Chrouv	Lean CLAY, Lean CLAY with sand, Sandy CLAY soil layer from 0.00m to 10.00m-15.00m, then reach rock layer.	Medium	Strong	very strong
5	BT-Meanchey	Malai Santepheap	Lean CLAY, Lean CLAY with sand, Sandy CLAY soil layer from 0.00m to 10.00m-15.00m, then reach rock layer.	Medium	Strong	very strong
6	BT-Meanchey	Preah Net Preah	Lean CLAY, Lean CLAY with sand, Sandy CLAY soil layer from 0.00 to 35.00m-40.00m, then reach rock layer.	Weak	Medium	Strong
7	BT-Meanchey	Phnom Srock	Lean CLAY, Lean CLAY with sand, Sandy CLAY soil layer from 0.00 to 25.00m-35.00m, then reach rock layer.	Weak	Medium	Strong
8	BT-Meanchey	Thma Puok	Lean CLAY, Lean CLAY with sand, Sandy CLAY soil layer from 0.00m to 15.00m-20.00m, then reach rock layer.	Weak	Strong	very strong
9	BT-Meanchey	Svay Chek	Lean CLAY, Lean CLAY with sand, Sandy CLAY soil layer from 0.00m to 20.00m-25.00m, then reach rock layer.	Weak	Medium	Strong
10	Battambang	Thma Koul	Lean CLAY, Lean CLAY with sand, Sandy CLAY soil layer from 0.00m to 30.00m-40.00m, then reach rock layer.	Medium	Strong	Strong
11	Battambang	Mong Russei	Lean CLAY, Lean CLAY with sand, Sandy CLAY soil layer from 0.00m to 30.00m-40.00m depth reach rock layer.	Weak	Medium	Strong
12	Battambang	Sampov Luon	Lean CLAY, Lean CLAY with sand, Sandy CLAY soil layer from 0.00m to 10.00m-15.00m, then reach rock layer.	Medium	Medium	Strong
13	Battambang	Norin	Lean CLAY, Lean CLAY with sand, Sandy CLAY soil layer from 0.00m to 30.00m-40.00m, then reach rock layer.	Medium	Medium	Strong
14	Battambang	Rokar	Lean CLAY, Lean CLAY with sand, Sandy CLAY soil layer from 0.00m to 30.00m-40.00m, then reach rock layer.	Medium	Medium	Strong
15	Kg Cham	Hunsen Stung Trang	Lean CLAY with gravel, Lean CLAY with sand, Sandy CLAY, SIL, Clayey SAND soil layer from 0.00m to 20.00m-25.00m, then reach rock layer.	Weak	Weak	Very Strong
16	Kg Cham	Choeung Prey	Clayey SAND with gravel, Sandy SILT, Lean CLAY with sand, Clayey SAND, Sandy Lean CLAY soil layer from 0.00m to 25.00m-30.00m, then reach rock layer.	Weak	Medium	Strong
17	Kg Cham	Batheay	Lean CLAY, Sandy CLAY, Clayey SAND soil layer from 0.00m to 15.00m-20.00m, then reach rock layer.	Weak	Medium	Strong
18	Kg Cham	Prey Chhor	Lean CLAY, Clayey SAND soil layer from 0.00m to 10.00m-15.00m, then reach rock layer.	Medium	Strong	very strong
19	Kg Cham	Koh Soutin	Sandy SILT, Silty SAND, SILT with sand, SILT, Silty SAND soil layer from 0.00m to 40.00m-50.00m, then reach rock layer.	Weak	Medium	weak
20	Kg Cham	Srei Santhor	Sandy SILT, SILT, Clayey SAND, Silty SAND soil layer from 0.00m to 40.00m-50.00m, then reach rock layer.	Weak	Medium	weak
21	Kg Cham	Chamkar Leu	Elastic SILT, Silty SAND with gravel, Sandy Elastic SILT, Elastic SILT, Sandy SILT soil layer from 0.00m to 20.00m-25.00m, then reach rock layer.	Medium	Strong	very strong
22	Kg Cham	Kung Meas	Sandy SILT, Lean CLAY, Lean CLAY with sand, Clayey Silty SAND soil layer from 0.00m to 45.00m-60.00m, then reach rock layer.	Weak	Medium	weak
23	Kg Chhnang	Kampong Chhnang	Lean CLAY, SILT, Clayey SAND soil layer from 0.00m to 15.00m-20.00m, then reach rock layer.	Medium	Strong	very strong
24	Kg Thom	Stong	Lean CLAY, Lean CLAY with sand, Sandy CLAY, Clayey SAND soil layer from 0.00m to 20.00m-30.00m, then reach rock layer.	Medium	Strong	very strong
25	Kampot	Angkor Chey	Lean CLAY, SILT, Silty SAND soil layer from 0.00m to 35.00m-40.00m, then reach rock layer.	Weak	Medium	Strong

No	Province	Hospital	Type of soil	Soil Strength (Weak, Medium, Strong)		
				0.00m to 5.00m	5.00m to 10.00m	>10.00m
26	Kampot	Bunrany Hsen Koh Sla	Lean CLAY, SILT, Silty SAND soil layer from 0.00m to 35.00m-40.00m, then reach rock layer.	Medium	Strong	very strong
27	Kampot	Kampong Trach	Lean CLAY, SILT, Clayey soil layer from 0.00m to 35.00m-40.00m, then reach rock layer.	Medium	Strong	very strong
28	Kandal	Takhmau PRH	Lean CLAY, SILT, Silty SAND soil layer from 0.00m to 40.00m-50.00m, then reach rock layer.	Weak	Medium	weak
29	Kandal	Koh Thom	Lean CLAY, SILT, Silty SAND soil layer from 0.00m to 40.00m-50.00m, then reach rock layer.	Weak	Medium	weak
30	Kandal	Bunrany HSen Rokarkorng	Lean CLAY, SILT, Silty SAND soil layer from 0.00m to 40.00m-50.00m, then reach rock layer.	Weak	Medium	weak
31	Kandal	Ponhea Leu	Lean CLAY, SILT, Silty SAND soil layer from 0.00m to 40.00m-50.00m, then reach rock layer.	Weak	Medium	weak
32	Kratie	Kratie PRH	Lean CLAY, Lean CLAY with gravel, Sandy CLAY, soil layer from 0.00m to 15.00m-25.00m, then reach rock layer.	Medium	Strong	very strong
33	Kratie	Chhlong	Lean CLAY, SILT, Silty SAND, soil layer from 0.00m to 30.00m-40.00m, then reach rock layer.	Medium	Weak	Strong
34	Mondulkiri	Senmonorum PRH	Gravelly Silty SAND, Sandy Elastic SILT, Sandy CLAY soil layer from 0.00m to 5.00m-10.00m, then reach rock layer.	Weak	very strong	very strong
35	Prey Veng	Prey Veng PRH	Lean CLAY, Sandy CLAY, Silty SAND soil layer from 0.00m to 40.00m-50.00m, then reach rock layer.	Medium	Medium	Strong
36	Prey Veng	Kampong Trabek	Lean CLAY, Sandy CLAY, Silty SAND soil layer from 0.00m to 40.00m-50.00m, then reach rock layer.	Weak	Medium	weak
37	Prey Veng	Neak Loeung	Lean CLAY, Sandy CLAY, Silty SAND soil layer from 0.00m to 45.00m-60.00m, then reach rock layer.	Weak	Medium	weak
38	Prey Veng	Peareang	Lean CLAY, Sandy CLAY, Silty SAND soil layer from 0.00m to 40.00m-50.00m, then reach rock layer.	Weak	Medium	Strong
39	Ratanakiri	Ratanakiri PRH	Lean CLAY, SILT, Sandy Lean CLAY, Silty SAND soil layer from 0.00m to 20.00m-35.00m, then reach rock layer.	Weak	Strong	Medium
40	Ratanakiri	Bor Keo	Lean CLAY, SILT, Sandy Lean CLAY, Silty SAND soil layer from 0.00m to 20.00m-35.00m, then reach rock layer.	Weak	Strong	Medium
41	Siemreap	Kralanh	Sandy Lean CLAY, Clayey SAND, Lean CLAY with sand soil layer from 0.00m to 45.00m-60.00m, then reach rock layer.	Medium	Strong	Strong
42	Siemreap	Sot Nikum	Sandy Lean CLAY, Clayey SAND, Lean CLAY with sand soil layer from 0.00m to 45.00m-60.00m, then reach rock layer.	Weak	Medium	Strong
43	Siemreap	Ankor Chhum	Sandy Lean CLAY, Clayey SAND, Lean CLAY with sand soil layer from 0.00m to 45.00m-60.00m, then reach rock layer.	Weak	Medium	Medium
44	Siemreap	Pouk	Sandy Lean CLAY, Clayey SAND, Lean CLAY with sand soil layer from 0.00m to 40.00m-50.00m, then reach rock layer.	Weak	Medium	Strong
45	Svay Rieng	Svay Chrum	Lean CLAY, Lean CLAY with sand, SILT, Silty SAND soil layer from 0.00m to 40.00m-50.00m, then reach rock layer.	Weak	Medium	Medium
46	Svay Rieng	Chi Phu	Lean CLAY, Lean CLAY with sand, SILT, Silty SAND soil layer from 0.00m to 40.00m-50.00m, then reach rock layer.	Medium	Strong	Medium
47	Svay Rieng	Romeas Hek	Lean CLAY, Lean CLAY with sand, SILT, Silty SAND soil layer from 0.00m to 40.00m-50.00m, then reach rock layer.	Medium	Weak	Medium
48	Svay Rieng	Svay Teap	Lean CLAY, Lean CLAY with sand, SILT, Silty SAND soil layer from 0.00m to 40.00m-50.00m, then reach rock layer.	Medium	Strong	Medium
49	Svay Rieng	Samaki Romduol	Lean CLAY, Lean CLAY with sand, SILT, Silty SAND soil layer from 0.00m to 40.00m-50.00m, then reach rock layer.	Weak	Medium	Medium
50	Takeo	Kirivong	Clayey SAND, Lean CLAY soil layer from 0.00m to 35.00m-50.00m, then reach rock layer.	Weak	Strong	Strong
51	Takeo	Prey Kabass	Clayey SAND, Silty SAND, Lean CLAY soil layer from 0.00m to 35.00m-50.00m, then reach rock layer.	Medium	Strong	Strong

Source: JICA Survey Team

1-3-3 Metrological Condition

Based on the hearing survey at the target hospitals, the possibility of flooding at the proposed site for the incinerator installation is shown in Table 1-7. Of the 51 target hospitals for the survey, 15 are found to be at risk of retaining stormwater at the potential equipment installation sites.

Table 1-7 Possibility for Flooding

No	Province	Hospital	Possibility for flooding
1	BT-Meanchey	Mongkol Borei	Yes
2	BT-Meanchey	Serei Sorphorn	Yes
3	BT-Meanchey	Poy Pet	No
4	BT-Meanchey	Or Chrouv	Yes
5	BT-Meanchey	Malai Santepheap	Yes
6	BT-Meanchey	Preah Net Preah	No
7	BT-Meanchey	Phnom Srock	No
8	BT-Meanchey	Thma Puok	Yes
9	BT-Meanchey	Svay Chek	No
10	Battambang	Thma Koul	No
11	Battambang	Mong Russei	No
12	Battambang	Sampov Luon	No
13	Battambang	Norin	Yes
14	Battambang	Rokar	No
15	Kg Cham	Hunsen Stung Trang	No
16	Kg Cham	Choeung Prey	Yes
17	Kg Cham	Batheay	No
18	Kg Cham	Prey Chhor	No
19	Kg Cham	Koh Soutin	No
20	Kg Cham	Srei Santhor	Yes
21	Kg Cham	Chamkar Leu	Yes
22	Kg Cham	Kung Meas	No
23	Kg Chhnang	Kampong Chhnang	Yes
24	Kg Thom	Stong	Yes
25	Kampot	Angkor Chey	No
26	Kampot	Bunrany Hsen Koh Sla	No
27	Kampot	Kampong Trach	No
28	Kandal	Takhmau PRH	No
29	Kandal	Koh Thom	No
30	Kandal	Bunrany HSen Rokarkorng	No
31	Kandal	Ponhea Leu	No
32	Kratie	Kratie PRH	Yes
33	Kratie	Chhlong	No
34	Mondulkiri	Senmonorum PRH	No
35	Prey Veng	Prey Veng PRH	No
36	Prey Veng	Kampong Trabek	No
37	Prey Veng	Neak Loeung	No
38	Prey Veng	Peareang	No
39	Ratanakiri	Ratanakiri PRH	No
40	Ratanakiri	Bor Keo	No
41	Siemreap	Kralanh	Yes
42	Siemreap	Sot Nikum	No
43	Siemreap	Ankor Chhum	Yes
44	Siemreap	Pouk	No
45	Svay Rieng	Svay Chrum	No
46	Svay Rieng	Chi Phu	Yes
47	Svay Rieng	Romeas Hek	No
48	Svay Rieng	Svay Teap	No
49	Svay Rieng	Samaki Romduol	No
50	Takeo	Kirivong	No
51	Takeo	Prey Kabass	No

Source: JICA Survey Team

1-4 Environmental and Social Consideration

This project involves procurement and installation of incinerators to 29 hospitals. This project does not qualify as a large-scale waste management and disposal sector project as given in the JICA Guidelines for Environmental and Social Considerations (January 2022; hereinafter JICA Environmental Guidelines). It also

is not judged to have a major adverse impact on the environment, has no environmentally sensitive features, and is not in an environmentally sensitive region as given in the JICA Environmental Guidelines. Given this, the project is Category B based on the JICA Environmental Guidelines.

1-4-1 Comparing Alternatives

Alternatives are exanimated for the project to mitigate the environmental and social impacts as shown in Table 1-8. The targeted 29 hospitals are unable to properly treat medical waste with their existing waste treatment equipment, or if they can, the amount of medical waste treated is not keeping pace with the volume of medical waste generated. Even though the incinerator requires appropriate burning temperature control and exhaust gas treatment, incinerator made of brick or concrete, and aging incinerators are not equipped with these functions. Furthermore, if the volume of medical waste exceeds the treatment capacity, medical waste, including untreated infectious waste, will pile up in the hospital, leading to a risk of exposure to infectious pathogens. Therefore, it is important to properly dispose of medical waste treatment generated in hospitals. If the Project is not implemented, the medical waste will not be properly treated because of continuation of open burning, improper treatment by the aging incinerator without proper functions. Even though the procurement of incinerators may be expected to have negative environmental impacts on air and water caused of the emission gas and ash, the mitigation measures can be taken to minimize the environmental impact.

If a sterilizer for medical waste is installed instead of an incinerator, the impact of air pollution is less than that of an incinerator. On the other hand, it requires a stable power supply and more sophisticated equipment maintenance management than incinerators. In addition, the amount of residue after treatment is not reduced compared to that before treatment, so measures must be taken for disposal.

Table 1-8 Alternatives

Item		Case 1	Case 2	Zero Option
Type/outline of alternative		Install and operate an incinerator in the hospital for medical waste disposal.	Install and operate a sterilizer in the hospital for medical waste disposal.	The situation where medical waste is not properly disposed.
Technical Aspect		Dioxin generation can be prevented by high temperature processing technology and reducing the amount of medical waste. On the other hand, there are smoke and odor problems due to improper operation or insufficient fuel supply.	Medical waste is disinfected by sterilization. There is no reduction in waste volume after treatment like an incinerator, and disposal of the residue after sterilization is problematic. In addition, the usage is limited without a stable power supply. Maintenance and operation is more difficult than for incinerators.	Currently, medical waste is disposed of using open burning and simple incinerators.
Impact	Pollution	Impact : Medium(-) Due to the operation of the incinerator, the effects of air pollution and noise are relatively large compared to other cases.	Impact : Small(-) It is less affected by air pollution and noise.	Impact : Large(-) The incineration temperature is not controlled and regulated, and dioxins and other substances are generated.
	Natural environment	Impact : Small(-) Impact on the natural environment is small	Impact : Small(-) Impact on the natural environment is small	
	Social environment	Impact : Medium(+) The aging incinerators currently in use have caused smoke and odor problems, causing complaints from nearby residents. New incinerators can avoid this problem and have a positive impact on the social environment.	Impact : Small(-) It generates a strong, pungent odor during processing, affecting the working environment of workers.	Impact : Medium(-) Existing incinerators have caused smoke and odor problems and causing complaints from nearby residents.
Remarks		In order to prevent smoke and odors caused by incomplete combustion, the equipment should	It is difficult to operate and maintain because of new technology. Stable electric supply	

Item	Case 1	Case 2	Zero Option
	be properly operated, regular maintenance should be carried out, and it should be operated by a skilled (trained) operator.	is required. Some hospitals have stopped operations.	
Selection	This case is selected.	It is difficult to maintain the equipment, and considering the local power situation, it will not be adopted.	Zero option is not selected.

Source: JICA Survey Team

1-4-2 Scoping

The scoping results are shown in Table 1-9. In terms of the pollution, noise to the surrounding environment during construction shall be considered, and there are concerns about air pollution from the emission gas of the incinerator and water pollution from incinerated ash when the incinerator is in service. However, no significant impact is anticipated, as the incinerator with temperature control and exhaust gas treatment will be properly operated. In terms of the social environment, the incinerator will enable the proper disposal of medical waste that could not be properly disposed of in aging incinerators, thereby reducing the risk of health hazards to residents in and around the hospital.

Table 1-9 Scoping Results

	№	Evaluation Item (from the JICA Guidelines)	Rating		Reason of the Rating
			Pre/During Construction	Operation Phase	
Pollution	1	Air pollution	✓	✓	**Construction phase:** Temporary negative impact is expected on air quality due to the use of construction machines, such as a crane. **Operation phase:** Even though the incinerator to be procured is small in size, negative impact is expected on air pollution.
	2	Water pollution		✓	**Construction phase:** No impact is expected because of installation work only. **Operation phase:** Nearby water sources can be affected by incinerator ash.
	3	Waste	✓		**Construction phase:** Even though no waste earth and tree trimming are expected, an increase in waste from workers during construction and solid waste from construction work is expected. **Operation phase:** No impact is expected.
	4	Soil contamination			**Construction:** No impact is expected. **Operation phase:** Even though improper maintenance cause oil leaking, the leaked oil is caught by the concrete basement.
	5	Noise and vibration	✓	✓	**Construction phase:** Noise and vibration is expected to be generated due to works of construction machines and equipment. **Operation phase:** Noise and vibration by incinerators is expected if not properly maintained.
	6	Land subsidence			**Construction and operation phase:** No impact is expected since activities which cause ground subsidence is not included.
	7	Odor			**Construction and operation phase:** No impact is expected since, solid waste generated in the hospitals is managed, stored and treated in the hospitals.
	8	Bottom Sediment			**Construction and Operation phase:** No impact is expected since activities that affect bottom sediment is not included.
Natural environment	9	Protected area			**Construction phase and Operation phase:** There is no protected area around the project site. No impact is expected.
	10	Ecosystem		✓	**Construction and Operation phase:** During operation, the emission gas from the incinerator is expected to have an impact on the surrounding ecosystem.

	№	Evaluation Item (from the JICA Guidelines)	Rating		Reason of the Rating
			Pre/During Construction	Operation Phase	
	11	Hydrology			**Construction and Operation phase:** No activities cause negative impact on the hydrological situation of the river.
	12	Topography and geology			**Construction and operation phase:** No change of topography of land. No particular topographical and geological area is confirmed around the Project sites.
Social environment	13	Involuntary resettlement			**Pre-Construction phase:** No resettlement is expected. **Operation phase:** No impact is expected
	14	The poor			**Construction phase:** No impact is expected by the small construction for the installation work with around 5 workers only. **Operation phase:** No impact is expected.
	15	Indigenous and ethnic people			**Construction phase:** There is no are where indigenous and ethnic people live. No impact is expected. **Operation phase:** There is no are where indigenous and ethnic people live. No impact is expected.
	16	Local economy such as employment and livelihood			**Pre-construction phase:** No impact on local economy expected by small construction for the installation work with around 5 workers only. **Operation phase:** No impact on the local business is expected
	17	Land use and utilization of local resources			**Pre-construction phase:** No impact is expected. **Operation phase:** No impact is expected.
	18	Water usage			**Construction phase:** No impact is expected. **Operation phase:** No impact is expected.
	19	Existing social infrastructures and services		✓	**Pre-Construction and construction phase:** No impact on the access to emergency services and social infrastructure (e.g. school, hospital etc.) since no increase of traffic after transportation of the equipment is expected. **Operation phase:** Positive impact is expected (e.g. reducing medical waste can improve the performance at hospitals.).
	20	Social institutions such as local decision making institutions			**Construction and operation phase:** No impact on Local decision-making institutions is expected.
	21	Misdistribution of benefit and damage			**Construction and operation phase:** No misdistribution of benefit and damage to install the incinerator which treat medical waste is expected.
	22	Local conflicts of interest			**Construction and operation phase:** Local conflicts of interest caused by this project is not expected.
	23	Cultural heritage			**Pre-Construction, construction and operation phase:** Religious and cultural facilities are not observed at the project sites.
	24	Landscape			**Construction and operation phase:** No impact is expected.
	25	Gender			**Construction and operation phase:** The construction will take place in an open area of the hospital, but the hospital will be staffed by female nurses and employees. Female patients also visit the hospital. During the construction, access to the area around the construction site will be restricted to those involved in the construction, including women. Therefore, no gender impact is expected during the installation of the incinerator. In addition, no gender-related impacts are expected regardless of gender during the operation phase, since the project is the procurement of incinerators in the hospitals.
	26	Right of children			**Construction and operation phase:** No child worker will be involved in the Project given the small construction scale requiring around five workers. No negative impacts specifically on children's right are expected.

	No	Evaluation Item (from the JICA Guidelines)	Rating		Reason of the Rating
			Pre/During Construction	Operation Phase	
	27	Infectious diseases such as HIV/AIDS			**Construction and operation phase:** Infection risk is not increased because there are no workers from other areas.
	28	Labor environment			**Construction and operation phase:** Labor environment is protected because the equipment will be installed with around five workers for a short period. Since the equipment will be utilized by workers of the hospitals, no impact on the working environment is expected.
Others	29	Accidents	✓	✓	**Construction phase:** It is necessary to consider occupational accidents during construction. **Operation phase:** There is a risk of accident when operating the incinerator.
	30	Cross boundary impacts and climate change			**Construction and operation phase:** No impact is expected.

✓ Impact is expected
Source: JICA Survey Team

1-4-3 Terms of Reference for Environmental Impact Assessment

Study methods for the environmental items narrowed down from the scoping assessments is given in the Terms of Reference (hereinafter referred to as "TOR") in Table 1-10. Since the Project is procurement of incinerators, no instrumental environmental measurements (air, water, noise, etc.) are taken. The study is based on existing data and interviews conducted by environmental group members at the target hospital and its surroundings.

Measurement of noise values in the hospitals was conducted as a baseline survey of the monitoring as mentioned in 1-4-8.

Table 1-10 TOR for Environmental Items

No	Impacts (Expected impacts only)	Item for Study	Methodology
1. Pollution			
1	Air Pollution	✓ Collect the related regulation and standard ✓ Confirm present condition in the project area	✓ Collect existing information. ✓ Estimate the impacts during an operation phase by incinerators based on hearing from targeted hospitals and the manufactures.
2	Water Pollution	✓ Collect the related regulation and standard ✓ Collect information on present water sources	✓ Collect existing information. ✓ Estimate impacts by conducting water source surveys and hearing surveys on water quality around the target hospitals.
3	Waste	✓ Work contents to generate waste ✓ Disposal status of general waste at hospitals	✓ Confirm the amount of general waste generated during construction from the contractor and estimate the impact. ✓ Check the disposal status of general waste in the hospital and confirm whether general waste from construction can be treated.
5	Noise and Vibration	✓ Collect the related regulation and standard ✓ Confirm present condition in targeted hospitals	✓ Collect existing information. ✓ Estimate the impact through hearing from targeted hospitals. ✓ Measure noise value at the health facilities as baseline.
2. Natural Environment			
10	Ecosystem	✓ Confirm the ecosystem around the hospitals ✓ Confirmation of emission gas amount from incinerator	✓ Predict the impact by confirming endangered species around the project site through a survey of existing materials (the national red list of Cambodia). ✓ Hearing from the incinerator manufacturer about the emission gas from the incinerator to be installed and predict the impact on the ecosystem.
3. Social Environment			
19	Existing Social	✓ Identify the infrastructures	✓ Hearing from targeted hospitals and estimate the

No	Impacts (Expected impacts only)	Item for Study	Methodology
	Infrastructures and Services	affected by the Project	impact.
4. Others			
29	Accidents	✓ Details of construction , incinerator structure and mechanism	✓ Predict the impact of accidents based on hearing from the contractors about construction details, and predict accidents caused by incinerators.

Source: JICA Survey Team

1-4-4 Impact Assessment

Table 1-11 is an impact assessment of the project components based on the Environmental and Social Evaluation results in the previous section. The incinerators to be procured under the Project are small in size with a maximum 50kg/hour capacity. According to Cambodian law, such a small incinerator is not subject to an Environmental Impact Assessment (hereinafter referred to as "EIA") or an Initial Environmental Impact Assessment (hereinafter referred to as "IEIA"). Under Japanese Environmental Impact Assessment law, development projects above a certain size are subject to assessment, however waste treatment facilities do not require the assessment. In addition, under the Waste Management Law, living environment impact studies are required for general waste incineration facilities with a processing capacity of 200 kg/hour or more, which does not apply to small incinerators such as the one targeted in this project. Moreover, the Air Pollution Control Law applies to smoke and soot generating facilities that are waste incinerators with a grate area of $2m^2$ or more or an incineration capacity of 200 kg/hour or more. Small incinerators, such as the one targeted in this project, are not subject to air quality measurement or monitoring.

Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control) sets emission standards for pollutants for each specific industrial activity and also requires environmental monitoring. Environmental monitoring is supposed to be based on Best Available Techniques (hereinafter referred to as "BAT"), and the BAT specifies the items to be monitored and their frequency. Specific industrial activities subject to the Directive 2010/75/EU and waste-related operations subject to the application of BAT are as follows, which do not apply to small-scale operations as in this Project.

- Non-hazardous waste treatment facilities: treatment capacity exceeding 3 tons per hour
- Hazardous waste treatment facilities: treatment capacity exceeding 10 tons per day

As mentioned above, small incinerators such as the one to be procured under the Project are not subject to environmental monitoring in Japan and the EU. In light of these standards, air pollution under the operation is not subject to monitoring.

Table 1-11 Evaluation of Environmental Impact

	No	Impacted Item on JICA Guidelines	Scoping Result		Evaluation		Reasons of Evaluation
			Pre/ During Construction	Operation Phase	Pre/ During Construction	Operation Phase	
Pollution	1	Air pollution	✓	✓	D	D	**Construction phase:** The work involved only the installation of the incinerator by about five people, and the only heavy equipment used was a crane, so no impact on air quality is expected. **Operation phase:** The incinerator is small and emission gas from the incinerator becomes thin immediately because of the small volume of the emission gas equivalent to a few cars.
	2	Water pollution		✓	N/A	D	**Construction phase:** No impact is expected. **Operation phase:** By scoping, it was assumed that the incineration ash would pollute the water, but disposing of the ash in the pit inside the hospital would not affect the surrounding water environment. In addition, there are no water sources (rivers, lakes) to be polluted around the target hospitals.

	№	Impacted Item on JICA Guidelines	Scoping Result		Evaluation		Reasons of Evaluation
			Pre/ During Construction	Operation Phase	Pre/ During Construction	Operation Phase	
	3	Waste	✓		D	N/A	**Construction phase:** Although an increase in waste by workers and construction waste was anticipated during construction, no waste impacts are expected during construction. Since general waste generated in the hospital will be collected by a private contractor and can be disposed of.
	5	Noise and vibration	✓	✓	B-	B-	**Construction phase:** Noise generation is expected due to given the use of construction machines such as crane. **Operation phase:** Noise and vibration by incinerators is expected.
Natural environment	10	Ecosystem		✓	N/A	D	**Operation phase:** The installation work will be done in a vacant space within the hospitals, and since only one small incinerator will be installed in each hospital. Therefore, the amount of emission gas is small and no impact on the existing ecosystem is expected. Medical waste management is in place within the hospital, and the waste is disposed of properly, so there will be no impact on the ecosystem. During construction, the area will be enclosed to prevent animals from entering, and even when the incinerator is in service, there will be no impact because fencing and other measures will be taken to prevent animals from entering the area around the incinerator.
Social environment	19	Existing social infrastructures and services		✓	N/A	B+	**Operation phase:** No impact on the access to emergency services and social infrastructure (e.g. school, hospital etc.) since no increase of traffic after transportation of the equipment is expected. **Operation phase:** Positive impact is expected (e.g. reducing medical waste can improve the performance at hospitals.).
Others	29	Accidents	✓	✓	B-	B-	**Construction phase:** Since cranes are used to handle heavy objects, precautions should be taken for accidents caused by falling heavy objects. **Operation phase:** It is necessary to prevent injuries related with the high temperature due to operational errors.

Note: A+/-: Significant positive/negative impact is expected.
B+/-: Some positive/negative impact is expected.
C+/-: Extent of impact is unknown at this stage (A further examination is needed, and the impact could be clarified as the study progresses)
D: No impact is expected.
N/A: Evaluation is not conducted
Source: JICA Survey Team

1-4-5 Mitigation Measures and Environmental Management Plan

Mitigation measures that may avoid, minimize, eliminate or mitigate the negative impacts listed above should be considered at each stage of pre, during construction and operation to ensure that the project achieves its objectives while minimizing the associated environmental impacts. Mitigation measures for environmental items assessed as having negative impacts in the previous section are given in Table 1-12.

Table 1-12 Environmental Management Plan (Draft)

	№	Impacted Item on JICA Guidelines	Major Mitigation Measures		Responsibility		Cost
			Pre and During Construction phase	Operation phase	Implementation Agency	Responsible Agency	
Pollution	5	Noise and vibration	[Construction noise] ✓ Selecting low-noise equipment. ✓ Avoiding works of heavy equipment during night time. ✓ Informing the construction schedule to surrounding communities to obtain their consensus.	[Noise from Incinerators] ✓ Install a low-noise fan in the incinerator. ✓ Install a soundproof box on the blower of the incinerator.	Contractor and Infection Prevention Control Committee (hereinafter referred to as "IPCC") of the hospitals	MOH	Procured incinerator is soundproofed, so there is no additional cost.
Others	29	Accidents	[Accident due to crane operation] ✓ Enclose the area around the site to prevent the general public from entering. ✓ Safety management, such as not going under the load when operating a crane.	[Accident due to incinerator operation ✓ Provide initial operation instruction so that the operator can operate the incinerator properly. ✓ Prepare an operation manual.	Contractor and IPCC of the hospitals	MOH	Included in construction cost.

Source: JICA Survey Team

1-4-6 Monitoring Plan

The environmental monitoring plan during construction and operation is shown in Table 1-13. The monitoring method was established considering the availability and capability of measuring materials in Cambodia. Monitoring frequency and items will be reviewed considering the result.

Table 1-13 Environmental Monitoring Plan (EMoP)

Category	Item	Method of Monitoring	Monitoring Place/Point	Frequency (Period)	Referable Standards	Implementation Org.	Responsible/Supervising org.	Responsible Organization for Monitoring Cost
Construction Phase								
Noise and vibration	Noise level	On site measurement	One point at construction site and one site at near residence area	Every day	Sub-decree on Air Pollution Control and Noise Disturbance (2000), Cambodia	Contractor	MOH and IPCC of the hospitals	Including cost of construction
Accidents	Records of accidents and near –misses accidents	Report from contractor		Once a week		Contractor	MOH and IPCC of the hospital	Including cost of construction
Operation Phase								
Noise and vibration	Noise level	On site measurement	Selected sites near incinerator and near residence area	Once a year	Sub-decree on Air Pollution Control and Noise Disturbance (2000), Cambodia	MOH	MOH and IPCC of the hospitals	Including the cost of Operation and Maintenance

Category	Item	Method of Monitoring	Monitoring Place/Point	Frequency (Period)	Referable Standards	Implementation Org.	Responsible/Supervising org.	Responsible Organization for Monitoring Cost
Accidents	Accident record due to operation error	Operation report		Once a year		MOH	MOH and IPCC of hospitals	Including the cost of Operation and Maintenance

Source: JICA Survey Team

1-4-7 Implementation Structures of Environmental Management Plan and Environmental Monitoring Plan

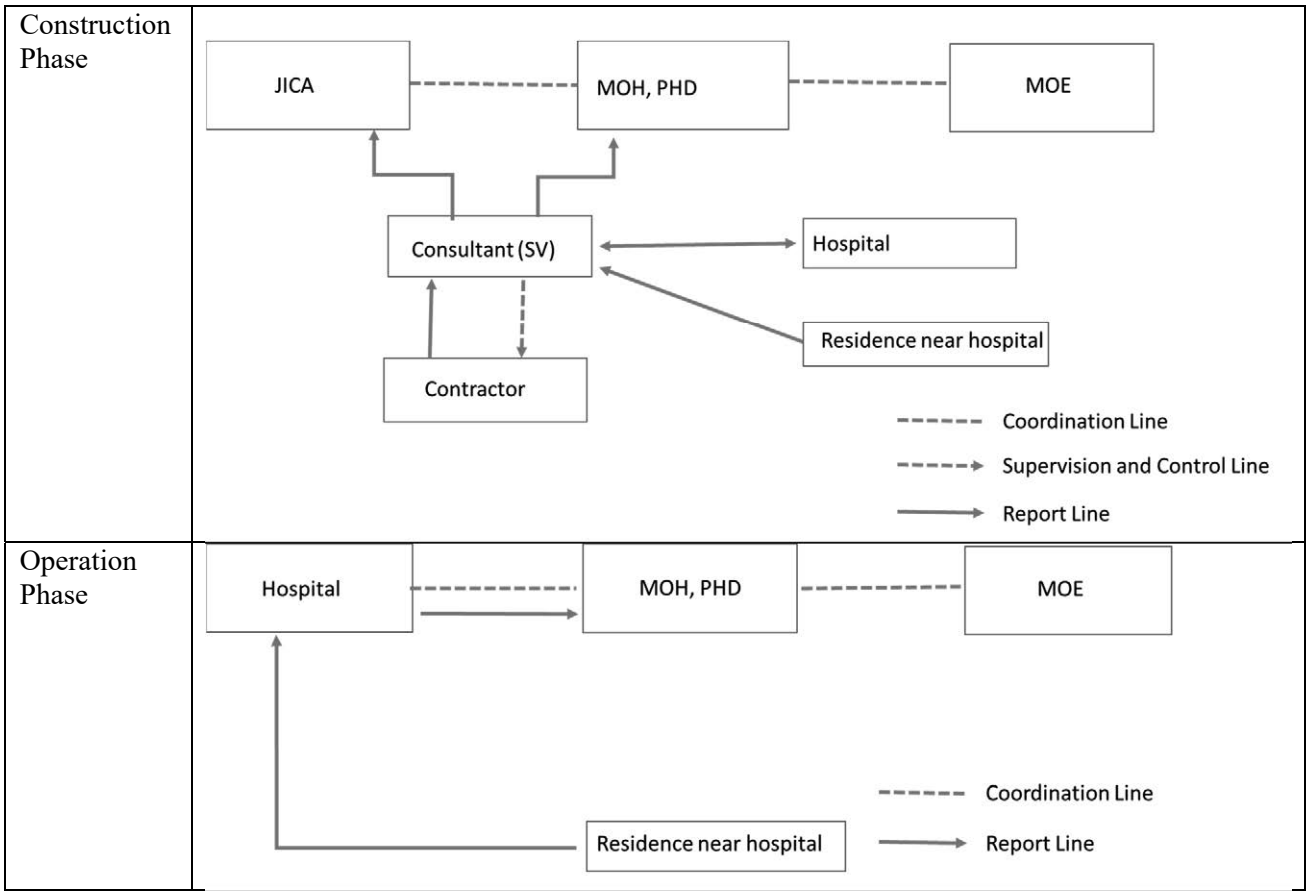
Implementation structures of Environmental Management Plan (hereinafter referred as to "EMP") and Environmental Monitoring Plan (hereinafter referred to as "EMoP") during construction and operation phase are as follows.

Table 1-14 Environmental Management and Monitoring Organization

MOH IPCC of the hospitals	- Conduct EMP and EMoP for the mitigation measures. - Confirm the EMP included in the specifications of the contract document before the construction. - Bear responsibility for any accident evenly with the contractor during construction. - Confirm the environmental monitoring report prepared by the contractor in construction phase. - Conduct environmental monitoring via an inspection agency in the operation phase.
Contractor Manufacture	- Responsible for applying environmental management plan and environmental regulations during construction. Include environmental experts in the workforce to ensure compliance with environmental constraints and to conduct environmental monitoring on site. - Prepare environmental monitoring reports and submit them to the Ministry of Health and the hospitals' IPCC in the construction phase.
MoE	- Confirm the process of the EMP and conduct monitoring if necessary.

During construction, contractors will implement mitigation measures in accordance with the EMP. The consultant will supervise the work and report the monitoring results submitted by the contractor to JICA and the MOH in line with the EMoP. The MOH will also share information with the MOE to confirm that there are no problems. If there are any problems with the hospital or surrounding residents, the consultant will interview them and act accordingly based on observations made during interviews.

During operation, the hospital will take the lead in monitoring according to the EMoP and share the results with the MOH. After that, MOH informs the results to MOE. In addition, the hospital will respond to inquiries about the incinerator from nearby residents. The monitoring results will also be shared with JICA (Three years after completion).



PHD: Provincial Health Departments
Source : MOH

Fig. 1-2 Implementation Structure of EMP and EMoP during Construction and Operation

1-4-8 Environmental Monitoring Form

Draft monitoring forms to be used during construction and operation are shown in Table 1-15 and Table 1-16. Serei Sorphorn Hospital in BT-Meanchey Province is currently planning to relocate, and baseline value of the noise will be obtained after relocation during the operation phase. Many hospitals exceed the baseline values. In these hospitals, noise levels during construction and in-service will be controlled to ensure that noise levels do not significantly exceed the baseline results, with reference to Cambodia's standards and international standards.

Table 1-15 Monitoring Form (during Construction) (Draft)

Item	Monitoring Item (unit)	Baseline Value	Measured Value (Mean)	Measured Value (Max.)	Standards of the country	International Standards	Remarks (Measurement point, frequency, method, etc.)
Noise	dB(A)				45	50	One point at construction site and one site near residence area

Monitoring Item	Status during the reported period
Accidents	(Description field)

Source : JICA Survey Team

Table 1-16 Monitoring Form (during Operation) (Draft)

Item	Monitoring Item (unit)	Baseline Value	Measured Value (Mean)	Measured Value (Max.)	Standards of the country	International Standards	Remarks (Measurement point, frequency, method, etc.)
Noise	dB(A)				45	50	sites around the hospital, one time/ year

Monitoring Item	Status during the reported period
Accidents	(Description field)

Source : JICA Survey Team

1-4-9 Environmental Checklist

Environmental checklist is shown in Table 1-17.

Table 1-17 Environmental Checklist

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/A (b) N/A (c) N/A (d) N/A	(a) EIA, IEIA and EPC are not required for the Project※. (b) Same as above. (c) Same as above. (d) No additional requirement. ※Initial Environmental Impact Assessment : IEIA Environmental Impact Assessment : EIA Environment Protection Contract : EPC
	(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) Stakeholder meetings were held at nine hospitals to get comment from residents. MOH is requested to disclose the results of the SHMs though their homepage. (b) The specifications of the equipment will be based on the comments from SHMs.
	(3) Examination of Alternatives	(a) Have alternative plans of the project been examined with social and environmental considerations?	(a) Y	(a) Two equipment (incinerator and sterilizer) to be used have been examined.
2 Pollution Control	(1) Air Quality	(a) Do air pollutants, such as sulfur oxides (SOx), nitrogen oxides (NOx), and soot and dust, and dioxins emitted from various sources, such as incinerators, and vehicles used for waste collection and transportation comply with the country's emission standards and ambient air quality standards?	(a) Y	(a) The volume of the emission gas generated from the incinerator with the emission gas treatment device is small because of the small capacity. The quality of the emission gas will be checked before the operation.
	(2) Water Quality	(a) Do effluents from various facilities comply with the country's effluent standards and ambient water quality standards? (b) Does the water quality of leachates from the waste disposal sites comply with the country's effluent standards and ambient water quality standards? (c) Are adequate measures taken to prevent contamination of surface water and groundwater by these effluents and leachates?	(a) N/A (b) N/A (c) N/A	(a) No effuents from incinerator. (b) N/A (c) N/A
	(3) Wastes	(a) Are wastes, such as treatment residues, cinder, and fly ash generated from crushing and segregation processes, and diverted wastes from composting process properly treated and disposed of in accordance with the country's regulations? (b) Are hazardous and dangerous wastes properly segregated from other wastes, stabilized, treated, and disposed of in accordance with the country's standards?	(a) Y (b) Y	(a) Hospitals treated properly. (b) Hospitals segregate properly.

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
	(4) Soil Contamination	(a) Are adequate measures taken to prevent contamination of soil and groundwater by leachates from the waste disposal sites?	(a) N/A	(a) No effluents from incinerator.
	(5) Noise and Vibration	(a) Do noise and vibrations generated by the facility operations (especially incinerators, waste segregation and crushing facilities), and vehicle traffic for waste collection and transportation comply with the country's standards?	(a) Y	(a) Noise reduction during construction and during operation by incinerator are shown in the mitigation measures.
	(6) Odor	(a) Are adequate odor control measures taken?	(a) Y	(a) Medical waste management including odor is conducted by each hospital.
3 Natural Environment	(1) Protected Areas	(a) Is the project site 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) No protected area around project site.
	(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) If significant ecological impacts are anticipated, are adequate protection measures taken to reduce the impacts on the ecosystem? (d) Is there a possibility that the project will adversely affect aquatic organisms? If impacts are anticipated, are adequate measures taken to reduce the impacts on aquatic organisms? (e) Is there a possibility that the project will adversely affect vegetation and wildlife? If impacts are anticipated, are adequate measures taken to reduce the impacts on vegetation and wildlife?	(a) N/A (b) N/A (c) N/A (d) N/A (e) N/A	(a) N/A (b) N/A (c) N/A (d) N/A (e) N/A
	(3) Management of Abandoned Sites	(a) Are environmental protection and restoration plans (such as landfill gas and leachate collection and treatment systems, prevention of illegal dumping, and reforestation) after facility closure considered? (b) Is a sustainable management framework for the abandoned sites established? (c) Are adequate financial provisions secured to manage the abandoned sites?	(a) N/A (b) N/A (c) N/A	(a) N/A (b) N/A (c) N/A

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
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 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?	(a) N/A (b) N/A (c) N/A (d) N/A (e) N/A (f) N/A (g) N/A (h) N/A (i) N/A (j) N/A	(a) No involuntary settelement is happend. (b) N/A (c) N/A (d) N/A (e) N/A (f) N/A (g) N/A (h) N/A (i) N/A (j) N/A
4 Social Environment	(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?(b) Are considerations given to the existing recovery systems, including waste pickers? (c) Is there a possibility that waste transportation will adversely affect the regional traffic? (d) Is there a possibility that effluents from the project and leachates form the waste disposal sites will adversely affect fisheries and other water uses by local inhabitants (especially drinking water)? (e) Is there a possibility that pathologic insects or other disease vectors will breed as a result of the project?	(a) N (b) N/A (c) N (d) N/A (e) N	(a) No adverse influence to the living conditions of inhabitants though the Project. (b) N/A (c) No influence to regional traffic. (d) No effluents from incinerator. (e) N/A
	(3) Heritage	(a) Is there a possibility that the project will damage the local archeological, historical, cultural, and religious heritage? Are adequate measures considered to protect these sites in accordance with the country's laws?	(a) N	(a) No heritage site around the project site.

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
	(4) Landscape	(a) Is there a possibility that the project will adversely affect the local landscape? Are necessary measures taken?	(a) N	(a) No influence to 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/A (b) N/A	(a) No ethnic minorities and indigenous peoples around the project site. (b) N/A (no land acquisition)
	(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, 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?	(a) Y (b) Y (c) Y (d) Y	(a) Compliance with work environment laws is documented and controlled in contracts with subcontractors. (b), (c), (d) Safety issues during construction and operation is shown in mitigation measures.
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) Noise, vibration, dust, and exhaust gas emitted during construction and operation are specified in detail in the EMP and the monitoring is conducted based on EMoP. (b) N/A (c) N/A
	(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) Monitoring results are checked by MOH and EMoP is revised if necessary. (b) Adequacy of EMoP is examined by the MOH based on the result of monitoring. (c) Contractor appoint an environmental officer and take necessary measures. (d) According to the EMP, the contractor shall record the results of environmental monitoring in the work report.

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 Forestry Projects checklist should also be checked (e.g., projects including large areas of deforestation).	(a) N/A	(a) 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) N/A	(a) Project does not cause global environmental problems.

1) Regarding the term “Country’s Standards” mentioned in the above table, in the event that environmental standards in the country where the project is located diverge significantly from international standards,
appropriate environmental considerations are required to be made.
In cases where local environmental regulations are yet to be established in some areas, considerations should be made based on comparisons with appropriate standards of other countries (including Japan's experience).
2) Environmental checklist provides general environmental items to be checked. It may be necessary to add or delete an item taking into account the characteristics of the project and the particular circumstances of the
country and locality in which the project is located.
Source : JICA Survey Team

1-4-10 Stakeholder Meeting

The Project procures a small incinerator for medical waste on the premises of the target hospitals. Since the amount of medical waste to be processed differs from one target hospital to another, the incinerators are classified into three types in terms of their processing capacity. Performance and specifications among the three types are otherwise the same. In addition, since the incinerators are installed on the hospitals, the buildings surrounding the installation sites are hospital wards, residences and businesses in the vicinity of the hospitals, and there is no significant difference in social conditions among the target hospitals. Therefore, the stakeholder meeting of this survey will be held in nine hospitals (Serei Sorphorn, Or Chrouv, Malai Santepheap, Mong Russei, Kampong Chhnang, Kratie PRH, Chhlong, Neak Loeung, and Pouk) where residents have had issues with the existing medical waste treatment equipment. Details of the meetings are shown in the Appendix.

Serei Sorphorn Hospital in BT-Meanchey Province which will be relocated[4] invited residents near the new hospital area.

[4] Details regarding the relocation of the hospital location are described in 2-2-4-2 Implementation Conditions.

Chapter 2 Contents of the Project

2-1 Outline of the Project

2-1-1 Overall Goal and Project Purpose

The Project aims to strengthen infectious waste treatment by installing infectious waste treatment facilities in 29 public hospitals, thereby contributing to the reduction of health hazards. The overall goal and project purpose of the Project are shown in Table 2-1.

Table 2-1 Overall Goal and Project Purpose of the Project

	Objectives and output
Overall Goal	Infectious waste is properly managed in the target hospitals, thereby reducing health hazards.
Project Purpose	Infectious waste in target hospitals is properly treated.
Expected Output	Medical waste incinerators are installed in the 29 target public hospitals.
Objectively Verifiable Indicators	[Quantitative indicator] Amount of medical waste treated properly [Qualitative indicators] Reduce damage or the risk of exposure to infectious pathogens. Reduce negative impact on the surrounding environment (smoke pollution, odors, etc.)

Source: JICA Survey Team

2-1-2 Outline of the Project

In order to achieve the above project purpose, the Project will install an incinerator as medical waste treatment equipment in the target hospitals. The Project will also provide the MOH with technical guidance, as a soft component for proper operation and maintenance of the incinerator and improvement of in-hospital medical and infectious waste management.

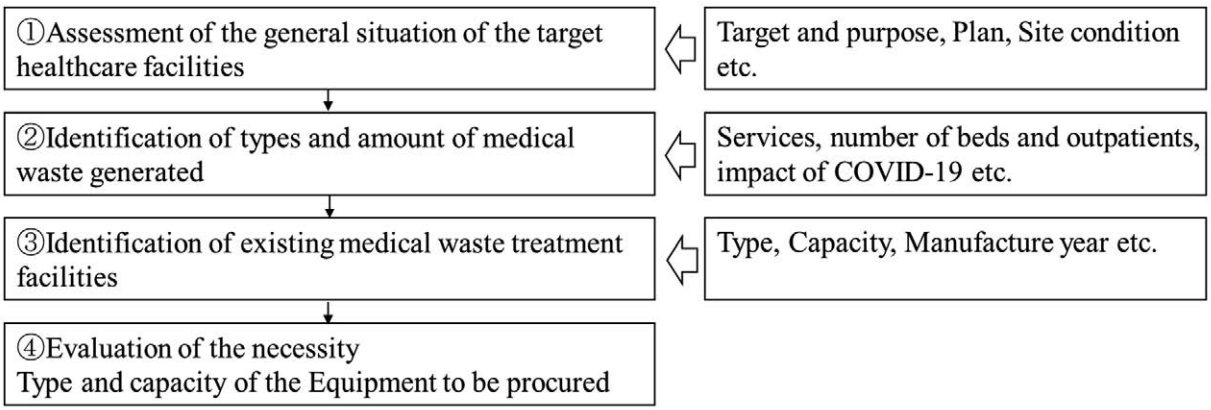
Although the requested equipment was an incinerator and sterilizer for medical waste, discussions were held with the MOH after the field survey. Given the technical perspectives exchanged during discussions, it was decided that the sterilizers would not be installed (see 2-2-2-2(3) for details).

2-2 Outline Design of the Requested Japanese Assistance

2-2-1 Design Policy

2-2-1-1 Basic Policies (Policies on the Selection of Models and Sizes of Equipment)

The selection of the target hospitals for the Project and the setting of the capacity of the equipment will be carried out according to the procedure in Fig. 2-1. As a general overview of the target hospitals for the survey, the site condition, including plans for expansion works and space for equipment installation will be checked. The types and amount of medical waste generated by the hospital will then be identified. This information is verified though comparisons of contents of the healthcare services provided and the number of beds. Next, information on the type, capacity, and manufacturing year of existing medical waste treatment equipment are collected, and the need for the procurement and capacity of the procured equipment is assessed for each hospital.



Source: JICA Survey Team

Fig. 2-1 Procedure of Selecting Targeted Hospitals and Equipment

Some of the existing incinerators in the surveyed hospitals have been shut down or have had their operating hours restricted due to complaints from the surrounding community related to odor and smoke generated by the incinerator. Many of these existing incinerators are aging mechanical incinerators or brick / concrete incinerators without the ability to control the combustion temperature. The incinerators will be replaced under the Project with advanced ones with combustion temperature control and exhausted gas treatment device. The incinerators to be procured will not produce virtually little odor or smoke pollution under the proper operation.

Sterilizers have been also installed in many hospitals with the support of other development partners, and there is little risk of complaints from the surrounding community as with existing incinerators. However, sterilizers are relatively new technology, hospital staff are unfamiliar with their operation and maintenance. Furthermore, in areas where the electricity supply is unstable, the sterilizers may be forced to stop due to power failure while in operation. In such cases, the medical waste treatment in progress must be removed from the machine and restarted. Due to these reasons, 20-30% of existing sterilizers have stopped the operation. When the sterilizers are introduced under the Project, the unfamiliarity with operation and maintenance could be overcome by providing better initial operational guidance and maintenance contracts. On the other hand, electric supply cannot be addressed through the Project, which remains a potential risk for the sterilizers.

Based on the above, the incinerator can be operated and maintained by selecting the appropriate equipment, and therefore can be procured regardless of the size of the hospital. On the other hand, the sterilizers require a stable electricity supply and hospital staff with a certain level of knowledge and skills in operation and maintenance. For this reason, if sterilizers are to be installed through the Project, they shall be limited to CPA3.

2-2-1-2 Policy on the Natural Environmental Conditions

Since the project sites are distributed throughout the country and some areas have high levels of annual rainfall, flood control measures for equipment will be considered according to the Project site. Based on interviews with hospitals, 9 target hospitals out of 29 hospitals are in need of flood control measures.

2-2-1-3 Policy on the Socio-Economic Condition

There are factors that may lead to an increase in the amount of medical waste, which may affect the treatment capacity of the procured equipment, such as the growing population trend, positive economic growth expected in 2021[5], and the impact of future infectious diseases, including COVID-19.

However, since the equipment to be procured has a relatively short service life of about 7 - 10 years, changes in socio-economic conditions over the long term will not be taken into account in the treatment capacity of the equipment, and the increase in treatment volume will be handled by extending operating hours as necessary.

[5] IMF estimate (as of April 2022)

On the other hand, for matters planned within the useful life of the equipment, such as hospital expansion plans and plans to accept waste from neighboring hospitals, treatment capacity will be considered in a manner that reflects these plans.

2-2-1-4 Policy on Construction and Procurement Conditions or Special Conditions and Business Practices in the Industry

(1) Major Environmental Laws and Regulations

The major environmental laws and regulations relating to medical waste management in Cambodia are shown in the following Table 2-2.

Table 2-2 Environmental Laws and Regulations Related to Medical Waste Management

Type		Title	Ministry
Law		Law on Environmental Protection and Natural Resources Management, 1993	MOE
	Sub-decree	Sub-decree on Air Pollution Control and Noise Disturbance, No:42 ANRK.BK, July 10, 2000	MOE
	Sub-decree	Sub-decree on Water Pollution Control, 1999	MOE
	Sub-decree	Sub-decree on Solid Waste Management, 1999	MOE
	Prakas	Prakas on Health Care Waste Management in the Kingdom of Cambodia, 2019	MOH

Source: Ministry of Environment (MOE), MOH

(2) Air Pollution Control and Noise Disturbance

The Sub-Decree on Air Pollution Control and Noise Disturbance establishes standards, permit systems, monitoring of sources and the environment, on-site inspections, and penalties. Incinerators are considered immovable sources in this sub-decree. The emission standards for immovable sources are shown in Table 2-3. For noise, the maximum permissible noise standards for public facilities and residential areas are specified in Table 2-4.

Table 2-3 Maximum Allowable Standard of Pollution Substance for Immovable Sources

No.	Parameter		Maximum Level of Discharge
1	Particulate in smoke of:		
	Incinerator		400 mg/m^3
	Heating Metal		400 mg/m^3
	Bad Stone, lime, cement manufacturing		400 mg/m^3
	Asphalt concrete plant		500 mg/m^3
2	Dust:		
	Containing silica (Si02)		100 mg/m^3
	Containing Asbetos		27 mg/m^3
	Chemical Inorganic Substances		
3	Aluminum	Al	(dust) 300mg/m^3 (Al) 50mg/m^3
4	Ammonia	NH_3	100 mg/m^3
5	Antimony	Sb	25 mg/m^3
6	Arsenic	As	20 mg/m^3
7	Berylium	Be	10 mg/m^3
8	Chloride	Cl	20 mg/m^3
9	Hydrogen chloride	HCl	200 mg/m^3
10	Hydrogen Fluoride	HF	10 mg/m^3
11	Hydrogen Sulfide	H_2S	2 mg/m^3
12	Cadmium	Cd	1 mg/m^3
13	Copper	Cu	(dust) 300 mg/m^3 (Cu) 20 mg/m^3
14	Lead	Pb	(dust) 100 mg/m^3 (Pb) 3 0 mg/m^3

No.	Parameter		Maximum Level of Discharge
15	Zinc	Zn	30 mg/m^3
16	Mercury	Hg	0, 1 mg/m^3
17	Carbon Monoxide	Co	1000 mg/m^3
18	Sulfur dioxide	SO_2	500 mg/m^3
19	Nitrogen oxide	NOx (all kinds)	1000 mg/m^3
20	Nitrogen oxide	NOx (emitted HNO_3 product)	2000 mg/m^3
21	Sulfuric Acid	H_2SO_4	35 mg/m^3
22	Nitric Acid	HNO_3	70 mg/m^3
23	Sulfur Trioxide	SO_3	35 mg/m^3
24	Phosphoric Acid	H_3PO_4	3 mg/m^3
	Chemical organic substance		
25	Acetylene tetra bromide	$CHBr_2CHBr_2$	14 mg/m^3
26	Acrolein	CH_2=CHCHO	1,2 mg/m^3
27	Aniline	$C_6H_5NH_2$	19 mg/m^3
28	Benzidine	$NH_2C_6H_4C_6H_4NH_2$	None
29	Benzene	C_6H_6	80 mg/m^3
30	Chloro benzyl	$C_6H_5CH_2CI$	5 mg/m^3
31	Butyl amine	$CH_3(CH_2)_2CH_2NH_2$	15mg/m^3
32	Cresol (o-, m-, p-)	$CH_3C_6H_6H_4OH$	22mg/m^3
33	Chloro benzene	C_6H_5Cl	350 mg/m^3
34	Chloroform	CHC_{13}	240 mg/m^3
35	Chloropicrin	$CC_{13}NO_2$	0,7 mg/m^3
36	O-dichlorinbenzene	$C_6H_4CI_2$	300 mg/m^3
37	1, 1 -dichloro ethane	$CHC_{12}CH_3$	400 mg/m^3
38	Di methyl sulfate	$(CH_3)_2SO_4$	0,5 mg/m^3
39	Di methyl hydrazine	$(NH_3)_2NNH_2$	1 mg/m^3
40	Di nitro benzene (o-, m-, p-)	$C_6H_1(NO_2)_2$	1 mg/m^3
41	Ethylene di amine	NH_2CH_2 –CH_2NH	30 mg/m^3
42	Ethylene Chlorohydrin	CH_2ClCH_2OH	16 mg/m^3
43	Ethylene oxide	CH_2OCH_2	20 mg/m^3
44	Formaldehyde	HCHO	6 mg/m^3
45	Methyl Acrylate	CH_2=$CHCOOCH_3$	35 mg/m^3
46	Methanol	CH_3OH	260mg/m^3
47	Methyl Bromide	CH_3Br	80 mg/m^3
48	Monomethylaniline	$C_6H_5NHCH_3$	9 mg/m^3
49	Nitro Benzene	$C_6H_5NO_2$	5mg/m^3
50	Nitroglycerine	$C_3H_5(NO_2)_3$	5 mg/m^3
51	Nitrotoluene	$NO_2C_6H_4CH_3$	30mg/m^3
52	Phenol	C_6H_5OH	19 mg/m^3
53	Phenylhydrazine	$C_6H_5NHNH_2$	22 mg/m^3
54	Pyridine	C_5H_5N	30 mg/m^3
55	Pyrene	$C_{16}H_{10}$	15 mg/m^3
56	Quinone	$C_6H_4O_2$	0,4 mg/m^3
57	Styrene	$C_6H_5CHCH_2$	420 mg/m^3
58	1,1;2,2 – tetrachloroethane	Cl_2HCCHC_{12}	35 mg/m^3
59	Tetrachloromethane	CC_{14}	65 mg/m^3
60	Toluene	$C_6H_5CH_3$	750 mg/m^3
61	Tetra nitromethane	$C(NO_2)_4$	8 mg/m^3
62	Toluidine	$CH_3C_6H_4NH_2$	22 mg/m^3
63	Toludine-2, 4-D-isocyanate	$CH_3C_6H_3(NCO)_2$	0,7 mg/m^3
64	Trichloro ethylene	$ClCH=CCl_2$	110 mg/m^3
65	Xylidine	$(CH_3)_2C_6H_3NH_2$	50 mg/m^3
66	Vinylchloride	$CH_2=CHC_l$	150 mg/m^3

Source: MOE

Table 2-4 Maximum Standard of Noise Level Allowable in Public and Residential Areas

No	Area	Time		
		From 6h AM to 18h	From 18h to 22h	From 22h to 6h AM
1	Quiet Areas - Hospitals - Libraries - School - Kindergarten	45 dB(A)	40 dB(A)	35 dB(A)
2	Residential Areas - Hotels - Administrative office - Villa, flat	60 dB(A)	50 dB(A)	45 dB(A)
3	Commercial and Service Areas and Area of multiple business	70 dB(A)	65 dB(A)	50 dB(A)
4	Small industrial factories intermingled in residential areas	75 dB(A)	70 dB(A)	50 dB(A)

Source: MOE

(3) Water Pollution Control

The Sub-Decree on Water Pollution Control stipulates standard values, licensing system, source and environmental monitoring, on-site inspections, and penalties. Since the medical waste incinerator to be procured will not discharge sewage from the equipment, they do not violate the said ordinance.

(4) Medical Waste Management

The MOH stipulates on the management, collection, transport, treatment, and responsibility for medical waste in the Prakas on Waste Management from Health Care Services, 2019. It confirms emissions from waste incinerators of hospitals shall comply with all of the standards and requirements determined by relevant law in Cambodia (Table 2-5).

Table 2-5 Emission Standards

Substance	Daily average (mg/m^3)	Hourly average (mg/m^3)	4-hourly average (mg/m^3)
Solid particulate	5	10	
Total organic carbon	5	10	
Chloride	5	10	
Fluoride	1	2	
Sulphur dioxide (SO_2)	25	50	
Nitrogen dioxide (NO_2)	100	200	
Carbon monoxide (CO)	50	100	
Mercury			0.05
Cadmium and thallium			0.05
Lead, chromium, copper, and manganese			0.5
Nickel and arsenic			0.5
Antimony (Sb), vanadium, cobalt, tin (Sn)			0.5
Dioxins and furans			0.1 ng/TEQ/Nm^3
Oxygen components	Have at least 6% within each step		

Source: MOH

2-2-1-5 Policy on Employment of Local Contractors (Construction Companies and Consultants)

The scope of the Project includes the construction of the foundation for the incinerator, the installation of the shed, and the installation of the incinerator. The existing incinerators or sterilizers in Cambodia are being installed by local contractors. The sheds and other structures of the Project are simple structures and which can be constructed by local contractors and managed by local consultants. Thus, local contractors and consultants available to carry out these works.

2-2-1-6 Policy on Utilization of Japanese Manufactures

(1) Medical Waste Incinerator

In Japan, in principle, infectious waste shall be incinerated in incineration facilities in medical institutions, melted in melting facilities, or sterilized in sterilizers. Incineration has been the most common and widespread method. In addition to infectious waste, approximately 80% of general waste is incinerated, and the legal system and technology for incineration are well established.

Currently, the market for small medical waste incinerators for individual hospitals is shrinking, as most medical institutions outsource their waste treatment, but there still are several Japanese companies in the market. In addition, many Japanese companies are expanding their technologies to Southeast Asian countries and other foreign countries.

In light of the above, it is desirable to utilize Japanese companies in the procurement of medical waste incinerators for this project.

(2) Medical Waste Sterilizer

There were only a few companies manufacturing sterilizers for infectious medical waste management in Japan, and two of these companies were interested in overseas development. Therefore, the costs information of the equipment was requested to the above two companies.

Unfortunately, neither of the two companies had a track record of selling products overseas, and if they were to expand overseas, they would need to establish a system for providing after-sales service, including repair services. It is required for the sustainable operation of the equipment to continuously procure spare parts from the companies.

For after-sales service, both companies plan to conclude an agency agreement with a local company that imports and sells similar equipment, and train and assign local technicians who can repair and maintain the equipment they handle. In the import and sales of medical equipment market, the companies are negotiating with Japanese trading firms that have already established networks to conclude distributorship agreements with their backers.

In addition to the after-sales service system, there are many other issues to be considered for overseas expansion, such as handling overseas specifications (e.g., power supply voltage) and technical documentation, including operation manuals, as well as supplying consumables and spare parts through sales agents.

In light of the various circumstances described above, it was assumed that if sterilizers for infectious medical waste management were to be introduced in the Project, it would be difficult to utilize Japanese companies and that it would be necessary to consider introduction from third country products.

Table 2-6 Technology of Japanese Manufacturers on Infectious Medical Waste Sterilizers

Company	Outline of the Specifications
A Company	1) Processing volume per hour: approx. 20 kg 2) Compression rate: 1/6 volume reduction by compression process 3) Processable infectious waste: Almost all types of infectious waste, except those containing large amounts of water or blood, such as broken metal medical instruments and disposable non-woven fabrics. 4) Treatment process: Medical waste treatment equipment that combines heating and pressure; sterilizes waste at 160°C to 180°C, then puts it in a pressure cylinder and melts it again at 160°C to 180°C while processing it into square plates at 20 tons of pressure.
B Company	1) Processing volume per hour: approx. 20 kg 2) Compression rate: approx. 1/10 volume reduction 3) Processable infectious waste: Broken metal medical instruments, disposable non-woven fabrics, and other oiling resin-based (PP (polypropylene), PE (polyethylene), PS (polystyrene)) medical waste. 4) Treatment process: Wet melt sterilization; sterilization at 190°C to 210°C, followed by sterilization in a storage box for 30 minutes until the temperature drops to 150°C, then processing to complete sterilization (become ingot)

Source: JICA Survey Team

2-2-1-7 Policy on Operation and Maintenance

From the viewpoint of the effective utilization of the procured equipment and the overseas operation of Japanese companies, a maintenance contract will applied for two years in addition to the one-year manufacturer's warranty period. The manufacturer's warranty covers free change of spare parts and damaged parts in response to malfunctions and defects, while the maintenance contract mainly covers the provision of a certain range of spare parts, regular inspections and maintenance. No inspections are performed prior to the expiration of the manufacturer's warranty, and similarly, no warranty inspections are performed.

2-2-1-8 Policy on the Selection of Grades of Equipment

(1) Medical Waste Incinerator

The performance of the incinerator shall meet the Japanese standards for incineration facilities. To prevent incomplete combustion, the incinerator shall (a) have a structure and equipment capable of supplying an appropriate amount of air, (b) have a device for measuring the temperature of combustion gas, and (c) have a secondary combustion burner capable of maintaining the combustion gas temperature at 800°C or higher. In addition, the combustion gas temperature should be automatically controllable to maintain the combustion temperature at a constant level.

The outline of the candidate procurement equipment are shown in Table 2-7. The equipment shall be selected based on the medical waste amount at each hospital.

Table 2-7 Outline of Candidate Procurement Equipment

Item	Company A			Company B			Company C	
Model	Model A1	Model A2	Model A3	Model B1	Model B2	Model B3	Model C1,C2	Model C3
Capacity	20 kg/h	25 kg/h	50 kg/h	17 kg/h	34 kg/h	67 kg/h	29 kg/h	49 kg/h
Fire bed	0.26 m^2	0.36 m^2	0.48 m^2	0.49 m^2	0.81 m^2	1.10 m^2	0.29 m^2	0.49 m^2
Size (m)	2.15 x 1.6	2.2 x 1.6	3.0 x 2.0	2.5 x 1.9	3.0 x 1.9	3.2 x 2.05	0.8 x 1.75	1.0 x 1.8
capacitance	0.83 kW	1.8 kW	2.6 kW	N/A	N/A	N/A	0.6 kW	0.8 kW
fuel consumption	N/A	N/A	N/A	N/A	N/A	N/A	1-5 L/h	2-8 L/h
Weight	1,700 kg	2,000 kg	3,000 kg	7,000 kg	10,000 kg	13,000 kg	1,800 kg	2,400 kg

Source: Manufacturer's brochures and website

2-2-1-9 Policy on Procurement Method and Project Schedule

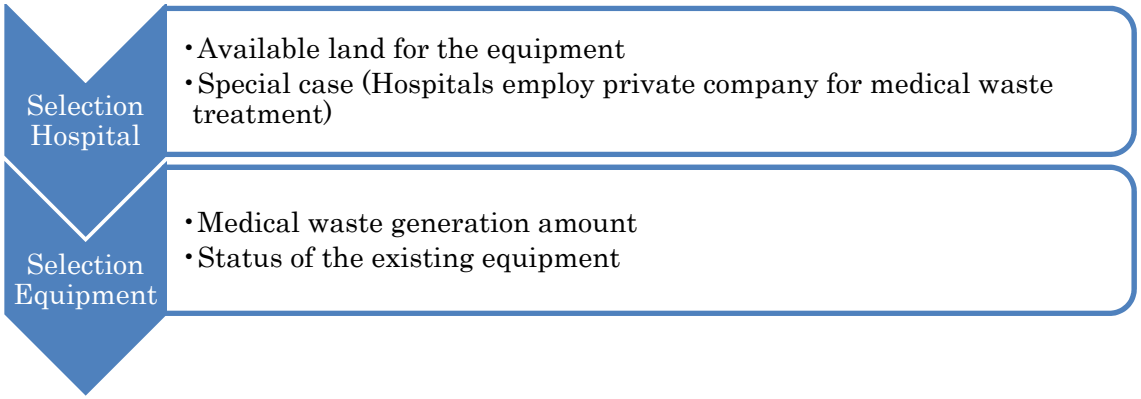
The incinerator will be procured from Japan. The manufacturing period of the shed is expected to be about 1.5 years after the selection of the contractor, but sufficient attention should be paid to manufacturing delays due to the global supply crisis for semiconductors and steel products, as well as delays in marine transportation.

The Project component will not be divided into lots, as only incinerators will be procured, although there will be differences in the scale of processing capacity. However, taking into account the urgency of the procurement and installation works in geographically dispersed target areas, the delivery of completed incinerators will be divided into several shipments, with installation and initial operational guidance provided each time, and the equipment will be put into use as partial deliveries.

2-2-2 Basic Plan (Equipment Plan)

2-2-2-1 Selection Methodology of the Targeted Hospital and Equipment

The selection of target hospitals and equipment is based on a comparison of the medical waste amount to be treated and the status of existing equipment (capacity, year of installation, etc.), after confirming the availability of a site for installing the equipment. The flow of the selection of target hospitals and equipment for the Project is shown in Fig. 2-2.



Source: JICA Survey Team

Fig. 2-2 Selection Flow of the Targeted Hospitals and Equipment

2-2-2-2 Equipment Plan for Medical Waste Treatment

(1) Amount of Medical Waste at the Hospitals

Table 2-8 shows the amount of medical waste at the 51 target hospitals. Note that these figures are based on the results of the questionnaire survey of each hospital, but few hospitals have an accurate grasp of the amount of waste by weighing instruments, and some of the figures may be sensory values of the respondents.

For hospitals that accept waste from neighboring hospitals, the volume of waste generated is assumed to include the accepted waste.

Of the 51 hospitals, one hospital (No. 12 Sampov Luon Hospital) has an unknown amount of medical waste, and two (No. 29 Koh Thom Hospital and No. 47 Romeas Hek Hospital) have plans to expand their wards with 110 beds in recent years, so estimates of future medical waste volumes are needed.

To estimate the amount of waste generated, the median amount of waste generated per day per number of beds (unit amount) was calculated using existing data for the 48 hospitals. From these values, the estimated medical waste volumes for the three hospitals mentioned above were calculated.

Unit amount: Daily waste generation per number of beds = daily waste generation ÷ number of beds*

*Because the amount of waste received from outside medical institutions is relatively small and the frequency of receipt varies, the number of beds outside the medical institutions is not taken into account in the denominator.

Table 2-8 Amount of Medical Waste at the Hospitals

No	Province	Hospitals	CPA	Nos of Accepting Hospitals	number of beds	Amount of waste (kg/day)		Unit amount (kg/day/bed)		Remarks
						Total waste	Medical waste	Total waste	Medical waste	
1	BT-Meanchey	Mongkol Borei	CPA3		240	465	70	1.94	0.29	
2	BT-Meanchey	Serei Sorphorn	CPA1		106	350	50	3.30	0.47	
3	BT-Meanchey	Poy Pet	CPA2	4	100	295	195	2.95	1.95	
4	BT-Meanchey	Or Chrouv	CPA1		60	200	20	3.33	0.33	
5	BT-Meanchey	Malai Santepheap	CPA1	14	60	635	35	10.58	0.58	
6	BT-Meanchey	Preah Net Preah	CPA2	20	60	150	10	2.5	0.17	
7	BT-Meanchey	Phnom Srock	CPA1		60	50	10	0.83	0.17	
8	BT-Meanchey	Thma Puok	CPA2	14	80	80	35	1.00	0.44	
9	BT-Meanchey	Svay Chek	CPA1		60	54	4	0.90	0.07	
10	Battambang	Thma Koul	CPA1		48	110	20	2.29	0.42	
11	Battambang	Mong Russei	CPA2	14	84	370	70	4.40	0.83	
12	Battambang	Sampov Luon	CPA2	12	65	149	23	2.29	0.36	Calculated using median of unit amount due to lack of data
13	Battambang	Norin	CPA1		40	22	5	0.55	0.13	

No	Province	Hospitals	CPA	Nos of Accepting Hospitals	number of beds	Amount of waste (kg/day)		Unit amount (kg/day/bed)		Remarks
						Total waste	Medical waste	Total waste	Medical waste	
14	Battambang	Rokar	CPA1		45	250	50	5.56	1.11	
15	Kg Cham	Hunsen Stung Trang	CPA1		50	40	5	0.80	0.10	
16	Kg Cham	Choeung Prey	CPA2	7	80	250	50	3.13	0.63	
17	Kg Cham	Batheay	CPA2	10	80	60	10	0.75	0.13	
18	Kg Cham	Prey Chhor	CPA1	14	70	260	140	3.71	2.00	
19	Kg Cham	Koh Soutin	CPA1	3	40	100	10	2.50	0.25	
20	Kg Cham	Srei Santhor	CPA2	9	80	100	30	1.25	0.38	
21	Kg Cham	Chamkar Leu	CPA2	6	100	105	30	1.05	0.30	
22	Kg Cham	Kung Meas	CPA1	9	45	100	20	2.22	0.44	
23	Kg Chhnang	Kampong Chhnang	CPA3		235	300	60	1.28	0.26	
24	Kg Thom	Stong	CPA2	12	70	104	4	1.49	0.06	
25	Kampot	Angkor Chey	CPA2	11	60	90	30	1.50	0.50	
26	Kampot	Bunrany Hsen Koh Sla	CPA1		35	60	10	1.71	0.29	
27	Kampot	Kampong Trach	CPA2	17	65	250	30	3.85	0.46	
28	Kandal	Takhmau PRH	CPA3	4	120	500	150	4.17	1.25	
29	Kandal	Koh Thom	CPA2	17	150	344	54	2.29	0.36	Calculated using the number of beds at the time of reconstruction in 2023 (adding 150 beds) and the median of unit amount
30	Kandal	Bunrany HSen Rokarkorng	CPA2		40	60	35	1.50	0.88	
31	Kandal	Ponhea Leu	CPA2		108	240	90	2.22	0.83	
32	Kratie	Kratie PRH	CPA3		75	333	33	4.44	0.44	
33	Kratie	Chhlong	CPA2	2	70	255	15	3.64	0.21	
34	Mondulkiri	Senmonorum PRH	CPA2	4	77	119	19	1.55	0.25	
35	Prey Veng	Prey Veng PRH	CPA3	10	200	1200	30	6.00	0.15	
36	Prey Veng	Kampong Trabek	CPA2	13	120	150	30	1.25	0.25	
37	Prey Veng	Neak Loeung	CPA2	7	120	600	100	5.00	0.83	
38	Prey Veng	Peareang	CPA2	10	120	1000	100	8.33	0.83	
39	Ratanakiri	Ratanakiri PRH	CPA3	13	122	500	10	4.10	0.08	
40	Ratanakiri	Bor Keo	CPA2	10	71	345	45	4.86	0.63	
41	Siemreap	Kralanh	CPA2	16	81	35	5	0.43	0.06	
42	Siemreap	Sot Nikum	CPA2	20	100	230	30	2.30	0.30	
43	Siemreap	Ankor Chhum	CPA1	9	40	200	50	5.00	1.25	
44	Siemreap	Pouk	CPA2	4	76	200	50	2.63	0.66	
45	Svay Rieng	Svay Chrum	CPA1		60	50	5	0.83	0.08	
46	Svay Rieng	Chi Phu	CPA1	11	60	135	30	2.25	0.50	
47	Svay Rieng	Romeas Hek	CPA2	13	84	462	116	2.38	0.60	Waste amount for the new 110-bed ward have been estimated and added. The number of beds and unit amount are current. (The current medical waste amount is 50kg.)
48	Svay Rieng	Svay Teap	CPA1	31	55	95	20	1.73	0.36	
49	Svay Rieng	Samaki Romduol	CPA1		45	50	8	1.11	0.18	
50	Takeo	Kirivong	CPA2	14	120	750	20	6.25	0.17	
51	Takeo	Prey Kabass	CPA2	4	70	75	15	1.07	0.21	

Source: JICA Survey Team

(2) Primary Selection of Target Hospital for the Project

Selecting the eligible hospitals for the Project from the 51 hospitals surveyed is done according to the evaluation criteria in Table 2-9. As a result, No. 12 Sampov Luon Hospital, No. 13 Norin Hospital, No. 19 Koh Soutin Hospital and No. 22 Kung Meas Hospital do not have available space for the equipment, these hospitals will be excluded from the Project. Furthermore, No. 30 Bunrany HSen Rokarkorng Hospital and No. 31 Ponhea Leu Hospital outsourced the collection and treatment of medical waste to private companies and do not need to procure the equipment in their hospitals. As a result, six hospitals are excluded from the Project.

Table 2-9 Evaluation Criteria of Selecting a Hospital for the Project

Evaluation item	Description of evaluation	Eligible for grant aid
Secure location of equipment	Yes	Covered
	No	Not covered
Special cases	Outsourced medical waste management system established	Not covered

Source: JICA Survey Team

(3) Selection of Medical Waste Treatment Equipment

The suitable medical waste treatment equipment for hospitals assessed as eligible for the Project in the primary selection will be evaluated based on the criteria in the Table 2-10. In this process, existing incinerators made of brick, concrete, or aging incinerators installed before 2016 will be evaluated as “none”, as they cause odor and smoke pollution and should be renovated. It should be noted that according to interviews with incinerator manufacturers in Japan, the service life of incinerators is generally around 7-10 years. Assuming the target year of 2027 (three years after project completion), equipment installed in 2016 will likely reach its 11th year in 2027 and be out of operation. In addition, as mentioned in 2-2-1-1, if sterilizers are to be installed in the Project, they shall be limited to CPA3.

Table 2-10 Evaluation Criteria of Selecting Equipment

Case	Existing equipment		Requirement regarding medical waste generation amount	Type of the equipment to be procured
	Incinerator	Sterilizer		
1	None*	None	No requirement	Incinerator or Sterilizer
2	None*	Existing	20kg or more	Incinerator
			Less than 20kg	None
3	Existing	None	20kg or more	Sterilizer
			Less than 20kg	None

*Brick, concrete and deteriorated incinerators are rated “none”.
Source: JICA Survey Team

The assessment results are shown in Table 2-11, where 29 hospitals are target for the Project. Of these, the existing incinerator in No. 28 Takhmau PRH is assessed as “None” because the existing one was made in 2013 and is therefore obsolete, and given it is CPA 3, both the incinerator and the sterilizer can be installed. However, as the sterilizer is not considered to be appropriate for treating 150 kg/day of medical waste, therefore an incinerator is planned to be installed. As a result, 29 incinerators and no sterilizer will be procured under the Project.

Table 2-11 Selection of the Equipment to be Procured through the Project

No.	Hospital	CPA	MW amount (kg/day)	Existing equipment				Procurement under the Project	
				Incinerator		Sterilizer		Incinerator	Sterilizer
1	Mongkol Borei	CPA3	70	Aging mechanical incinerator	1991	SW 100	2020	Yes	
2	Serei Sorphorn	CPA1	50	Brick product	1999	None		Yes	

No.	Hospital	CPA	MW amount (kg/day)	Existing equipment				Procurement under the Project	
				Incinerator		Sterilizer		Incinerator	Sterilizer
3	Poy Pet	CPA2	195	Aging mechanical incinerator	2012	SW 100	2020	Yes	
4	Or Chrouv	CPA1	20	Concrete product	2019	None		Yes	
5	Malai Santepheap	CPA1	35	Brick product	1997	None		Yes	
6	Preah Net Preah	CPA2	10	MP 100 / UK	2021	None		No	
7	Phnom Srock	CPA1	10	Brick product		None		Yes	
8	Thma Puok	CPA2	35	None		SW 100	2020	Yes	
9	Svay Chek	CPA1	4	Brick product	1993	None		Yes	
10	Thma Koul	CPA1	20	Concrete product	1993	None		Yes	
11	Mong Russei	CPA2	70	Unknown	2000	SW 100	2017	Yes	
12	Sampov Luon	CPA2	Not applicable (No available location)					No	
13	Norin	CPA1	Not applicable (No available location)					No	
14	Rokar	CPA1	50	Concrete product	2019	None		Yes	
15	Hunsen Stung Trang	CPA1	5	Ecoland 50	2022	SW 100	2019	No	
16	Choeung Prey	CPA2	50	Ecoland 50	2022	SW 100	2020	No	
17	Batheay	CPA2	10	Stella NU 100	2010	None		Yes	
18	Prey Chhor	CPA1	140	Ecoland	2019	None		No	
19	Koh Soutin	CPA1	Not applicable (No available location)					No	
20	Srei Santhor	CPA2	30	Ecoland 50	2019	None		No	
21	Chamkar Leu	CPA2	30	Ecoland 50	2021	SW 100	2018	No	
22	Kung Meas	CPA1	Not applicable (No available location)					No	
23	Kampong Chhnang	CPA3	60	Stella NU 100	2009	SW 100	2021	Yes	
24	Stong	CPA2	4	Aging mechanical incinerator	2010	SW 100	2018	No	
25	Angkor Chey	CPA2	30	Aging mechanical incinerator	2000	SW 100	2020	No	
26	Bunrany Hsen Koh Sla	CPA1	10	Brick product	2018	None		Yes	
27	Kampong Trach	CPA2	30	Aging mechanical incinerator	2011	SW 100	2019	Yes	
28	Takhmau PRH	CPA3	150	China	2013	None		Yes	No
29	Koh Thom	CPA2	54	Concrete product	2018	SW 100	2019	Yes	
30	Bunrany HSen Rokarkorng	CPA2	Not applicable (Outsourcing to private company)					No	
31	Ponhea Leu	CPA2	Not applicable (Outsourcing to private company)					No	
32	Kratie PRH	CPA3	33	Brick product	1993	SW 100	2020	Yes	
33	Chhlong	CPA2	15	Brick product	2016	None		Yes	
34	Senmonorum PRH	CPA2	19	Brick product, Stella NU 100	2007, 2010	SW 100	2020	No	
35	Prey Veng PRH	CPA3	30	Stella NU 100	2010	SW 100	2019	Yes	
36	Kampong Trabek	CPA2	30	None		SW 100	2019	Yes	
37	Neak Loeung	CPA2	100	Stella NU 100	2010	None		Yes	
38	Peareang	CPA2	100	Brick product, Stella NU 100	2021, 2012	SW 100	2020	Yes	
39	Ratanakiri PRH	CPA3	10	Brick product, Stella NU 100	2008, 2012	SW 100	2019	No	
40	Bor Keo	CPA2	45	MP 100 / UK, Brick product	2020, 2015	None		No	
41	Kralanh	CPA2	5	Concrete product	2020	SW 100	2021	No	

No.	Hospital	CPA	MW amount (kg/day)	Existing equipment				Procurement under the Project	
				Incinerator		Sterilizer		Incinerator	Sterilizer
42	Sot Nikum	CPA2	30	MP 100 / UK	2019	None		No	
43	Ankor Chhum	CPA1	50	Concrete product	2010	None		Yes	
44	Pouk	CPA2	50	Aging mechanical incinerator	2012	SW 100	2019	Yes	
45	Svay Chrum	CPA1	5	None		None		Yes	
46	Chi Phu	CPA1	30	Aging mechanical incinerator	2004	SW 100	2019	Yes	
47	Romeas Hek	CPA2	116	MP 100 / UK Brick product Aging mechanical incinerator	2021 - 2005	None		Yes	
48	Svay Teap	CPA1	20	Concrete product	2017	None		Yes	
49	Samaki Romduol	CPA1	8	Brick product	2020	None		No	
50	Kirivong	CPA2	20	Stella NU 100 Brick product	2010 2020	SW 100	2019	No	
51	Prey Kabass	CPA2	15	Aging mechanical incinerator	2007	SW 100	2019	No	
							Total	29	0

Source: JICA Survey Team

2-2-3 Outline Design Specification

The specifications of the incinerator shall meet the Cambodian technical guidelines for a combustion temperature of at least 800°C and shall conform to Japanese structural standards (Table 2-12).

Table 2-12 Major Specifications of Medical Waste Incinerators

Item	Major specifications
Plan item	Treatment capacity: To be determined by the amount of treatment required by the target hospital Waste to be treated: Medical waste
Combustion conditions	Combustion temperature: 800°C or higher
Facilities	- To have a structure and equipment capable of supplying an appropriate amount of air, - To have a device for measuring the temperature of combustion gas, and - To have a secondary combustion burner capable of maintaining the combustion gas temperature at 800°C or higher

Source: JICA Survey Team

The equipment was selected according to the medical waste amount at the target hospital, as shown in Table 2-13.

A total of 29 units of small medical waste incinerator will be procured, consisting of three models with a processing capacity of approximately 20 kg/h (small model: 18 units), 30 kg/h (medium model: 8 units), and 50 kg/h (large model: 3 units). Medium model incinerators will be procured for the hospitals in which the medical waste amount treated by the new incinerator is 40kg/day – 80kg/day. Small and large model incinerators will be applied to the hospitals with less than 40kg/day and more than 81kg, respectively. Medical waste amount treated by brick, aging incinerators installed in 2016 or before is not considered as ones treated by the existing equipment.

Table 2-13 Medical Waste Amount and Size of Incinerators

Province	Hospital	MW amount (kg/day)	MW amount treated by the existing equipment (kg/day)	MW amount treated by the new equipment (kg/day)	Size of incinerator
BT-Meanchey	Mongkol Borei	70	20	50	medium
BT-Meanchey	Serei Sorphorn	50	0	50	medium
BT-Meanchey	Poy Pet	195	20	175	large
BT-Meanchey	Or Chrouv	20	0	20	small
BT-Meanchey	Malai Santepheap	35	0	35	small
BT-Meanchey	Phnom Srock	10	0	10	small
BT-Meanchey	Thma Puok	35	20	15	small
BT-Meanchey	Svay chek	4	0	4	small
Battambang	Thma Koul	20	0	20	small
Battambang	Mong Russei	70	20	50	medium
Battambang	Rokar	50	0	50	medium
Kg Cham	Batheay	10	0	10	small
Kg Chhnang	Kampong Chhnang	60	20	40	medium
Kampot	Bunrany Hsen Koh Sla	10	0	10	small
Kampot	Kampong Trach	30	20	10	small
Kandal	Takhmau PRH	150	0	150	large
Kandal	Koh Thom	54	20	34	small
Kratie	Kratie PRH	33	20	13	small
Kratie	Chhlong	15	0	15	small
Prey Veng	Prey Veng PRH	30	20	10	small
Prey Veng	Kampong Trabek	30	20	10	small
Prey Veng	Neak Loeung	100	0	100	large
Prey Veng	Peareang	100	20	80	medium
Siemreap	Ankor Chhum	50	0	50	medium
Siemreap	Pouk	50	20	30	small
Svay Rieng	Svay Chrum	5	0	5	small
Svay Rieng	Chi Phu	30	20	10	small
Svay Rieng	Romeas Hek	116	50	66	medium
Svay Rieng	Svay Teap	20	0	20	small
Total		1,452	310	1,142	

Source: JICA Survey Team

2-2-4 Implementation Plan

2-2-4-1 Implementation Policy

After signing the Exchange of Notes (hereinafter referred to as "E/N") and Grant Agreement (hereinafter referred to as "G/A") for the Project, a Japanese consultant who will be employed by the GOC will carry out the detailed design. After completion of the bidding documents based on the results of the detailed design, a contract will be concluded with GOC and a Japanese contractor selected through the bidding process. The procurement of the equipment will be carried out. The Project shall be an equipment project for procurement of medical waste treatment equipment.

In principle, the Japanese contractor selected will procure Japanese products. The specifications of the equipment shall be considered to at a wide range of manufacturers will be able to participate in the bidding process. During the procurement, initial technical guidance on operation and maintenance by technicians dispatched from the manufacturer (on-the-job training, hereinafter referred to as "OJT") is required. It is assumed that the manufacturer's technicians will provide on-site guidance, but depending on the situation with Covid-19, the guidance by a local agent or remote guidance from Japan may also be considered if necessary. The incinerator installation works including the construction of the foundation and installation of the shed will take around 30 days per hospital as mentioned below.

(1)	Preparation and excavation work	3 days
(2)	Form work and bottom slab concrete	7 days
(3)	Beams and pillars erection	7 days
(4)	Beams and pillars curing	7 days
(5)	Installation of the incinerator	2 days
(6)	Roof work	4 days

There are nine hospitals namely Mongkol Borei, Serei Sorphorn, Or Chrouv, Malai Santepheap, Thma Puok, Kampong Chhnang, Kratie PRH, Ankor Chhum, and Chi Phu which have poor rainwater drainage system. The basement of the nine hospitals will be constructed with landfills under the Project.

2-2-4-2 Implementation Conditions

The Project will be implemented as a Grant Aid Project, thus tax exemptions are required. The tax items involved in the Project are likely to be Value Added Tax (hereinafter referred to as "VAT") and the Custom import duty in consideration of the nature of the Project.

VAT is levied at a rate of 10%, which is calculated by multiplying the price of the subject goods and services by the ratio of the VAT. The procedure for tax exemption of VAT is that the Japanese contractor submits an application for tax exemption to the executing authority, MOH, which in turn submits it to the General Department of Taxation (hereinafter referred to as "GDT"). After internal approval by GDT, it is submitted to the Ministry of Economy and Finance for their approval. Upon approval by the ministry, a tax exemption certificate is issued by the GDT. This approval process takes approximately five months after application. The Japanese contractor submits the required documents to the GDT monthly. The required documents for the application include a list of items and services to be purchased locally, the local distributor's tax registration number, a copy of the invoice, and the contract with the local distributor. In addition, the paid VAT during the approval process will be reimbursed after the certificate.

Custom import duties are levied by multiplying the Cost Insurance and Freight (CIF) price of the goods by the rate (0-35%). The Japanese contractor applies for duty exemption with a list of imported goods to the executing agency, the MOH, which in turn submits it to the Cambodia Development Council (hereinafter referred to as "CDC"). CDC organizes a weekly tax exemption committee with the attendance of the Ministry of Economy and Finance, GDT, and the General Department of Customs and Excise of Cambodia (hereinafter referred to as "GDCE"), which deliberates and approves the application. The duty exemption certificate for the list of imported goods is issued to MOH and is copied to the Ministry of Economy and Finance, GDT and GDCE. The approval process takes approximately three months after the application is submitted by MOH to CDC. The Japanese contractor is required to submit a progress report on the duty exemption to the CDC during implementation.

Serei Sorphorn Hospital in BT-Meanchey Province is currently planning to relocate, with construction expected to begin in the first half of 2023. The new hospital will be located several kilometers away from the existing Serei Sorphorn Hospital. The incinerator will be installed at the new hospital, but it is highly likely that the incinerator will be installed during the construction period of the new hospital. The construction status of the new hospital must be closely monitored, and appropriate process and construction management is required.

2-2-4-3 Scope of Works

In the Project, the target hospitals will prepare land on their premises for the installation of incinerator, and the contractor will use local construction companies and others to install the equipment. The procurement and installation responsibility for Japan and Cambodia are shown in Table 2-14.

Table 2-14 Scope of Works for the Procurement and Installation Works

Installation work,	Responsibility
Securing of equipment installation sites/sites, clearing, mowing and removal of obstructions	Cambodia
Removal and relocation of existing equipment and facilities (if necessary)	Cambodia
Building and installation of equipment	Japan
Construction of electricity, water and sewerage lines to existing connection points	Japan

Source: JICA Survey Team

2-2-4-4 Consultant Supervision

The consultant shall implement supervisory measures based on the principle of the preparatory survey in compliance with the scheme of the Grant Aid of the Government of Japan. The consultant shall dispatch engineers specialized in various stages, such as inspection of completed equipment, Indicial Operation and Maintenance Guidance and handing-over, in accordance with the progress of the procedure and supervise progress and safety. The issues requiring special attention in consultant supervision are described below.

(1) Supervision of Progress

There are 29 target hospitals for the Project which are dispersed throughout the country. In these target hospitals, the contractor shall undertake the construction of the foundation, installation of the sheds, transportation of incinerator, installation work of the incinerator, and initial operation and maintenance guidance without delay. The consultant will supervise the contractor to ensure progress is on the schedule as specified in the contract, and will monitor progress monthly. When delays are anticipated, the consultant will report to JICA and have the contractor submit the recovery plan. As part of the progress supervision of the consultant, the following tasks should be carried out.

- Prepare a necessary and sufficient implementation schedule, taking into consideration the period required by the Grant Aid Project, and the period for the fabrication, transportation, and installation of the equipment. The implementation schedule shall be presented in the bidding documents.
- Review the schedule proposed by the contractor at the time of bidding to meet the contract period.
- Confirm the progress of the Project by comparing the implementation schedule with the contractor's actual performance.
- Issue a warning to the contractor and to encourage the contractor for recovering the schedule, in case of progress being far behind schedule. If necessary, the consultant will also review and propose countermeasures to recover from the delayed schedule.

(2) Quality and Quantity Control

The consultant will inspect the equipment to be procured for whether or not it complies with the quality and quantities stipulated in the contract documents using the following methods:

- To review and verify specifications of the equipment
- To review and verify the shop drawing and specifications proposed by the contractor
- To attend the factory inspection or to review and verify the inspection results
- To confirm inspections for handing over, the initial operation and maintenance guidance by the contractor and verify the inspection results

If the verification and comparison will reveal a possibility that the manufactured equipment may not comply with the quality or quantity standards, the consultant will request the contractor to correct, replace or repair it.

2-2-4-5 Quality Control Plan

Quality control shall be implemented simultaneously with the consultant supervision mentioned above. The consultant shall review whether or not the manufactured and delivered equipment satisfies the quality, performance and specifications required in the contract documents. The equipment is developed in a factory of the manufacturer, and therefore the quality control shall be based on the contractor's factory standard in principle. Since it is necessary to incinerate medical waste to check on performance, the performance test shall be done as

the acceptance inspection after installation work. The consultant shall implement the following tasks for quality control:

- Prepare the specifications based on the preparatory survey in the bidding documents.
- Confirm that the equipment proposed by the bidders meets the specifications specified in the bidding documents, at the time of bidding.
- Confirm more detailed specifications than those specified in the contract documents through the review of the contractor's documents, if necessary.
- Confirm the quality of the equipment before shipment by the shop test after factory fabrication with the witness of the consultant and reviewing the reports. To instruct the contractor to repair and adjust the Equipment, if necessary.
- Attend the acceptance inspection after installation of the equipment and to review the inspection results to whether the result satisfies the required performance. If not, the consultant instructs the contractor to repair and arrange the Equipment.

2-2-4-6 Procurement Plan

The countries to be procured and the countries of origin are shown in Table 2-15. Even though an incinerator manufacture is confirmed in Cambodia, its incinerator is not appropriate for the Project because of no combustion temperature control and no exhaust gas treatment.

Table 2-15 Country of Origin of the Equipment to be Procured

No.	Equipment	Item	Country to be procured			Country of Origin		
			Japan	Cambodia	Third Country	Japan	Cambodia	Third Country
1-1	Small medical waste incinerator	Small model	○	-	-	○	-	-
1-2		Medium model	○	-	-	○	-	-
1-3		Large model	○	-	-	○	-	-

Source: JICA Survey Team

2-2-4-7 Indicial Operation and Maintenance Guidance Plan

In each hospital, the IPCC is responsible for the maintenance of medical waste treatment equipment, and operates and maintains the existing equipment. However, the incinerators with advanced technology to be procured through the Project are not manufactured in Cambodia, while in Japan they are common incinerators with temperature control and exhaust gas treatment equipment. Therefore, since the products are designed, manufactured and tested in Japan or at a factory in a third country, it is necessary for the dispatched supervisor to provide technical guidance for the Cambodian personnel/engineers and workers using the actual equipment from the manufacturer. The contents and participants of the initial operation and maintenance guidance shall be as shown in Table 2-16.

Table 2-16 Initial Operation and Maintenance Guidance

Technical guidance	Content	Participants
Initial operational training	・ Incinerator operational guidance	・ IPCC member in charge of medical waste management ・ Mechanical engineers ・ Operators ・ Cleaners etc.
Technical guidance	・ On-the-job training with equipment in operation ・ Troubleshooting ・ Equipment maintenance, troubleshooting and safety training	

Source: JICA Survey Team

The initial operation and maintenance guidance is aimed at IPCC members and operators in each hospital. The repetitive instruction of “practical work ⇒ learning level confirmation test ⇒ supplementary training” is conducted to ensure the transfer of the necessary skills for the management and operation of the procured equipment. In addition, the manufacturer will instruct participants in the operation and maintenance guidance

on the know-how required for daily operation and maintenance consisting of periodic inspection methods, troubleshooting methods, procedures for requesting repairs from manufacturers, and reports.

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

(1) Background and Purpose

This project aims to improve and strengthen medical waste management by upgrading and installing medical waste incinerators in target hospitals in Cambodia, thereby enhancing medical waste disposal and infection control in the target hospitals and surrounding areas. The operation and maintenance of these incinerators are based on the existing waste and equipment management methods, and the equipment used for waste management is also based on existing products and some related equipment. Therefore, there are no particular handling problems. However, many target hospitals do not adequately implement medical waste management due to shortages and aging equipment. In order to implement this project, technical guidance on basic medical waste management and operation and maintenance of equipment is necessary for the maintenance equipment to be effectively utilized.

In addition, the fundamental maintenance system such as record keeping is not sufficient for incinerator operation. It is necessary to improve the system in order to properly implement monitoring and evaluation. Furthermore, the management of waste segregation or storage are not sufficiently practiced, although many hospitals have implemented conducted training, and information sharing on waste segregation, prevention of infectious diseases, and other precautions. Therefore, it is also required to provide basic technical guidance regarding medical waste management and infection prevention control. During the field survey, the MOH, many target Provincial Health Departments (hereinafter referred to as "PHD"), and hospital directors requested technical assistance regarding the aforementioned management system. Moreover, the large number (29) of target hospitals and multiple delivery periods make it difficult for consultants to visit all target hospitals and provide technical guidance to all potential recipients due to budget and scheduling constraints. Therefore, the cascading training system will be established to address these issues, in addition to the initial instruction by suppliers on machine operation and others, in order to ensure efficient and sustainable implementation.

Phase-1: Training of Trainers (hereinafter referred to as "ToT") for personnel from the target PHDs (and the MOH participating as facilitators/observers) (*The implementation plan for the target PHDs will be determined in consultation with the MOH and the health department personnel).

Phase-:2 ToT training for hospital supervisors such as IPCC personnel in the target hospitals by the PHD personnel who participated in the Phase 1 training.

Phase-3: Technical guidance for hospital-related staff by the person in charge who attended the Phase-2.

The content of the training in Phase-1 will include the preparation of a training plan covering the subsequent phases (Phase-3). In addition, a schedule for the completion of Phase-3 as well as a reporting system and budgetary measures will be agreed upon in advance. In the end, a monitoring and reporting system will be established through the MOH to enable the technical consultants to confirm the progress of the training.

Therefore, the MOH and the parties involved in this plan at the target hospitals are required to coordinate the schedule and provide the venue for the technical guidance based on the related discussions prior to the start of the soft component and the training plan prepared, and to select eligible participants and have them participate in the technical guidance. The Cambodia side will be required to conduct and report on each training program within the target period (Phase-2 and -3). The detail is described in the soft component plan.

The following three technical guidance (components) will be implemented in the target hospitals through the establishment of the above system.

Component 1: Technical guidance on the proper operation of incinerators

During the field survey, it was confirmed that several target hospitals already have their own incinerators and sterilization and use them on a daily basis. However, the equipment is not fully operational due to aging and insufficient capacity in many of the target hospitals. To address this issue, the following guidance will be conducted to improve and enhance the quality of medical waste management at the target hospitals, such as preparing a simplified operation manual and a simplified checklist for the incinerator before and after use;

preparing daily operation reports; technical guidance on the operation. It is also expected that the effectiveness of the project will be properly evaluated by monitoring the amount of processing volume through daily operation reports.

Component 2: Technical guidance on proper maintenance of incinerators

It was confirmed that the target hospitals do not have adequate basic maintenance systems for their incinerators. Since the project plans to provide the incinerator, it is essential to establish the system to ensure the proper and safe operation of the equipment. In the soft component, this maintenance and management system will be introduced to the target hospitals. It is expected that periodic inspections of incinerators and the management of spare parts and consumables will be properly implemented and documented to prevent equipment failure and reduce outage conditions.

Component 3: Technical guidance on medical waste management and behavior change

During the field survey, we confirmed that medical waste management, especially in terms of in-hospital segregation and handling, varies from hospital to hospital. For example, improper segregation and transportation can reduce the efficiency of disposal by incinerators and sterilizers and increase the risk of infection and other problems for hospital staff and visitors. It is expected that the efficiency of the above process will be improved and the risk of infection will be reduced through training and workshops on the correct management of medical waste and behavior change.

(2) Expected Output of the Soft Component

In the establishment of the system for the above technical guidance, Phase-1 ToT will be implemented in the departments in charge of the Ministry of Health, and the following outcomes will be achieved for the targeted Ministry of Health personnel after activities of the soft component.

Output for component 1: Through training, to enhance knowledge and technical skills for the safe operation of maintenance equipment and to be able to guide appropriate operation management. To be able to prepare simple operation checklists, etc. for maintenance equipment and to provide guidance using such checklists. Also, to encourage the preparation of a daily operation report to monitor the disposal amount and to submit it to the MOH and the PHD.

Output for component 2: Through training, increase the awareness of the importance of equipment maintenance and management, encourage to conduct periodic inspections and record in the equipment ledger, and encourage to write a summary in an annual report and submit it to the MOH and the PHD.

Output for component 3: Through training, the participants understand basic knowledge and techniques for medical waste management and are able to provide appropriate technical guidance. In addition, the participants will be able to provide technical guidance on waste management by preparing and utilizing in-hospital simplified waste management manuals and check sheets such as "10 items that must be implemented in waste management at all target hospitals (draft)" through the workshops. The participants will be able to provide guidance on making a summary of the medical waste management in an annual report and submitting it to the MOH and the PHD.

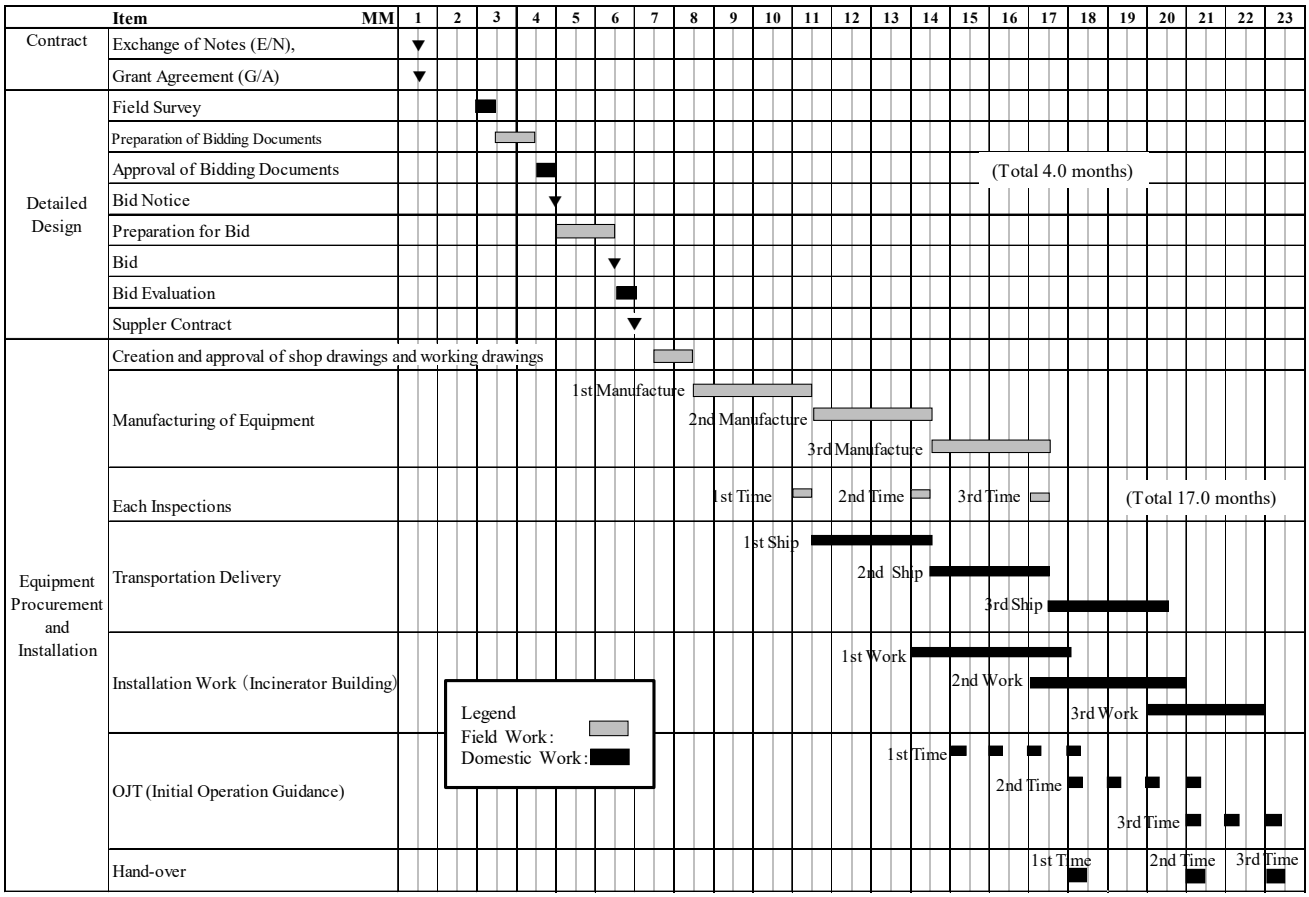
(3) Expected Outcomes of the Soft Component

The expected outcomes to be achieved through continued implementation of activities are as follows (Assuming a three-year timeframe).

- Strengthen medical waste management at target hospitals through proper operation and maintenance of incinerator.
- Improve infection prevention capabilities through proper medical waste management and use of incinerator.
- Reduce the environmental impact on the surrounding area through proper medical waste management and use of incinerator.

2-2-4-9 Implementation Schedule

Fig. 2-3 shows the tentative project implementation schedule, including the required construction period for the Project, the implementation design, procurement of equipment, installation work, testing, adjustment, and completion of the initial operation. The Project is planned to be manufactured, shipped and installed in three phases.



Source: JICA Survey Team

Fig. 2-3 Tentative Project Implementation Schedule

2-3 Security Plan

In Cambodia, there have been no significant signs of terrorism. As the Project site is located within the hospital premises, there are few safety concerns regarding the implementation of the Project, but Japanese technicians should be careful not to get involved in crime when travelling to the Project site.

2-4 Obligations of Recipient Country

2-4-1 Measure Obligatory Items of the Recipient Country

(1) Securing Equipment Locations, Clearing, Mowing and Removing Obstacles

The incinerators will be installed in the hospital by the Project. The Cambodia side needs to prepare the site for the installation of the incinerator such as clear the land, cutting trees and grass and removing obstacles so that there is no obstacles when installation works begin. Furthermore, the Cambodia side needs to secure the access road to the site for the installation of the incinerator so that construction vehicles can pass through.

(2) Basic Infrastructure such as Water and Electricity Outside the Project Sites

The Cambodia side must account for the following preparations for proper operation of the maintenance equipment.

- Distribution of industrial electricity to the selected hospitals.
- Water supply to the selected hospitals (some incinerators require tap water for operation, depending on the type of incinerator).
- Connection of the selected hospitals' drainage system (some incinerator types generate hot water during operation, which shall be drained into the existing drainage system).

(3) B/A and AP procedures, Tax Exemption Procedures

The Cambodia side will carry out the procedures for issuing Authorization to Pay (hereinafter referred to as "A/P"), which is required for payment to the Japanese consultant and contractor. The Cambodia side will also bear the following costs required for Banking Arrangement (hereinafter referred to as "B/A") for the implementation of the Project.

- Advising commission of A/P
- Payment commission for A/P

In addition, the Cambodia side is required to carry out the necessary tax exemption procedures to enable the Project to be implemented without delay.

(4) Operational Guidance and Training for Target Hospitals

Under the soft component of the Project, ToT training will be provided to the responsible departments of MOH (and the targeted PHDs) with the aim of strengthening the proper operation and maintenance of the incinerators and medical waste management. The Cambodia side is required to provide "training from MOH to the IPCC officers of the target hospitals" and "technical guidance from the IPCC officers to the hospital staff concerned". Furthermore, a monitoring and reporting system needs to be established to report progress using the Project Monitoring Report (PMR).

2-4-2 Specific Obligations of the GOC which will not be Funded with the Grant

Table 2-17 shows specific obligations of the GOC which will not be funded with the grant aid.

Table 2-17 Specific Obligations of the GOC which will not be Funded with the Grant

Before the Bidding

No	Items	Deadline	In charge	Estimated Cost (USD)
1	To coordinate with the National Bank of Cambodia to open Bank Account (Banking Arrangement (B/A))	Immediately after G/A	MOH	N/A
2	To facilitate A/P to a bank in Japan (the Agent Bank) for the payment to the consultant	within 1 month after the signing of the contract(s)	MOH	N/A
3	To facilitate bearing the following commissions to a bank of Japan for the banking services based upon the B/A			3,295
	1) Advising commission of A/P	within 1 month after the signing of the contract(s)	MOH	
	2) Payment commission for A/P	every payment	MOH	
4	To secure and clear the following lands Project sites for incinerator	before notice of the bidding documents	MOH	N/A
5	To 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	MOH	N/A
6	To clear, level and reclaim the following sites Leveling and reclaiming the sites for incinerator	before notice of the bidding documents	MOH	N/A
7	To submit Project Monitoring Report (with the result of Detailed Design)	before preparation of the bidding documents	MOH	N/A

B/A: Banking Arrangement, A/P: Authorization to Pay, G/A: Grant Agreement
MOH: Ministry of Health, PHD: Provincial Health Department
EMP: Environmental Management Plan, EMoP: Environmental Monitoring Plan

(2) During the Project Implementation

No	Items	Deadline	In charge	Estimated Cost (USD)
1	To facilitate A/P to a bank in Japan (the Agent Bank) for the payment to the supplier(s)	within 1 month after the signing of the contract(s)	MOH	N/A
2	To facilitate bearing the following commissions to a bank of Japan for the banking services based upon the B/A			Included No.3, (1) Before the Bidding
	1) Advising commission of A/P	within 1 month after the signing of the contract(s)	MOH	
	2) Payment commission for A/P	every payment	MOH	
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	MOH	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	MOH	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.	during the Project	MOH	108,795
6	To bear all the expenses, other than those covered by the Grant, necessary for the implementation of the Project, including the implementation cost for Soft-component.	during the Project	MOH	N/A
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	MOH	N/A
8	To submit Project Monitoring Report after each work under the contract(s) such as shipping, hand over, installation and operational training	within 1 month after completion of each work	MOH	N/A
	To submit Project Monitoring Report (final) (including equipment list, photographs, etc.)	within 1 month after issuance of Certificate of Completion for the works under the contract(s)	MOH	N/A
9	To submit a report concerning completion of the Project	within 6 months after completion of the Project	MOH	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 sites		MOH	N/A
	1) Electricity The distributing line for industrial power supply (the three phase power)to the site	before start of the construction		
	2) Water Supply The city water distribution main to the site	before start of the construction		
	3) Drainage The city drainage main (for storm, sewer and others) to the site	before start of the construction		
11	To provide equipment, facilities necessary for the implementation of the Project in the sites except for the equipment which are funded with the Grant. e.g. Equipment for medical waste containers for segregation	before start of the construction	MOH	N/A

No	Items	Deadline	In charge	Estimated Cost (USD)
12	To ensure the safety of persons engaged in the implementation of the Project	during the Project	MOH	N/A
13	To implement EMP and EMoP	during the construction	MOH	N/A
14	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	MOH	N/A

(3) After the Project

No	Items	Deadline	In charge	Estimated Cost (USD)
1	To implement EMP and EMoP	for a period based on EMP and EMoP	MOH	Annually 100
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 MOH and JICA.	for 3 years after the Project	MOH	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 3) Routine check/Periodic inspection (including record of the medical waste amount treated by the Equipment)	After completion of the construction	Provincial Government/ PHD/ Hospitals	Annually 7,306 – 13,153 per hospital
4	To maintain proper disposal of incinerator ash.	After completion of the construction	Provincial Government/ PHD/ Hospitals	N/A

2-5 Project Operation Plan

2-5-1 Operation and Maintenance Structure of the Incinerators

The MOH is the supervising and implementing agency of the Project, but after the handover, each hospital will be responsible for its operation and maintenance. The Project aims to strengthen infectious waste treatment by installing infectious waste treatment equipment in 29 public hospitals, thereby contributing to the reduction of health hazards.

Each hospital should continue to make efforts to proper allocation of personnel and strengthen their operation and maintenance capacity in accordance with the guidelines for infectious waste management set by the Cambodian government. In addition, the Project plans the soft components (technical guidance) with TOT style, to ensure smooth operation and maintenance of the incinerator after its handover. The staff of the MOH and the PHD will be a trainer and give initial operational guidance and skills training for incinerator operation to the operators and the hospital administration staff.

2-5-2 Staffing Plan

Although the incinerators are operated by hospital administration department staff and operators, it is difficult to respond to big problems or breakdowns. In such case, each hospital requests the incinerator suppliers / vendors to for the maintenance. The need to strengthen the operational management of the incinerators, which would be led by the administration department of each hospital, was confirmed with the MOH and the administrative staff of each hospital.

2-5-3 Incinerator Maintenance Management Plan

During the initial operation instruction at the time of installation, the hospital administration department staff and operators will be instructed on the operation and daily inspection work of incinerator. To ensure proper operation and maintenance of the incinerator, one-year manufacturer ordinal warranty period and two-year maintenance contract after expiration of the warranty period is planned (in total three-years), after handover the inclinator. The expense will be covered by the Japanese side. The maintenance contract will include periodic inspections and on-call service by the distributor's engineer, as well as the replacement of periodically replaced parts.

After delivery of the incinerator under the Project, the following maintenance and management system will be required.

(1) Start-up and End-of-work Cleaning/Inspection

Currently, it is difficult to say that regular inspections of incinerators are being carried out reliably, and repairs are requested when problems occur. In order to keep the equipment in good condition and prevent breakdowns, it is desirable to conduct inspections at the beginning and end of the workday including removal of incinerator ash, as well as periodic inspections. Therefore, at the time of delivery of the incinerator, the installation engineer will provide guidance on the cleaning and inspection of the incinerator. Furthermore, in order to ensure that the incinerator is properly maintained and managed even after handover to the hospitals, the engineer of the local distributor / agent will provide continuous guidance and confirmation during the maintenance contract period. The engineer will visit the target hospitals for periodic inspections, with the aim of establishing daily and periodic inspections.

Diesel oil is to be used as fuel. When the oil is of poor quality, the impurities will cause some trouble. In order to avoid troubles, the impurities are removed by two fuel strainers (filters) which are set in the oil tank itself and between the tank and burner. The strainers need to be cleaned regularly so that it can work effectively.

(2) Calibration

From the perspective of compliance with environmental standards, it is important to ensure the effectiveness of incinerators (maintenance of performance). Therefore, it is necessary to check the accuracy of the incinerator

(calibration) at regular intervals. In cooperation with the Provincial Health Department and local distributor / agent, the periodic maintenance and calibration of incinerators should be established through the Plan of Soft Component to ensure the establishment of quality check-up.

(3) Repair in Case of Breakdown

Since most hospitals do not have the capability to repair incinerators, when a breakdown occurs, the hospital administrative personnel either requests repairs from the local agent or, if replacement parts or repairs are expensive, a repair contractor is chosen through a bidding process.

In order to ensure prompt repair response in the event of breakdowns and sustainable use of the incinerator, it is recommended that the maintenance contract be continued between the hospital and the local distributor / agency, after Japanese grant supported period. It is also recommended that the incinerator maintenance manager (hospital administration department staff) be identified in each target hospital. At the time of delivery of the incinerator, a list of the distributor / agent name, contact person, and contact information should be given to the hospitals so that a smooth response can be made in the event of a malfunction.

(4) Equipment Inventory List

Each hospital has an inventory list to centrally manage owned equipment and materials, the incinerator to be installed in the Project will also be registered in the inventory list immediately after delivery. It will be instructed during the training (the soft components).

2-6 Project Cost Estimation

2-6-1 Initial Cost Estimation

2-6-1-1 Cost Born by Japan Side

This part is not disclosed due to confidentiality for one year until final verification of the contract of the supplier.

2-6-1-2 Cost Born by Cambodia

The total estimated cost to be undertaken by Cambodia side is approx. 112.10 thousand USD (approx. 15 million JPY).

- Bank Commissions: approx. 3.30 thousand USD
- Refund of VAT: approx. 108.80 thousand USD

2-6-1-3 Estimation Conditions

i) Time of estimation: July 2022

ii) Foreign exchange rates: 1USD = 130.727 JPY

1KHR = 0.031269 JPY

iii) Implementation period: The periods for the bidding and procurement are shown in 2-2-4-9 Implementation Schedule.

iv) Miscellaneous matter: The costs are to be estimated in accordance with the provisions of the grant aid program of the Government of Japan.

2-6-2 Operation and Maintenance Cost

2-6-2-1 Operation cost

Utilities are electricity, water, and fuel. No additional costs would be incurred for operators or supervisors, as existing personnel would be utilized. Since the utility costs for operation vary depending on the treatment

capacity, selected equipment, and waste quality, costs were calculated under certain conditions shown in note 4 in Table 2-18. Operating costs under the conditions range from USD 5.92 to USD 11.72 per hour, resulting in a cost per year of USD 5,967 to USD11,814, assuming operation for 3 hours per day, 7 days per week.

Table 2-18 Operation Cost per Hour

Item	Unit cost			Usage				Use fees			
Electricity	0.1525	USD /kWh	*1	0.823	～	2.633	kWh	0.13	～	0.40	USD
Water	0.625	USD /m^3	*2	70	～	160	L	0.04	～	0.10	USD
Fuel (Diesel)	1.368	USD /L	*3	4.2	～	8.2	L	5.75	～	11.22	USD
Total	－			－				5.92	～	11.72	USD

*1: Electricity Authority of Cambodia End of Year 2020 Summary Report (Ministry of Mines and Energy), adopting unit prices for usage 51-200 kwh/month
*2: Annual Report 2019 (Phnom Penh Water Supply Authority), adopting unit prices for clients as ministry, public institution, and embassy
*3: https://www.globalpetrolprices.com/Cambodia/diesel_prices/
*4: (Calculation conditions) Combustion temperature: 800 °C, lower calorific value: 4,986 kcal/kg, treatment capacity: 20-50 kg/h, type: water-cooled incinerator
Source: JICA Survey Team

2-6-2-2 Maintenance Cost

Maintenance costs will vary depending on usage conditions, years of use, and equipment selected, but assuming standard consumables, maintenance contracts and environmental monitoring using Noise Measurement App, annual maintenance costs will be 175,458 JPY (USD 1,342.24), shown in Table 2-19. Additional costs will be incurred when repairs are required.

For the one-year manufacturer's warranty period and the two-year maintenance contract period, totaling of three years, this cost will be covered by the Project, but from the fourth year, this cost will be covered by the each hospital.

Table 2-19 Maintenance Cost per Hospital

	No	Item	Cycle	Number	unit price	Total price
Spare parts *1						
	1	Frame eye	2 years	6	6,000 JPY	36,000 JPY
	2	Nozzle	2 years	6	3,000 JPY	18,000 JPY
	3	Acrylic board for peep window	2 years	6	2,000 JPY	12,000 JPY
	4	Burner blower motor	2 years	1	2,000 JPY	2,000 JPY
	5	Thermo couple	2 years	1	30,000 JPY	30,000 JPY
	6	Ball tap	2 years	1	8,000 JPY	8,000 JPY
	7	Temperature controller	2 years	1	14,000 JPY	14,000 JPY
	8	Fan for burner	2 years	2	8,000 JPY	16,000 JPY
	9	Electro magnetic pump	2 years	2	7,000 JPY	14,000 JPY
	Sub Total					150,000 JPY
	Sub Total per year					75,000 JPY (573.75 USD)
Maintenance contract *1						
	Set (annual)					100,000 JPY (764.99 USD)
Environmental monitoring						
	Noise Measurement App (annual)					458 JPY (3.5 USD)
Total						175,458 JPY (1,342.24 USD)

*1: Japanese manufacturer's quotation
Source: JICA Survey Team

2-6-2-3 Operation and Maintenance cost

The additional annual operation and maintenance costs for this project are shown in Table 2-20. With regard to operating costs, there will be no additional personnel costs for operators and supervisors, as existing personnel will be utilized. Utility costs such as electricity for operation and control, cooling water, and fuel for keeping the burning temperature will be incurred depending on the processing capacity of the incinerator. Maintenance and management costs will be incurred for the purchase of consumables, implementation of maintenance plans, and environmental monitoring, regardless of the incinerator's capacity. Operation and maintenance costs are paid out of the budget allocated to each hospital.

Table 2-20 Annual Operation and Maintenance Cost per Hospital

Item	Unit	Annual Operation & Maintenance cost
Operation cost (electricity, water, and fuel)	USD	5,967 ～ 11,814
Maintenance cost (Spare parts, Maintenance contract)	USD	1,339
(Environmental Monitoring)	USD	3.5
Total	USD	7,309 ～ 13,156

Source: JICA Survey Team

The year-on-year increase in the MOH budget has been in the 5% range since FY 2019 (Table 2-21). The budget from the government for public hospitals in Cambodia is based on a system in which the PHD in each province compiles the required amount for referral hospitals and health centers in the province via the Operational District, which then request it from MOH. On the other hand, each hospital's revenue consists of reimbursement from medical fees and other sources in addition to the government budget. Table 2-22 shows a breakdown of the annual operational expenditures of the following two of the target hospitals.

The operation and maintenance cost of the incinerator to be installed in this project is approximately USD 7,309 to USD 13,156 per hospital per year, which is equivalent to 1.9% to 4.9% of the operation cost of the two target hospitals shown in Table 2-22, which is within the range that the budget can cover. In addition, the target hospitals that have existing brick or aging incinerators can divert the operation and maintenance costs incurred from the existing incinerators when operating the maintenance equipment in place of the existing incinerators, so the increase in costs is even smaller and deemed sufficient to maintain the incinerators. MOH has agreed to secure the operation and maintenance costs.

Table 2-21 MOH Budget (by Central and Local) Yearly Trends

Item	FY 2019		FY 2020		FY 2021	
	Million KHR	Million USD*	Million KHR	Million USD*	Million KHR	Million USD*
MOH Budget	1,545,525.00	369.70	1,636,498.00	391.46	1,720,684.00	411.60
Increase over previous year	10.90%		5.90%		5.10%	
Central Budget	931,572.00	222.84	961,462.00	229.99	1,030,290.00	246.45
Increase over previous year	13.60%		3.20%		7.20%	
Percentage of budget	60%		59%		60%	
Local Budget	613,953.00	146.86	675,036.00	161.47	690,394.00	165.15
Increase over previous year	7%		9.90%		2.30%	
Percentage of budget	40%		41%		40%	

*: Converted to USD

Source: Health Sector Progress in 2021, MOH

Table 2-22 Expenditure Breakdown Budgets for the Two target Hospitals (FY 2021)

Unit: USD

Item			Malai Santepheap CPA1	Kratie PRH CPA3
Expenditure	Running cost	Hygiene Management Materials Fee	14,714	26,231
		Facility Management material costs	37,889	61,075
		Medical equipment management materials costs	45,913	34,083
		Fuel costs	20,100	21,923
		Electricity	5,558	0
		Water supply	0	0
		Outsourcing contract costs	10,210	31,559
		Facility maintenance costs	12,623	51,768
		Other maintenance costs	0	160,017
		Transport costs	783	6,960
		Total Running cost	147,788	393,616
	Other than Running cost		15,559	397,014
	Total Expenditure		163,347	790,629

Source: Malai Santepheap RH, Kratie PRH

Chapter 3 Project Evaluation

3-1 Preconditions

The preconditions for implementation of the Project are undertaken by the Cambodia side, namely tax exemption, customs clearance procedures, and payment of bank charges.

3-2 Necessary Inputs by Recipient Country

The following are actions that need to be addressed by the Cambodia side to achieve and sustain the Project effects.

- Electricity, fuel, and operating personnel required to operate the incinerator.
- Continuous training of infection prevention control committee personnel and workers on the operation and maintenance of equipment and medical waste management.
- Control the usage and inventory of spare parts required to maintain the equipment, and replenish them regularly to maintain adequate stock.
- After the two-year maintenance service contract for the Project, conclude another maintenance contract with the manufacturer or its local agent for regular inspections and continue to carry out environmental monitoring.
- Properly dispose of ash after incineration of medical waste in accordance with regulations, e.g. by disposing of it in hospital pits or consigning it to local authorities.

3-3 Important Assumptions

None.

3-4 Project Evaluation

3-4-1 Relevance

(1) Project Beneficiaries

The beneficiaries of the project are staff and inpatients of the 29 target hospitals (5 provincial hospitals and 24 district hospitals) and residents in the areas under the jurisdiction of hospitals. The 10 targeted provinces are BT-Menchay, Battambang, Kg Cham, Kg Chhnang, Kampot, Kandal, Kratie, Prey Veng, Siemreap and Svay Rieng. The beneficiary population is 541,520 people, as shown in Table 3-1. There are no accurate data on the population of the areas under the jurisdiction of the hospitals, and therefore the annual number of outpatients has been substituted for the population.

Table 3-1 Beneficiaries of the Project

Province	Hospital	Hospital staff	Annual Inpatient	Annual outpatient	Total
BT-Meanchey	Mongkol Borei	258	8,748	12,300	21,306
BT-Meanchey	Serei Sorphorn	83	3,000	9,600	12,683
BT-Meanchey	Poy Pet	116	15,168	16,032	31,316
BT-Meanchey	Or Chrouv	39	1,440	6,000	7,479
BT-Meanchey	Malai Santepheap	34	2,400	5,400	7,834
BT-Meanchey	Phnom Srock	48	2,172	6,000	8,220
BT-Meanchey	Thma Puok	57	2,400	3,000	5,457
BT-Meanchey	Svay chek	39	1,140	4,812	5,991
Battambang	Thma Koul	51	4,692	17,676	22,419
Battambang	Mong Russei	121	3,240	18,000	21,361

Province	Hospital	Hospital staff	Annual Inpatient	Annual outpatient	Total
Battambang	Rokar	42	2,640	14,400	17,082
Kg Cham	Batheay	71	7,200	12,000	19,271
Kg Chhnang	Kampong Chhnang	240	11,976	20,688	32,904
Kampot	Bunrany Hsen Koh Sla	34	900	720	1,654
Kampot	Kampong Trach	60	2,400	3,600	6,060
Kandal	Takhmau PRH	260	720	51,000	51,980
Kandal	Koh Thom	69	3,600	7,200	10,869
Kratie	Kratie PRH	165	10,800	27,600	38,565
Kratie	Chhlong	86	4,200	720	5,006
Prey Veng	Prey Veng PRH	162	24,000	60,000	84,162
Prey Veng	Kampong Trabek	40	2,400	3,600	6,040
Prey Veng	Neak Loeung	89	5,400	10,800	16,289
Prey Veng	Peareang	77	5,640	10,320	16,037
Siemreap	Ankor Chhum	54	2,400	8,400	10,854
Siemreap	Pouk	62	4,104	23,136	27,302
Svay Rieng	Svay Chrum	62	3,600	4,200	7,862
Svay Rieng	Chi Phu	72	3,600	8,400	12,072
Svay Rieng	Romeas Hek	77	4,200	14,400	18,677
Svay Rieng	Svay Teap	32	3,084	11,652	14,768
Total		2,600	147,264	391,656	541,520

Source: JICA Survey Team

(2) Urgency

The public healthcare service delivery system in Cambodia is being developed, particularly in the capital Phnom Penh, but there are large disparities between the capital and the provinces. With regard to medical waste management, many hospitals in the provinces lack incinerators and other treatment equipment, and existing equipment has become obsolete. As a result, even normal medical waste treatment is not being carried out adequately. Furthermore, although the volume of medical waste related to diagnosis, treatment and vaccination has increased as a result of the spread of COVID-19 infection, medical waste management has not been thoroughly implemented. As a result, hospital staff and neighboring residents are at risk of exposure to infectious pathogens due to inappropriate dumping and disposal of infectious waste, and medical waste treatment equipment needs to be urgently developed.

(3) Projects Contributing to the Achievement of the Cambodian National Health Policy

The Third Health Strategic Plan (2014-2018), published in May 2016, refers to medical waste management as “improving medical waste management, including the disposal of damaged materials and equipment that pose a high risk to public health in all hospitals” and “preventing health hazards by providing appropriate personnel and protective equipment/materials".

Furthermore, in the National Deployment and Vaccination Plan for COVID-19 Vaccines, published in January 2021, the COVID-19 vaccination campaign, one of the priorities is to create an enabling environment for proper waste treatment at each medical institution in order to cope with increased medical waste generated by the campaign.

Thus, the project is in line with the Cambodian national health policy/COVID-19 response policy and will contribute to its implementation.

(4) Consistency with the Assistance Policies and Strategies of the Government of Japan

In Japan’s “Country Development Cooperation Policy for the Kingdom of Cambodia” (July 2017), the

healthcare sector is recognized as a priority area for “improving quality of life”. In the "JICA Country Analysis Paper to the Kingdom of Cambodia" (March 2014), the promotion of social development such as "improvement of waste management" and "improvement of health and sanitation" was analyzed as a priority issue, and the Project is consistent with these policies and analyses. In addition, JICA’s issue-specific project strategy for the health sector promotes the creation of a system to strengthen the response to public health crises such as COVID-19 and to protect the health that forms the basis of people’s lives, and the Project is in line with this strategy. Furthermore, as the project contributes to strengthening hospital functions, it is also positioned under the JICA's Initiative for Global Health and Medicine “Strengthening Treatment system”.

3-4-2 Effectiveness

3-4-2-1 Quantitative Effectiveness

The quantitative effectiveness indicators[6] resulting from the Project, the current baseline values and the target value in 2027 are shown in Table 3-2.

Table 3-2 Quantitative Effectiveness of the Project

Objectively verifiable indicators	Baseline value (actual value in 2022)	Target value (2027) [Three years after project completion]
Amount of medical waste treated properly (kg/day)*	310	1,452

* medical waste amount treated by the environmental friendly equipment, such as incinerator with temperature control and sterilizer for medical waste. Baseline value and target value are medical waste amount treated in the target 29 hospitals.
Source: JICA Survey Team

(1) Amount of Medical Waste Treated Properly

The baseline value is the actual total amount of medical waste treated properly in the 29 targeted hospitals in 2022. The amount of medical waste treated by brick, aging incinerators, open fires, etc. is not included in the actual values, as it cannot be regarded as the amount of waste properly treated due to its negative environmental impact. The target value is the amount of medical waste that will be properly treated in 2027 in the 29 target hospitals by the incinerators installed by the Project and existing equipment in operation. Details are given in Table 2-13.

3-4-2-2 Qualitative Effectiveness

The implementation of the Project is expected to have the following qualitative effectiveness.

(1) Reduce Damage or the Risk of Exposure to Infectious Pathogens

Proper collection and incineration of medical waste treatment in the target hospitals is expected to reduce the damage or risk of exposure of hospital staff to infectious pathogens.

This qualitative indicator will be measured through interviews to the hospital staff on the segregation and storage of medical waste and the circumstances of infection incidents related to medical waste.

(2) Reduce Negative Impact on the Surrounding Environment (Smoke Pollution, Odors, etc.)

Some brick incinerators and aging incinerators currently in use generate smoke pollution and odors in the surrounding area due to a lack of proper combustion management. According to the interview with the targeted hospitals, nine hospitals had received complaints from nearby residents regarding medical waste treatment such as black smoke and odors. The renewal of these incinerators will contribute to reduced negative environmental impact on the surrounding population.

This qualitative indicator will be measured though interviews to the hospitals after obtaining the number of complaints received by the hospital from residents in the vicinity about the operation of the incinerator.

[6] Some documents indicate 1,454 kg/day, but with detail examination, this indicator is revised as 1,452 kg/day.

[Appendices]

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1 Member List of the Study Team

Appendix-1 Member List of the Study Team

(Japan International Cooperation Agency: JICA)

No	Name	Assignment	Organization
1	HIRAOKA Hisakazu	Leader	Japan International Cooperation Agency
2	YOSHIZU Chie	Planning Management	Japan International Cooperation Agency
3	HASEGAWA Aya	Planning Management	Japan International Cooperation Agency

(Consultant)

No	Name	Assignment	Organization
Japanese expert			
1	ARAI Takatoshi	Chief Consultant / Medical Waste Management / Facility Plan	Yachiyo Engineering Co., Ltd.
2	NOZAKI Tamotsu	Deputy Chief Consultant / Equipment Plan 1	Koei Research & Consulting Inc.
3	YAMANAKA Chikako	Equipment Plan 2 / Equipment Management	Yachiyo Engineering Co., Ltd.
4	YOSHIDA Kenji	Environmental and Social Considerations	Yachiyo Engineering Co., Ltd.
5	SUGINO Yoshiharu	Health and Medical Plan	Koei Research & Consulting Inc.
6	KATO Atsushi	Procurement Plan / Cost Estimation	Yachiyo Engineering Co., Ltd.
National Staff			
1	Chhoun Pheak	Senior Engineer	KHANA Center for Population Health Research
2	Hum Sokheng	Senior Engineer	KHANA Center for Population Health Research
3	Yim Theary	Senior Engineer	KHANA Center for Population Health Research
4	Heang Mouyim	Senior Engineer	KHANA Center for Population Health Research
5	Bora Bormeysohphoan	Engineer	KHANA Center for Population Health Research
6	Lun Chandet	Engineer	KHANA Center for Population Health Research
7	Rom Sang Heang	Engineer	KHANA Center for Population Health Research

2 Study Schedule

Appendix-2 Study Schedule

The field survey was done by Mr. Hiraoka and Ms. Hasegawa from JICA, Mr. Arai, Mr. Nozaki, Ms. Yamanaka, Dr. Yoshida and Dr. Sugino from consultant.

No.	Date		JICA		Consultant				
			Leader	Planning Management	Chief Consultant / Medical Waste Management / Facility Plan	Deputy Chief Consultant / Equipment Plan 1	Equipment Plan 2 / Equipment Management	Environmental and Social Considerations	Health and Medical Plan
			Hiraoka Hisakazu	Hasegawa Aya	Arai Takatoshi	Nozaki Tamotsu	Yamanaka Chikako	Yoshida Kenji	Sugino Yoshiharu
1	28-May	Sat			Travel (Tokyo → Phnom Penh)				
2	29-May	Sun			Data analysis, Internal meeting				
3	30-May	Mon			Data analysis, Internal meeting Meeting with MOH				
4	31-May	Tue			Data analysis, Internal meeting				
5	1-Jun	Wed			Meeting with Kandal PHD, Visit target hospitals in Kandal Province				
6	2-Jun	Thu			Visit target hospitals in Pray Veng Province Meeting with Kg Cham PHD, Visit target hospitals in Kg Cham Province				
7	3-Jun	Fri			Meeting with MOH Visit target hospitals in Kg Cham Province				
8	4-Jun	Sat			Data analysis, Internal meeting				
9	5-Jun	Sun			Data analysis, Internal meeting				
10	6-Jun	Mon			Data analysis Visiting a domestic incinerator manufacture				
11	7-Jun	Tue			Meeting with Takeo PHD, Visit target hospitals in Takeo Province Meeting with Siemreap PHD, Visit target hospitals in Siemreap Province				
12	8-Jun	Wed			Meeting with Kampot PHD, Visit target hospitals in Kampot Province Visit target hospitals in BT-Meanchey Province				
13	9-Jun	Thu			Meeting with Pray Veng PHD, Visit target hospitals in Pray Veng Province Meeting with BT-Meanchey PHD				
14	10-Jun	Fri			Meeting with Svay Rieng PHD Meeting with MOH Meeting with Battambang PHD, Visit target hospitals in Battambang Province				
15	11-Jun	Sat	Travel (Tokyo → Phnom Penh)		Data analysis, Internal meeting				
16	12-Jun	Sun			Data analysis				
			Internal meeting						
17	13-Jun	Mon	Meeting with JICA Cambodia Office Meeting with MOH						
18	14-Jun	Tue	Meeting with Kg Chhnang PHD, Visit target hospitals in Kg Chhnang Province Meeting with DOE						
19	15-Jun	Wed	Visit Environmental Consultant, Meeting with DOE Meeting with Kratie PHD, Visit target hospitals in Kratie Province						
20	16-Jun	Thu	Meeting with MOH (Signing on M/D) Visit target hospitals in Kratie Province						
21	17-Jun	Fri	Report to JICA Cambodia Office, Report to Embassy of Japan in Cambodia Meeting with Planning office of MOH, Meeting with MOH about Field Report Visit target hospitals in Kg Cham Province						
22	18-Jun	Sat	Travel (Phnom Penh → Tokyo)	Data analysis					
23	19-Jun	Sun		Travel (Phnom Penh → Colombo)				Data analysis	
24	20-Jun	Mon						Data analysis	

No.	Date		JICA		Consultant				
			Leader	Planning Management	Chief Consultant / Medical Waste Management / Facility Plan	Deputy Chief Consultant / Equipment Plan 1	Equipment Plan 2 / Equipment Management	Environmental and Social Considerations	Health and Medical Plan
			Hiraoka Hisakazu	Hasegawa Aya	Arai Takatoshi	Nozaki Tamotsu	Yamanaka Chikako	Yoshida Kenji	Sugino Yoshiharu
25	21-Jun	Tue						Travel (Phnom Penh → Colombo)	Data analysis
26	22-Jun	Wed							Data analysis
27	23-Jun	Thu							Data analysis
28	24-Jun	Fri							Data analysis
29	25-Jun	Sat							Data analysis
30	26-Jun	Sun							Travel (Phnom Penh → Colombo)

3 List of Principal Interviewees

Appendix-3 List of Principal Interviewees

Organization	Position and Name
Ministry of Health (MoH)	
Directorate General for Health	Director / Hok Kimcheng
Department of Hospital Services (DHS)	Director / Sok Srun
Department of International Cooperation (DIC)	Officer / Moeun Sreyleap
Ministry of Environment(MoE)	
Department of EIA	Depuly Director / Chea Leng, MSC
Provincial Health Department (PHD)	
BT-Meanchey PHD	Director and others
Battanbang PHD	Director and others
Kg Cham PHD	Director and others
Kg Chhnang	Director and others
Kg Thom PHD	Director and others
Kampot PHD	Director and others
Kandal PHD	Director and others
Kratie PHD	Director and others
Mondulkiri PHD	Director and others
Prey Veng PHD	Director and others
Ratanakiri PHD	Director and others
Siem Reap PHD	Director and others
Svey Rieng PHD	Director and others
Takeo PHD	Director and others
JICA Cambodia Office	
	Senior Representative / Yanagawa Shinji
	Project Formulation Advisor / Ogasawara Tadashi

4 Minutes of Discussions

4a Minutes of Discussions (June 16, 2022)

4b Minutes of Discussions (Sep. 8, 2022)

Minutes of Discussions
on the Preparatory Survey for
The Project for the Improvement of Infectious Waste Management

Based on the several preliminary discussions between the Royal Government of Cambodia (hereinafter referred to as "Cambodia") and Japan International Cooperation Agency (hereinafter referred to as "JICA") Cambodia Office, JICA dispatched the Preparatory Survey Team for the Outline Design (hereinafter referred to as "the Team") of the Project for the Improvement of Infectious Waste Management (hereinafter referred to as "the Project") to Cambodia. The Team held a series of discussions with the officials of the Government of Cambodia and conducted a field survey. In the course of the discussions, both sides have confirmed the main items described in the attached sheets.

Phnom Penh, June 16, 2022

平岡久和	
Mr. HIRAOKA Hisakazu	Dr. Hok Kimcheng
Leader	Director General for Health
Preparatory Survey Team	Ministry of Health
Japan International Cooperation Agency	The Kingdom of Cambodia
Japan	

ATTACHMENT

1. Objective of the Project

   The objective of the Project is to strengthen the infectious waste treatment in hospitals through the procurement of equipment for the infectious waste management, thereby contributing to improving the infectious waste management.

2. Title of the Project

   Both sides confirmed that the tittle of the Preparatory Survey as "The Preparatory Survey for the Project for the Improvement of Infectious Waste Management"

3. Project sites

   Both sides confirmed the priority criteria of the Project sites are shown in Annex 1. The final project sites will be determined based on the result of survey.

4. Responsible authority for the Project

   Both sides confirmed the authorities responsible for the Project are as follows:
   The Ministry of Health 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 relevant authorities shall manage the undertakings for the Project properly and on time. The organization chart and leading department are shown in Annex 2.

5. Items requested by the Government of Cambodia

   As a result of discussions, both sides confirmed that the items requested by the Royal Government of Cambodia are as follows:

   1) Incinerator (foundation, fence, storage space, etc. where necessary)
   2) Sterilizer for medical waste

   JICA will assess the feasibility of the above 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.

6. Procedures and Basic Principles of Japanese Grant

6-1. The Cambodia side agreed that the procedures, and basic principles of Japanese Grant (hereinafter referred to as "the Grant") as described in Annex 3 shall be applied to the Project.

As for the monitoring of the implementation of the Project, JICA requires Cambodia side to submit the Project Monitoring Report, the form of which is attached as Annex 4.

6-2. The Cambodia side agreed to take the necessary measures, as described in Annex 5, for smooth implementation of the Project. The contents of the Annex 5 will be elaborated and refined during the Preparatory Survey and be agreed in the mission dispatched for explanation of the Draft Preparatory Survey Report.
The contents of Annex 5 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 Cambodia until 26 June 2022.

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

7-3. JICA will prepare a draft Preparatory Survey Report in English and organize online meetings with Cambodia side in order to explain its contents around mid-August 2022.

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

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

8. Environmental and Social Considerations

8-1. The Cambodia side confirmed 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 (Jan., 2022).

8-2. The Project is categorized as "B" from the following considerations:
The project is not considered to be a large-scale Waste project, is not located in a sensitive area, and has none of the sensitive characteristics under the JICA guidelines for environmental and social considerations (Jan., 2022), it is not likely to have a significant adverse impact on the environment.
Both sides will confirm the necessity of the procedures concerning environmental assessment. If necessary, the Cambodia side will conduct the necessary procedures concerning the environmental assessment (including stakeholder meetings,

Environmental Impact Assessment (EIA) / Initial Environmental Examination (IEE) and information disclosure, etc.) and make EIA/IEE report of the Project. The EIA/IEE approval shall be received from the responsible authorities and submitted to JICA by the date to be notified later.

9. Other Relevant Issues

9-1. Exemption of customs duties, internal taxes and other fiscal levies

To ensure that customs duties, internal taxes and other fiscal levies which may be imposed in Cambodia with respect to the purchase of the products and/or the services be exempted.

9-2. Soft Component

Users of supplied equipment need to improve the knowledge and technical skills needed to operate and maintain the equipment properly and safely and to improve the maintenance and monitoring skill for equipment, such as record keeping and ledger. Furthermore hospital staff need to improve basic knowledge and skills of medical waste and its segregation methods needed to manage medical waste properly and safely in the target hospitals. Both sides confirmed the necessity of technical assistance as soft components of the Project, which will be provided by Japan's grant aid as soft component, for proper operation and preventive maintenance of the equipment.

9-3. Maintenance service contract

Both side agreed the importance of maintenance and maintenance service contract for the equipment to be procured. Both sides also agreed to consider maintenance service contract for the medical waste treatment equipment that need professional maintenance to be included in the Grant.

9-4. Characteristics of requested items

-Incinerators have advantages: sterilization, reduction of volume of the waste and established technology of operation and maintenance. And they need consideration: smoke and smell when operated inappropriately and supply of fuel.

-Sterilizers for medical waste have advantages: sterilization, shredding/melting sharps. And they need considerations: stable electricity, difficulty in operation and maintenance due to new technology, and smell upon operation.

9-5. Exchange of information regarding related projects

The Cambodia side agreed to inform the Japanese side all projects related to the Project especially on medical and infectious waste management, including current

and future ones, by Cambodia Government's funds and other development partners' funds.

Annex 1 Project Sites
Annex 2 Organization Chart
Annex 3 Japanese Grant
Annex 4 Project Monitoring Report (template)
Annex 5 Major Undertakings to be taken by the Government of Cambodia

Project sites

Priority Criteria for the Project Sites from the 51 Survey Hospitals

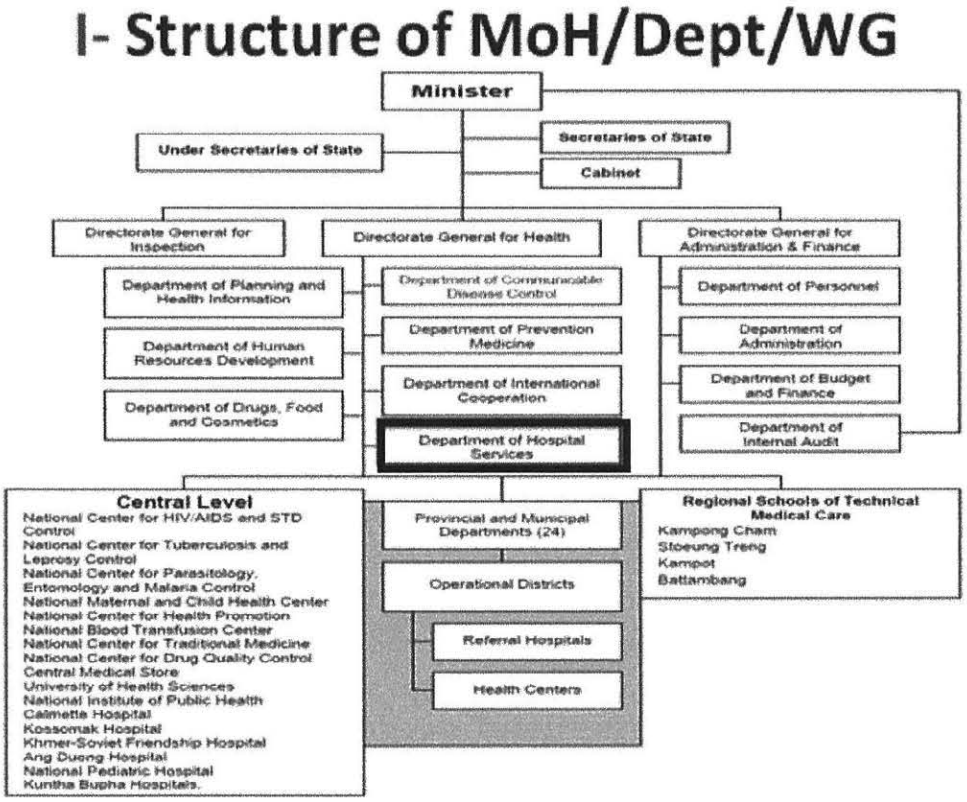
1. Hospitals facing difficulties of infectious waste management
   1) Hospitals without equipment for infectious waste management
      *excluding hospitals with proper waste transfer system to institutions outside
   2) Hospitals with equipment to be improved
      e.g. brick made incinerator, deteriorated incinerator
   3) Hospitals with infectious waste more than the capacity of current equipment
   4) Hospitals with sufficient land to set up equipment
2. Hospitals appointed as a high priority for introducing infectious medical waste equipment by Ministry of Health and Provincial Health Department

Survey Hospitals (51)

	Province	Name of Hospital	Hospital Level
1	BT-Meanchey	Mongkol Borei	CPA3
2	BT-Meanchey	Serei Sorphorn	CPA1
3	BT-Meanchey	Poy Pet	CPA2
4	BT-Meanchey	Or Chrouv	CPA1
5	BT-Meanchey	Malai Santepheap	CPA1
6	BT-Meanchey	Preah Net Preah	CPA2
7	BT-Meanchey	Phnom Srock	CPA1
8	BT-Meanchey	Thma Puok	CPA2
9	BT-Meanchey	Svay Chek	CPA1
10	Battambang	Thma Koul	CPA1
11	Battambang	Mong Russei	CPA2
12	Battambang	Sampov Luon	CPA2
13	Battambang	Norin	CPA1
14	Battambang	Rokar	CPA1
15	Kg Cham	Hunsen Stung Trang	CPA1
16	Kg Cham	Choeung Prey	CPA2
17	Kg Cham	Batheay	CPA2
18	Kg Cham	Prey Chhor	CPA1
19	Kg Cham	Koh Soutin	CPA1
20	Kg Cham	Srei Santhor	CPA2
21	Kg Cham	Chamkar Leu	CPA2

22	Kg Cham	Kung Meas	CPA1
23	Kg Chhnang	Kampong Chhnang	CPA3
24	Kg Thom	Stong	CPA2
25	Kampot	Angkor Chey	CPA2
26	Kampot	Bunrany Hsen Koh Sla	CPA1
27	Kampot	Kampong Trach	CPA2
28	Kandal	Takhmau PRH	CPA3
29	Kandal	Koh Thom	CPA2
30	Kandal	Bunrany HSen Rokarkorng	CPA2
31	Kandal	Ponhea Leu	CPA2
32	Kratie	Kratie PRH	CPA3
33	Kratie	Chhlong	CPA2
34	Mondulkiri	Senmonorum PRH	CPA2
35	Prey Veng	Prey Veng PRH	CPA3
36	Prey Veng	Kampong Trabek	CPA2
37	Prey Veng	Neak Loeung	CPA2
38	Prey Veng	Peareang	CPA2
39	Ratanakiri	Ratanakiri PRH	CPA3
40	Ratanakiri	Bor Keo	CPA2
41	Siemreap	Kralanh	CPA2
42	Siemreap	Sot Nikum	CPA2
43	Siemreap	Ankor Chhum	CPA1
44	Siemreap	Pouk	CPA2
45	Svay Rieng	Svay chrum	CPA1
46	Svay Rieng	Chi Phu	CPA1
47	Svay Rieng	Romeas Hek	CPA2
48	Svay Rieng	Svay Teap	CPA1
49	Svay Rieng	Samaki Romduol	CPA1
50	Takeo	Kirivong	CPA2
51	Takeo	Prey Kabass	CPA2

Organization Chart



The leading department is Department of Hospital Services and detail organization will be formulated to coordinate with relevant authorities for smooth implementation of the Project including Monitoring and Evaluation.

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 singed 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 followings:

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 (January, 2022).

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) Measures to ensure more efficient implementation of the Grant

i) In the event that the E/N and the G/A concerning a project cannot be signed by the end of the following Japanese fiscal year of the cabinet decision concerned by the GOJ, the authorities concerned of the two Governments will discuss the cancellation of the project.

ii) In the event that the period, specified in the G/A, during which the grant is available expires before the completion of the disbursement, the authorities concerned of the GOJ will thoroughly review the status, situation and perspective of the implementation of the project concerned before extending the said period. The authorities concerned of the two Governments will discuss the termination of the project including a refund, unless there are concrete prospects for its completion.

iii) Regardless of the period mentioned in 2) above, the authorities concerned of the two Governments will, in the event that five years have passed since the cabinet decision concerned by the GOJ before the completion of the disbursement, except as otherwise confirmed between them, discuss the termination of a project including a refund, unless there are concrete prospects for its completion.

4) 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.

5) Export and Re-export

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

PROCEDURES OF JAPANESE GRANT

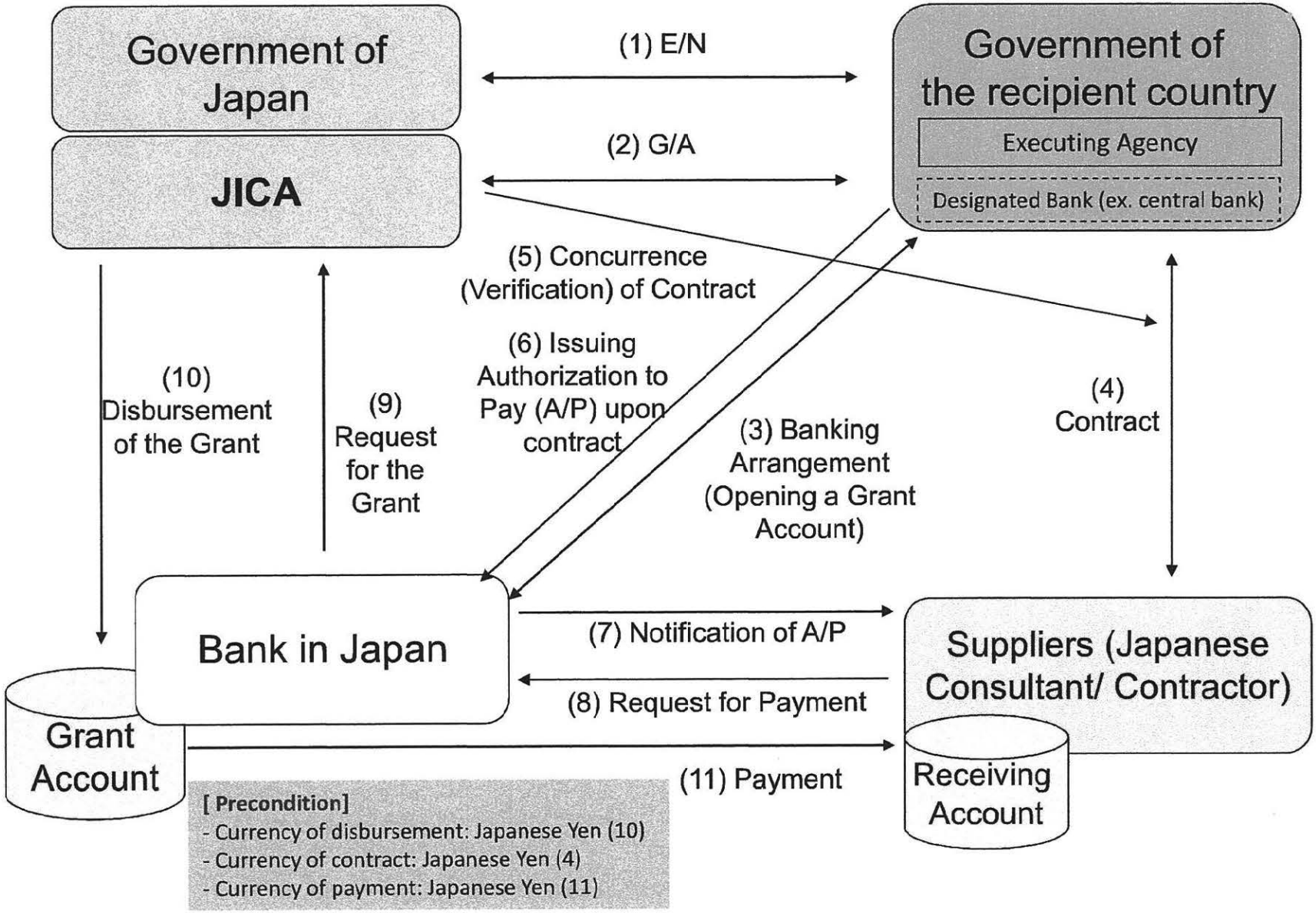
Stage	Procedures	Remarks	Recipient Government	Japanese Government	JICA	Consultants	Contractors	Agent Bank
Official Request	Request for grants through diplomatic channel	Request shall be submitted before appraisal stage.	x	x				
1. Preparation	(1) Preparatory Survey Preparation of outline design and cost 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.

Financial Flow of Japanese Grant (A/P Type)



Project Monitoring Report
on
Project Name
Grant Agreement No. XXXXXXX

20XX, Month

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

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.			

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:
	Contingency Plan (if applicable):
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:
	Contingency Plan (if applicable):
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.

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.

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.

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
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)

-
-
-

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%)	

Major Undertakings to be taken by the Government of Cambodia

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

(1) Before the Bidding

NO	Items	Deadline	In charge	Estimated Cost	Ref.
1	To coordinate with the National Bank of Cambodia to open Bank Account (Banking Arrangement (B/A))	Immediately after G/A	MOH		
2	To facilitate A/P to a bank in Japan (the Agent Bank) for the payment to the consultant	within 1 month after the signing of the contract(s)	MOH		
3	To secure and clear the following lands Project sites for incinerator and sterilizer for medical waste	before notice of the bidding documents	MOH		
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	MOE		
5	To clear, level and reclaim the following sites leveling and reclaiming the sites for incinerator and sterilizer for medical waste	before notice of the bidding documents	MOH		
6	To submit Project Monitoring Report (with the result of Detailed Design)	before preparation of the bidding documents	MOH		

B/A: Banking Arrangement, A/P: Authorization to Pay, G/A: Grant Agreement
MOE: Ministry of Environment, MOH: Ministry of Health, PHD: Provincial Health Department
IEE: Initial Environmental Examination, EIA: Environmental Impact Assessment, EMP: Environmental Management Plan, EMoP: Environmental Monitoring Plan

(2) During the Project Implementation

NO	Items	Deadline	In charge	Estimated Cost	Ref.
1	To facilitate A/P to a bank in Japan (the Agent Bank) for the payment to the supplier(s)	within 1 month after the signing of the contract(s)	MOH		
2	To facilitate bearing the following commissions to a bank of Japan 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)	MOH		
	2) Payment commission for A/P	every payment	MOH		
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	MOH		
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	MOH		
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.	during the Project	MOH		
6	To bear all the expenses, other than those covered by the Grant, necessary for the implementation of the Project	during the Project	MOH		
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	MOH		

8	To submit Project Monitoring Report after each work under the contract(s) such as shipping, hand over, installation and operational training	within 1 month after completion of each work	MOH		
	To submit Project Monitoring Report (final) (including equipment list, photographs, etc.)	within 1 month after issuance of Certificate of Completion for the works under the contract(s)	MOH		
9	To submit a report concerning completion of the Project	within 6 months after completion of the Project	MOH		
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)		MOH		
	1) Electricity The distributing line to the site	before start of the construction			
	2) Water Supply The city water distribution main to the site	before start of the construction			
	3) Drainage The city drainage main (for storm, sewer and others) to the site	6 months before completion of the construction			
11	To provide equipment, facilities necessary for the implementation of the Project in the site(s) except the equipment which are funded with the Grant. e.g. Equipment for medical waste containers for segregation	before start of the construction	MOH		
12	To ensure the safety of persons engaged in the implementation of the Project	during the Project	MOH		
13	To implement EMP and EMoP	during the construction	MOH		
14	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	MOH		

(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	MOH		
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 MOH and JICA.	for 3 years after the Project	MOH		
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 3) Routine check/Periodic inspection (including record of the medical waste amount treated by the Equipment)	After completion of the construction	Provincial Government/ PHD/ Hospitals		

4 Minutes of Discussions

4a Minutes of Discussions (June 16, 2022)

4b Minutes of Discussions (Sep. 8, 2022)

Minutes of Discussions
on the Preparatory Survey for
The Project for the Improvement of Infectious Waste Management
(Explanation on Draft Preparatory Survey Report)

With reference to the minutes of discussions signed between the Ministry of Health, the Royal Government of Cambodia and the Japan International Cooperation Agency (hereinafter referred to as "JICA") on 16 June, 2022 and in response to the request from the Royal Government of Cambodia dated 19 July, 2022, JICA organized 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 the Improvement of Infectious Waste Management (hereinafter referred to as "the Project").

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

Phnom Penh, 8 September, 2022

平岡 久和

Mr. HIRAOKA Hisakazu
Leader
Preparatory Survey Team
Japan International Cooperation Agency
Japan

Dr. Hok Kimcheng
Director General for Health
Ministry of Health
The Kingdom of Cambodia

ATTACHEMENT

1. Objective of the Project

   The objective of the Project is to strengthen infectious waste treatment at the 29 public health facilities by installing medical waste incinerators, thereby contributing to the reduction of health hazards.

2. Project sites

   Both sides confirmed that the sites of the Project are 29 public health facilities in 10 provinces, which are shown in Annex 1.

3. Items requested

   As a result of the discussions, both sides confirmed that the items requested by the Ministry of Health, the Government of Cambodia (hereinafter referred to as "Cambodia") is Incinerator (foundation, fence, storage space, etc. where necessary). The final scope of the Project will be decided by the Government of Japan.

4. Contents of the Draft Report

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

5. Cost estimate

   Both sides confirmed that the cost estimate explained by the Team is provisional and will be examined further by the Government of Japan for its approval.

6. 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.

7. Timeline for the project implementation

   The Team explained to the Cambodia side that the expected timeline for the project implementation is as attached in Annex 2.

8. Expected outcomes and indicators

Both sides agreed that key indicators for expected outcomes are as follows. The Cambodia side will be responsible for the achievement of agreed key indicators targeted in year 2027 and shall monitor the progress for Ex-Post Evaluation based on those indicators.

[Quantitative indicators]

- Amount of medical waste treated properly (kg/day)

Indicator	Baseline (2022)	Target (2027) 【3years after the Project completion】
Amount of medical waste treated properly (kg/day)*	310	1,452

*Total volume for the 29 hospitals (not including the amount of medical waste disposed of in brick incinerators and aging incinerators, etc., considering the environmental impact).

[Qualitative indicators]

- Reduce damage or the risk of exposure to infectious pathogens
- Reduce negative impact on the surrounding environment (smoke pollution, odors, etc.)

9. 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, and Sustainability). The result of the evaluation will be publicized. The Cambodia side is required to provide necessary support for the data collection.

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

Considering the sustainable operation and maintenance of the products as hardware and services granted through the Project, the following technical assistance is planned under the Project to improve capacity and skills for the target hospitals, with the MoH.

The Team explained that the contents of the soft component are as below;

- Component1: Technical guidance on the proper operation of incinerators
- Component2: Technical guidance on proper maintenance of incinerators
- Component3: Technical guidance on medical waste management and behavior change

The Team also explained the three expected outcomes of the Soft Component to be achieved (Assuming a three-year timeframe).

- Strengthen infectious waste management at the target hospitals through proper operation and maintenance of incinerator.
- Improve infection prevention capabilities through proper medical waste management and use of incinerator.
- Reduce the environmental impact on the surrounding area through proper medical waste management and use of incinerator.

The Team further explained the cascade training system, the Regional level training of trainers (TOT) will be funded with the Grant and the Cambodia side will be responsible for the implementation on the hospital level and within hospital training including its supervision and facilitation as the training plan developed at the MoH. The training at the hospital level is expected to complete by the end of the Project completion. The MoH will conduct the monitoring of the training and report using Project Monitoring Report (PMR), attached as Annex4.

The Cambodia side will also be responsible for the expenses incurred on the Cambodia side such as venue, transportation, daily allowance, and others during all periods.

11. Undertakings of the Project

Both sides confirmed the undertakings of the Project as described in Annex 3. With regard to exemption of customs duties, internal taxes and other fiscal levies as stipulated in 1. (2)-5 of Annex 3, both sides confirmed that such customs duties, internal taxes and other fiscal levies, which shall be clarified in the bid documents by the Ministry of Health during the implementation stage of the Project.

The Cambodia 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 3 will be used as an attachment of G/A.

11-1 Exemption of customs duties, internal taxes and other fiscal levies

With regard to exemption of customs duties, internal taxes and other fiscal levies as stipulated in 1.(2)-5 of Annex 3, both sides confirmed that such customs duties, internal taxes and other fiscal levies, which shall be clarified in the bid documents by Cambodia during the implementation stage of the Project. Both sides confirmed

descriptions regarding items to be exempted and procedures for exemption in the Draft Report of the preparatory survey.

11-2 Allocation of necessary personnel and budget for the Project

The Cambodia side confirmed the human resource plan described in the Draft Report and agreed to allocate necessary personnel for implementation of the Project and staff training to operate the new incinerators before completion of the Project.

The Team provided estimated budget for implementation of the Project and staff training emphasized that necessary budget to operate the new incinerators. The Cambodia side confirmed the estimation and assured to take the necessary measures to secure and allocate the human resource and budget.

11-3 Supply and expenses of fuel, electricity and water

The Team explained that the result of fuel, electricity and water supply forecast. According to the forecast, both sides confirmed that the Cambodia side must make the utmost efforts to secure the fuel, electricity and water required for the operation of the incinerators after the completion of the Project. The Cambodia side agreed to cover the necessary expenses of fuel, electricity and water in order to meet the demand at the 29 hospitals.

11-4 Maintenance service contract

Both sides agreed the importance of maintenance and maintenance service contract for the incinerators. Both sides also agreed that the maintenance service contract for the incinerators to be included in the Grant. Moreover, Cambodia side agreed to consider the arrangement of continue maintenance service contract with allocation of the necessary budget after the Grant supported contract end.

11-5 Proper disposal of incinerator ash

Incinerator ash contains hazardous substances such as heavy metals etc. cause the environmental pollution. The Cambodia side agreed to maintain proper disposal of incinerator ash at the 29 hospitals or request the municipal authority for the disposal.

12. Monitoring during the implementation

The Project will be monitored by the Executing Agency and reported to JICA by using the form of PMR. The timing of submission of the PMR is described in Annex 3.

13. Project completion

Both sides confirmed that the project completes when all the 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.

14. Environmental and Social Considerations

14-1 General Issues

14-1-1 Environmental Guidelines and Environmental Category

The Team explained that 'JICA Guidelines for Environmental and Social Considerations (January 2022)' (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, and has none of the sensitive characteristics under the guidelines, it is not likely to have a significant adverse impact on the environment.

14-1-2 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 5. Both sides confirmed that in case of major modification of the content of the Environmental Checklist, the Cambodia side shall submit the modified version to JICA in a timely manner.

14-2 Environmental Issues

14-2-1 Initial Environmental Impact Assessment (IEIA), EIA, Environment Protection Contract (EPC)

Both sides confirmed IEIA, EIA and EPC are not required for installing the incinerator within the hospital premises according to the Prakas No. 021(dated February 3, 2020), Ministry of Environment of Cambodia.

14-2-2 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 6, respectively. Both sides 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.

14-3 Environmental and Social Monitoring

14-3-1 Environmental Monitoring

Both sides agreed that the Cambodia side will submit results of environmental monitoring to JICA by using the monitoring form attached as Annex 7. The timing of submission of the monitoring form is described in Annex 3.

14-3-2 Information Disclosure of Monitoring Results

Both sides confirmed that the Cambodia side will disclose results of environmental and social monitoring to local stakeholders through their website / in their field

offices.

The Cambodia side agreed JICA will disclose results of environmental and social monitoring submitted by the Cambodia side as the monitoring forms attached as Annex 7 on its website.

15. Other Relevant Issues

15-1 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.

15-2.Gender Mainstreaming

Both sides confirmed that gender mainstreaming should be duly practiced for the Project implementation.

Annex 1 Project Sites
Annex 2 Project Implementation Schedule
Annex 3 Major Undertakings to be taken by the Government of Cambodia
Annex 4 Project Monitoring Report (template)
Annex 5 Environmental Check List
Annex 6 Environmental Management Plan/Environmental Monitoring Plan
Annex 7 Environmental and Social Monitoring Form

Project sites

29 Hospitals

	Province	Name of Hospital	Hospital Level	Size of Incinerator
1	BT-Meanchey	Mongkol Borei	CPA3	Middle
2	BT-Meanchey	Serei Sorphorn	CPA1	Middle
3	BT-Meanchey	Poy Pet	CPA2	Large
4	BT-Meanchey	Or Chrouv	CPA1	Small
5	BT-Meanchey	Malai Santepheap	CPA1	Small
6	BT-Meanchey	Phnom Srock	CPA1	Small
7	BT-Meanchey	Thma Puok	CPA2	Small
8	BT-Meanchey	Svay Chek	CPA1	Small
9	Battambang	Thma Koul	CPA1	Small
10	Battambang	Sampov Luon	CPA2	Middle
11	Battambang	Rokar	CPA1	Middle
12	Kg Cham	Batheay	CPA2	Small
13	Kg Chhnang	Kampong Chhnang	CPA3	Middle
14	Kampot	Bunrany Hsen Koh Sla	CPA1	Small
15	Kampot	Kampong Trach	CPA2	Small
16	Kandal	Takhmau PRH	CPA3	Large
17	Kandal	Koh Thom	CPA2	Small
18	Kratie	Kratie PRH	CPA3	Small
19	Kratie	Chhlong	CPA2	Small
20	Prey Veng	Prey Veng PRH	CPA3	Small
21	Prey Veng	Kampong Trabek	CPA2	Small
22	Prey Veng	Neak Loeung	CPA2	Large
23	Prey Veng	Peareang	CPA2	Middle
24	Siemreap	Ankor Chhum	CPA1	Middle
25	Siemreap	Pouk	CPA2	Small
26	Svay Rieng	Svay chrum	CPA1	Small
27	Svay Rieng	Chi Phu	CPA1	Small
28	Svay Rieng	Romeas Hek	CPA2	Middle
29	Svay Rieng	Svay Teap	CPA1	Small

CPA: Complementary Package of Activities

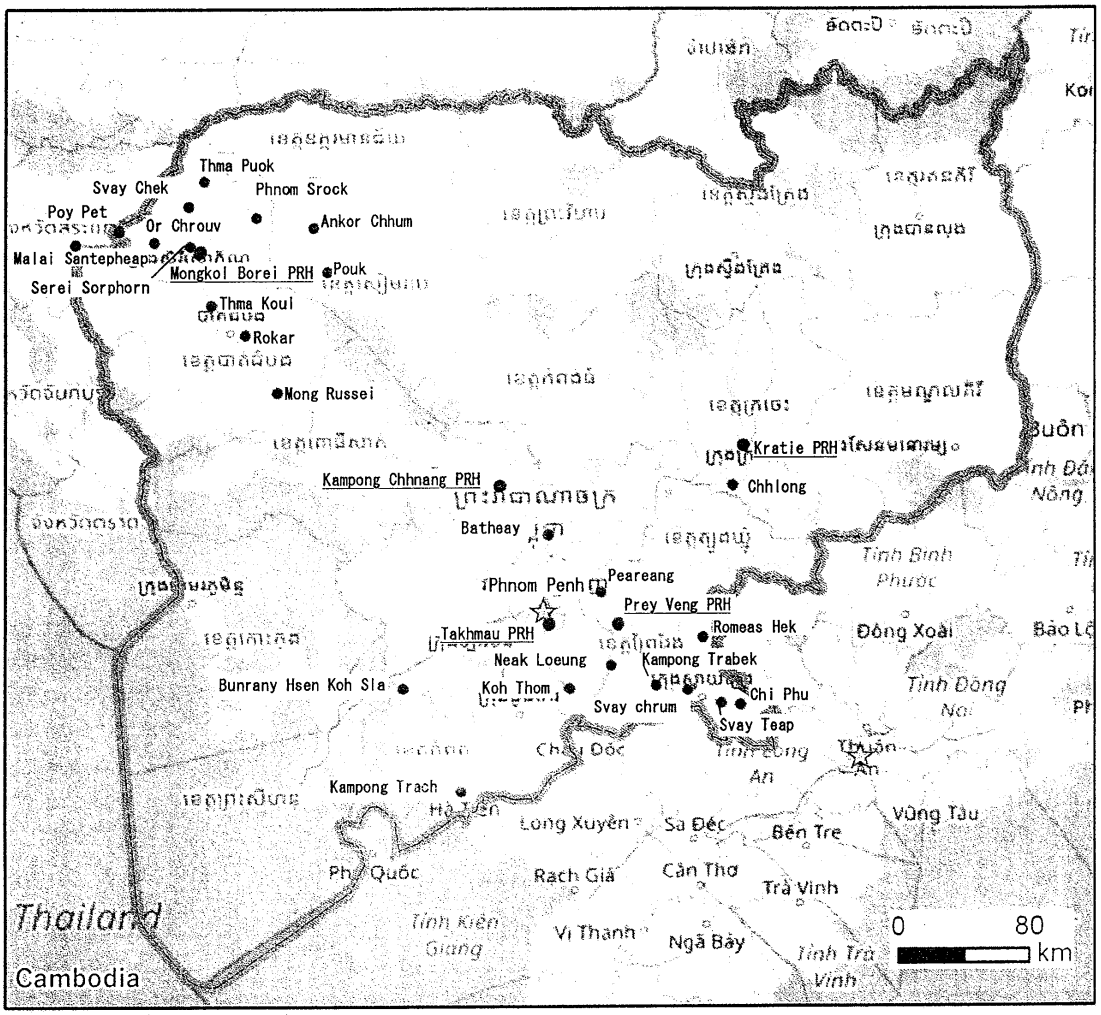
Size of Incinerator

Large: 50kg/h

Middle: 30kg/h

Small: 20kg/h

Map of the Project Sites



N

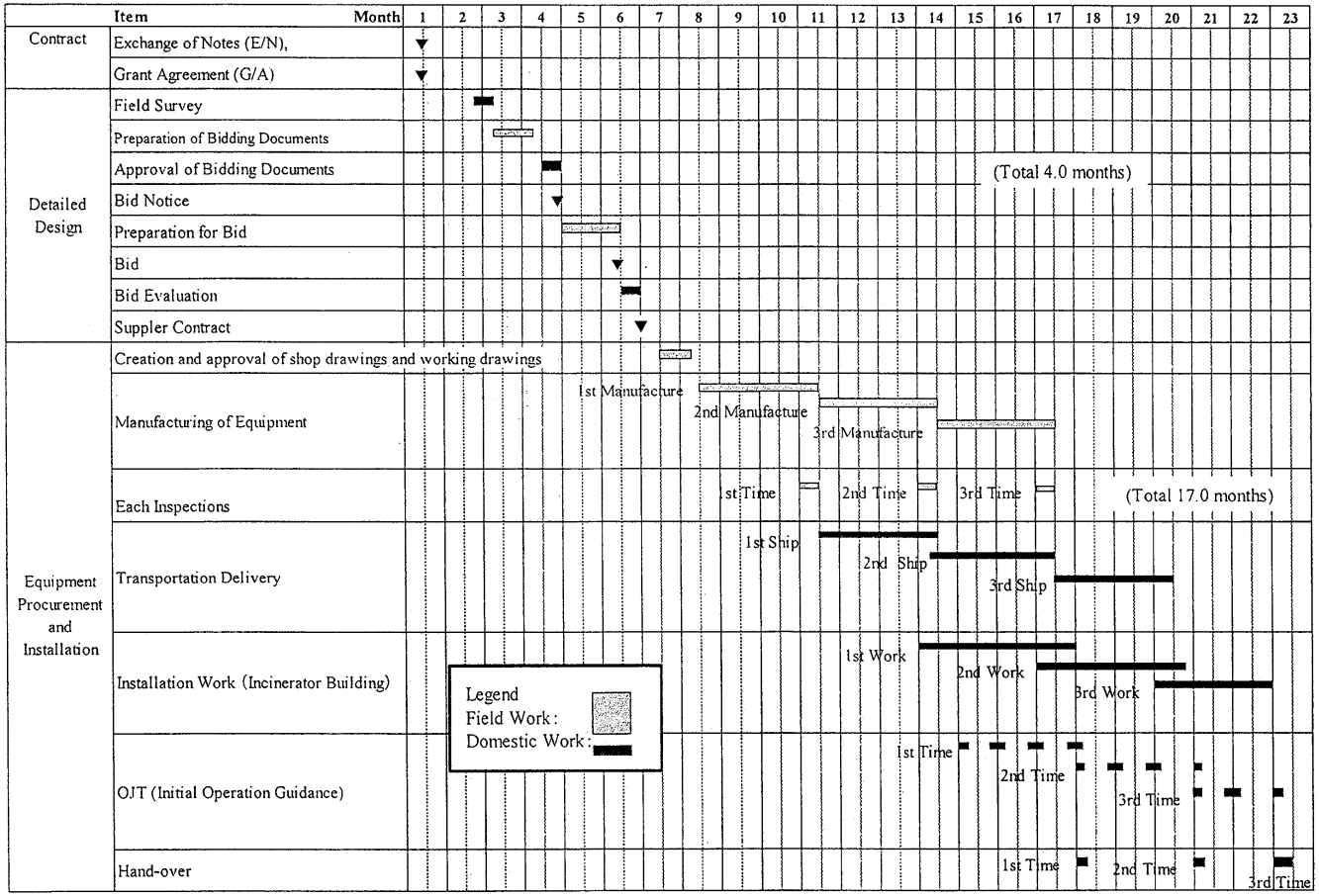
Legend

- ☆ Capital City
- ● Province Referral Hospital
- ● Hospital

Annex 2

Project Implementation Schedule

The following shows the tentative project implementation schedule.



Major Undertakings to be taken by the Government of Cambodia

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

(1) Before the Bidding

NO	Items	Deadline	In charge	Estimated Cost (USD)	Ref.
1	To coordinate with the National Bank of Cambodia to open Bank Account (Banking Arrangement (B/A))	Immediately after G/A	MOH	N/A	
2	To facilitate A/P to a bank in Japan (the Agent Bank) for the payment to the consultant	within 1 month after the signing of the contract(s)	MOH	N/A	
3	To facilitate bearing the following commissions to a bank of Japan for the banking services based upon the B/A			3,295	
	1) Advising commission of A/P	within 1 month after the signing of the contract(s)	MOH		
	2) Payment commission for A/P	every payment	MOH		
4	To secure and clear the following lands Project sites for incinerator	before notice of the bidding documents	MOH	N/A	
5	To 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	MOH	N/A	
6	To clear, level and reclaim the following sites Leveling and reclaiming the sites for incinerator	before notice of the bidding documents	MOH	N/A	
7	To submit Project Monitoring Report (with the result of Detailed Design)	before preparation of the bidding documents	MOH	N/A	

B/A: Banking Arrangement, A/P: Authorization to Pay, G/A: Grant Agreement
MOH: Ministry of Health, PHD: Provincial Health Department
EMP: Environmental Management Plan, EMoP: Environmental Monitoring Plan

(2) During the Project Implementation

NO	Items	Deadline	In charge	Estimated Cost (USD)	Ref.
1	To facilitate A/P to a bank in Japan (the Agent Bank) for the payment to the supplier(s)	within 1 month after the signing of the contract(s)	MOH	N/A	
2	To facilitate bearing the following commissions to a bank of Japan for the banking services based upon the B/A			Included No.3, (1) Before the Bidding	
	1) Advising commission of A/P	within 1 month after the signing of the contract(s)	MOH		
	2) Payment commission for A/P	every payment	MOH		
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	MOH	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	MOH	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.	during the Project	MOH	108,795	
6	To bear all the expenses, other than those covered by the Grant, necessary for the implementation of the Project, including the implementation cost for Soft-component.	during the Project	MOH	N/A	
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	MOH	N/A	
8	To submit Project Monitoring Report after each work under the contract(s) such as shipping, hand over, installation and operational training	within 1 month after completion of each work	MOH	N/A	
	To submit Project Monitoring Report (final) (including equipment list, photographs, etc.)	within 1 month after issuance of Certificate of Completion for the works under the contract(s)	MOH	N/A	
9	To submit a report concerning completion of the Project	within 6 months after completion of the Project	MOH	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 sites		MOH	N/A	
	1) Electricity The distributing line for industrial power supply (the three phase power)to the site	before start of the construction			
	2) Water Supply The city water distribution main to the site	before start of the construction			
	3) Drainage The city drainage main (for storm, sewer and others) to the site	before start of the construction			
11	To provide equipment, facilities necessary for the implementation of the Project in the sites except the equipment which are funded with the Grant. e.g. Equipment for medical waste containers for segregation	before start of the construction	MOH	N/A	

12	To ensure the safety of persons engaged in the implementation of the Project	during the Project	MOH	N/A	
13	To implement EMP and EMoP	during the construction	MOH	N/A	
14	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	MOH	N/A	

(3) After the Project

NO	Items	Deadline	In charge	Estimated Cost (USD)	Ref.
1	To implement EMP and EMoP	for a period based on EMP and EMoP	MOH	Annually 100	
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 MOH and JICA.	for 3 years after the Project	MOH	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 3) Routine check/Periodic inspection (including record of the medical waste amount treated by the Equipment)	After completion of the construction	Provincial Government/ PHD/ Hospitals	Annually 7,306 - 13,153 per hospital	
4	To maintain proper disposal of incinerator ash.	After completion of the construction	Provincial Government/ PHD/ Hospitals	N/A	

2. Other obligations of the Government of Cambodia funded with the Grant

This section is closed due to confidentiality.

* The Amount is provisional. This is subject to the approval of the Government of Japan.

Project Monitoring Report
on
Project Name
Grant Agreement No. XXXXXXX

20XX, Month

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

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.			

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:
	Contingency Plan (if applicable):
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:
	Contingency Plan (if applicable):
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.

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.

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.

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)
12. Report on the Management of Safety for Construction Works

Attachment 6

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
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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Attachment 7

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%)	

Report on the Management of Safety for Construction Works

Month/Year 2022 年×月	Cumulative number of labor 労働延人数	Cumulative number of public accident 公衆災害件数	Cumulative hours worked 延べ実労働時間数	Number of deaths and injuries due to industrial accidents 労働災害による死傷者				Frequency rate 度数率	Severity rate 強度率
					Death and injuries 死傷者数	Aggregated number of calendar days absent 延べ休業日数	Aggregated number of work-days lost 延べ労働損失日数		
This Month 当月				Death 死者					
				More than 4 calendar days absent 休業 4 日以上					
				1 to 3 calendar days absent 休業 1～3 日					
				Total 計					
Total including this month 当月迄累計				Death 死者					
				More than 4 calendar days absent 休業 4 日以上					
				1 to 3 calendar days absent 休業 1～3 日					
				Total 計					

Note 注)

1. Frequency rate is the frequency of occurrence of industrial accidents.
   Frequency rate = (Number of deaths and injuries due to industrial accidents ÷ Cumulative hours worked) × 1,000,000
   度数率＝（労働災害による死傷者数÷延べ実労働時間数）×100 万時間
2. Severity rate is degree of seriousness of the industrial accident.
   Severity rate = (Aggregated number of work-days lost ÷ Cumulative hours worked) × 1,000
   強度率＝（延べ労働損失日数÷延べ実労働時間数）1000 時間
3. Aggregated number of work-days lost = Aggregated number of calendar days absent ×(300÷365)
   Death（7,500 days）: death as a result of an industrial accident includes not only instantaneous death but also death as a result of occupational injury or disease.
   延べ労働損失日数＝延べ休業日数×（300÷365）・・・死亡 7500 日（即死のほか負傷が原因で死亡したものを含む）
4. Frequency rate and severity rate are rounding off the third decimal place.
   度数率・強度率は小数点第 3 位以下四捨五入

Annex 5

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/A (b) N/A (c) N/A (d) N/A	(a) EIA, IEIA and EPC are not required for the Project※. (b) Same as above. (c) Same as above. (d) No additional requirement. ※Initial Environmental Impact Assessment : IEIA Environmental Impact Assessment : EIA Environment Protection Contract : EPC
	(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) N (b) N	(a) Stakeholder meeting will be hold and the result will be disclosure. (b) Same as above.
	(3) Examination of Alternatives	(a) Have alternative plans of the project been examined with social and environmental considerations?	(a) Y	(a) Two equipment to be used have been examined.
2 Pollution Control	(1) Air Quality	(a) Do air pollutants, such as sulfur oxides (SOx), nitrogen oxides (NOx), and soot and dust, and dioxins emitted from various sources, such as incinerators, and vehicles used for waste collection and transportation comply with the country's emission standards and ambient air quality standards?	(a) Y	(a) The volume of the emission gas generated from the small capacity incinerators with the emission gas treatment device is small. The quality of the emission gas will be checked before the operation.
	(2) Water Quality	(a) Do effluents from various facilities comply with the country's effluent standards and ambient water quality standards? (b) Does the water quality of leachates from the waste disposal sites comply with the country's effluent standards and ambient water quality standards? (c) Are adequate measures taken to prevent contamination of surface water and groundwater by these effluents and leachates?	(a) N/A (b) N/A (c) N/A	(a) No effuents from incinerator (b) N/A (c) N/A

Annex 5

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
	(3) Wastes	(a) Are wastes, such as treatment residues, cinder, and fly ash generated from crushing and segregation processes, and diverted wastes from composting process properly treated and disposed of in accordance with the country's regulations? (b) Are hazardous and dangerous wastes properly segregated from other wastes, stabilized, treated, and disposed of in accordance with the country's standards?	(a) Y (b) Y	(a) Hospitals treated properly (b) Hospitals segregate properly
	(4) Soil Contamination	(a) Are adequate measures taken to prevent contamination of soil and groundwater by leachates from the waste disposal sites?	(a) N/A	(a) No effluents from incinerator
	(5) Noise and Vibration	(a) Do noise and vibrations generated by the facility operations (especially incinerators, waste segregation and crushing facilities), and vehicle traffic for waste collection and transportation comply with the country's standards?	(a) Y	(a) Noise reduction during construction and during operation by incinerator are shown in the mitigation measures.
	(6) Odor	(a) Are adequate odor control measures taken?	(a) Y	(a) Medical waste management including odor is conducted by each hospital
3 Natural Environment	(1) Protected Areas	(a) Is the project site 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) No protected area around project site
	(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) If significant ecological impacts are anticipated, are adequate protection measures taken to reduce the impacts on the ecosystem? (d) Is there a possibility that the project will adversely affect aquatic organisms? If impacts are anticipated, are adequate measures taken to reduce the impacts on aquatic organisms? (e) Is there a possibility that the project will adversely affect vegetation and wildlife? If impacts are anticipated, are adequate measures taken to reduce the impacts on vegetation and wildlife?	(a) N/A (b) N/A (c) N/A (d) N/A (e) N/A	(a) N/A (b) N/A (c) N/A (d) N/A (e) N/A

Annex 5

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
	(3) Management of Abandoned Sites	(a) Are environmental protection and restoration plans (such as landfill gas and leachate collection and treatment systems, prevention of illegal dumping, and reforestation) after facility closure considered? (b) Is a sustainable management framework for the abandoned sites established? (c) Are adequate financial provisions secured to manage the abandoned sites?	(a) N/A (b) N/A (c) N/A	(a) N/A (b) N/A (c) N/A
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 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?	(a) N/A (b) N/A (c) N/A (d) N/A (e) N/A (f) N/A (g) N/A (h) N/A (i) N/A (j) N/A	(a) N/A (b) N/A (c) N/A (d) N/A (e) N/A (f) N/A (g) N/A (h) N/A (i) N/A (j) N/A

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
4 Social Environment	(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?(b) Are considerations given to the existing recovery systems, including waste pickers? (c) Is there a possibility that waste transportation will adversely affect the regional traffic? (d) Is there a possibility that effluents from the project and leachates form the waste disposal sites will adversely affect fisheries and other water uses by local inhabitants (especially drinking water)? (e) Is there a possibility that pathologic insects or other disease vectors will breed as a result of the project?	(a) N (b) N (c) N (d) N (e) N	(a) No adverse influence to the living conditions of inhabitants though the Project (b) N/A (c) No influence to regional traffic (d) Only hot waste without contamination may be happen depending on the type of the equipment. (e) N/A
	(3) Heritage	(a) Is there a possibility that the project will damage the local archeological, historical, cultural, and religious heritage? Are adequate measures considered to protect these sites in accordance with the country's laws?	(a) N	(a) No heritage site around the project site.
	(4) Landscape	(a) Is there a possibility that the project will adversely affect the local landscape? Are necessary measures taken?	(a) N	(a) No influence to 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/A (b) N/A	(a) No ethnic minorities and indigenous peoples around the project site. (b) N/A (no land acquisition)
	(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, 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?	(a) Y (b) Y (c) Y (d) Y	(a) Compliance with work environment laws is documented and controlled in contracts with subcontractors. (b), (c), (d) Safety issues during construction and operation is shown in mitigation measures.

Annex 5

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
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) Noise, vibration, dust, and exhaust gas emitted during construction and operation are specified in detail in the EMP and the monitoring is conducted based on EMoP. (b) N/A (c) N/A
	(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) Monitoring results are checked by MOH and EMoP is revised if necessary. (b) Adequacy of EMoP is examined by the MOH based on the result of monitoring (c) Contractor appoint an environmental officer and take necessary measures. (d) According to the EMP, the contractor shall record the results of environmental monitoring in the work report.
6 Note	Reference to Checklist of Other Sectors	(a) Where necessary, pertinent items described in the Forestry Projects checklist should also be checked (e.g., projects including large areas of deforestation).	(a) N/A	(a) 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) N/A	(a) Project does not cause global environmental problems.

1) Regarding the term "Country's Standards" mentioned in the above table, in the event that environmental standards in the country where the project is located diverge significantly from international standards, appropriate environmental considerations are required to be made.
In cases where local environmental regulations are yet to be established in some areas, considerations should be made based on comparisons with appropriate standards of other countries (including Japan's experience).
2) Environmental checklist provides general environmental items to be checked. It may be necessary to add or delete an item taking into account the characteristics of the project and the particular circumstances of the country and locality in which the project is located.

Environmental Management Plan/Environmental Monitoring Plan

1. Mitigation Measures and EMP (Environmental Management Plan)

Mitigation measures for environmental items assessed as having negative impacts in the previous section are given in Table1.

Table1. Mitigation measures for anticipated impacts

	Nb	Impacted Item on JICA Guidelines	Major Mitigation Measures		Responsibility		Cost
			Pre and During Construction phase	Operation phase	Implementation Agency	Responsible Agency	
Pollution	5	Noise and vibration	[Construction noise] ✓ Selecting low-noise equipment. ✓ Avoiding works of heavy equipment during night time. ✓ Informing the construction schedule to surrounding communities to obtain their consensus.	[Noise from Incinerators] ✓ Install a low-noise fan in the incinerator ✓ Install a soundproof box on the blower of the incinerator	Contractor and IPCC of hospitals	MOH	Procured incinerator is soundproofed, so there is no additional cost.
Others	29	Accidents	[Accident due to crane operation] ✓ Enclose the area around the site to prevent the general public from entering. ✓ Safety management, such as not going under the load when operating a crane.	[Accident due to incinerator operation ✓ Provide initial operation instruction so that the operator can operate the incinerator properly. ✓ Prepare an operation manual.	Contractor and IPCC of the hospitals	MOH	Included in construction cost

Source: Survey team

2. Monitoring Plan

The measures discussed to mitigate the expected environmental loads will be monitored and managed during and after the construction to ensure they are being implemented properly. The required environmental items will be monitored by the construction contractor under management of the consultant, with reports made to the implementing body, MOH. During operation, performance of incinerator will be monitored by IPCC of each hospital who is in-charge of the O&M. The environmental monitoring plan during construction and operation is shown in Table2.

Table2. Environmental Monitoring Plan (EMP)

Category	Item	Method of Monitoring	Monitoring Place/Point	Frequency (Period)	Referable Standards	Implementation Org.	Responsible/Supervising org.	Responsible Organization for Monitoring Cost
Construction Phase								
Noise and vibration	Noise level	On site measurement	One point at construction site and one site at near residence area	Every day 29 hospitals	Sub-decree on Air Pollution Control and Noise Disturbance (2000), Cambodia	Contractor	MOH and IPCC of the hospitals	Including cost of construction
Accidents	Records of accidents and near – misses accidents	Report from contractor		Every week 29 hospitals		Contractor	MOH and IPCC of the hospital	Including cost of construction
Operation Phase								
Noise and vibration	Noise level	On site measurement	Selected sites near incinerator and near residence area	1x per year 29 hospitals (3 years)	Sub-decree on Air Pollution Control and Noise Disturbance (2000), Cambodia	MOH	MOH and IPCC of the hospitals	Including the cost of O&M
Accidents	Accident record due to operation error	operation report		1x per year 29 hospitals (3 years)		MOH	MOH and IPCC of hospitals	Including the cost of O&M

Source: Survey team

Implementation structures of EMP and EMoP during construction and Operation periods are as Table3.

Table3. Environmental Management and Monitoring Organization

MoH IPCC of the hospitals	- Conduct EMP and EMoP for the mitigation measures - Confirm the EMP included in the specification of the contract document before the construction. - Bear the responsibility for any accident evenly with the contractor during the construction - Confirm the environmental monitoring report prepared by the Contractor in construction stage. - Conduct the environmental monitoring by an inspection agency in operation phase.
Contractor	- Responsible for applying environmental management plan and environmental regulations during construction. Include environmental experts in the workforce to ensure compliance with environmental constraints and to conduct environmental monitoring on site. - Prepare environmental monitoring reports and submit them to the Ministry of Health and the hospitals' IPCC in construction phase.
MoE	- Confirm the process of the EMP and conduct the monitoring if necessary

During construction, contractors will implement mitigation measures in accordance with the EMP. The consultant will supervise the work and report the monitoring results submitted by the contractor to JICA and the MOH in line with the EMoP. The MOH will also share information with the MOE to confirm that there are no problems. If there are any problems with the hospital or surrounding residents, the consultant will interview them and deal with them.

During operation, the hospital will take the lead in monitoring according to the EMoP and share the results with the MOH and MOE. In addition, the hospital will respond to inquiries about the incinerator from nearby residents. The monitoring results will also be shared with JICA. (Three years after completion)

Environmental and Social Monitoring Form

- JICA undertakes environmental and social monitoring based on regular monitoring reports submitted by project proponents. The reports should include measured data of environmental and social monitoring items agreed at the JICA's environmental review. Where necessary, project proponents may refer to this monitoring form when submitting the monitoring reports.
- When defining monitoring items, frequency, and methods, etc., project phases and project life cycle (e.g., construction phase and operation phase) should be taken into account.

1. Permits and Consultations

Monitoring Item	Monitoring Results during Reporting Period (In the case of consultations with local stakeholders, describe whether there are records of the consultations, the dates, the number of participants, etc.)
Responses/actions to comments from authorities when obtaining EIA permit	Not applicable
Acquisition status of EIA permit	Not applicable
Implementation status of stakeholder meetings	

2. Pollution Control

Construction phase

Item	Monitoring Item (unit)	Baseline Value	Measured Value (Mean)	Measured Value (Max.)	Standards of the country	International Standards	Remarks (measurement point, frequency, method, etc.)
Noise	dB(A)				45	50	One point at construction site and one site at near residence area

Monitoring Item	Status during the reported period
Accidents	

Operation phase

Item	Monitoring Item (unit)	Baseline Value	Measured Value (Mean)	Measured Value (Max.)	Standards of the country	International Standards	Remarks (measurement point, frequency, method, etc.)
Noise	dB(A)				45	50	sites around the hospital, one time/ year

Operation Phase

Monitoring Item	Status during the reported period
Accidents	

3. Complaint Reception Status

Number and content of complaints	Responsible organization	Current situation

End.

5 Soft Component (Technical Assistance) Plan

The Kingdom of Cambodia

Ministry of Health

Preparatory Survey for the Project for the Improvement of Infectious Waste Management in The Kingdom of Cambodia

Soft Component Plan

August 2022

Japan International Cooperation Agency (JICA)

Yachiyo Engineering Co., Ltd.

Koei Research & Consulting Inc.

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1. Background of Development of the Soft Component Plan

The “The project for Preparatory Survey for the Project for the Improvement of Infectious Waste Management in the Kingdom of Cambodia” (hereafter referred to as the “Project”) project aims to improve and strengthen medical waste management by upgrading and installing medical waste incinerators in 29 top referral provincial hospitals (CPA3) and lower-level county hospitals (CPA2&1) in 10 provinces in Cambodia, thereby enhancing medical waste disposal and infection control in the target hospitals and surrounding areas. The equipment plan is focused on the incinerator as a result of the field survey. In the field survey, the team investigated and discussed the equipment based on the evaluation of its validity, including necessity, frequency of use, experience in use, etc. The equipment was decided to be operational at the technical level of the supplier. The operation and maintenance of these incinerators are based on existing waste and equipment management methods, and the equipment used for waste management is also based on existing products and some related equipment. Either incinerators or sterilizers carry out medical waste disposal in Cambodia. However, many target hospitals do not adequately implement medical waste management due to the shortage and aging equipment. Technical guidance on essential medical waste management and equipment operation and maintenance is necessary for the maintenance equipment to be effectively utilized. In addition, the fundamental maintenance system, such as record keeping, is insufficient in the incinerator operation, and it is necessary to improve the system to implement monitoring and evaluation properly. Furthermore, the management of waste segregation, storage, and others is insufficient, although many hospitals have implemented posting, training, and information sharing on waste segregation, prevention of infectious diseases, and other precautions. Therefore, providing basic technical guidance regarding medical waste management and infection prevention control is also required.

During the field survey, the Ministry of Health (MoH), many target provincial health departments (PHD), and hospital directors requested technical assistance. Based on the background and issues, the soft components are planned as follows.

2. Objectives of the Soft Component Plan

2.1 Contents of the Technical guidance

The following three components will be established to address these issues, in addition to initial instruction by suppliers on machine operation and others.

Component 1: Technical guidance on the proper operation of incinerator

During the field survey, it was confirmed that several target hospitals already have their incinerators and sterilization and use them daily. However, the equipment is not fully operational due to aging and insufficient capacity in many target hospitals. To address this issue, the following guidance will be conducted to improve and enhance the quality of medical waste management at the target hospitals, such as preparing a simplified operation manual and a simplified checklist

for the incinerator before and after use; preparing daily operation reports; technical guidance on the operation. It is also expected that the effectiveness of the project will be properly evaluated by monitoring the amount of processing volume through daily operation reports.

Component 2: Technical guidance on proper maintenance of incinerators

It was confirmed that the target hospitals do not have adequate maintenance systems for their incinerators.

Establishing the system is essential to ensure the incinerator's proper and safe operation. It is expected that periodic inspections and calibration of incinerators and managing spare parts and consumables will be implemented and documented correctly to prevent equipment failure and reduce outage conditions. This maintenance and management system to the target hospitals by Component 2.

Component 3: Technical guidance on medical waste management and behavior change

The team confirmed that medical waste management varies in terms of in-hospital segregation and handling in each hospital. Improper segregation and transportation can reduce disposal efficiency by incinerators and sterilizers and increase the risk of infection and other problems for hospital staff and visitors. It is expected to improve the efficiency of the above process and reduce the risk of infection through training and workshops on the correct management of medical waste and behavior change.

2.2 System and Scope of the Technical Guidance

In order to efficiently and sustainably provide these technical guidance to the target hospitals, the team proposes the establishment of a system that incorporates the following Training of Trainers (ToT).

Phase-1: Training of Trainers (ToT) for personnel from the target PHDs (and the MoH participating as facilitators/observers) (*The implementation plan for the target PHDs will be determined in consultation with the MoH and the PHD personnel).

Phase-:2 ToT training based on Phase-1 is provided to hospital supervisors such as Infection Prevention and Control Committee (IPCC) personnel in the target hospitals by the personnel of PHDs.

Phase-3: Technical guidance and on-the-job training (OJT) for hospital-related staff by the person in charge who attended Phase-2.

An overview of the technical guidance system and the scope of coverage in the soft component plan is shown as the below figure.

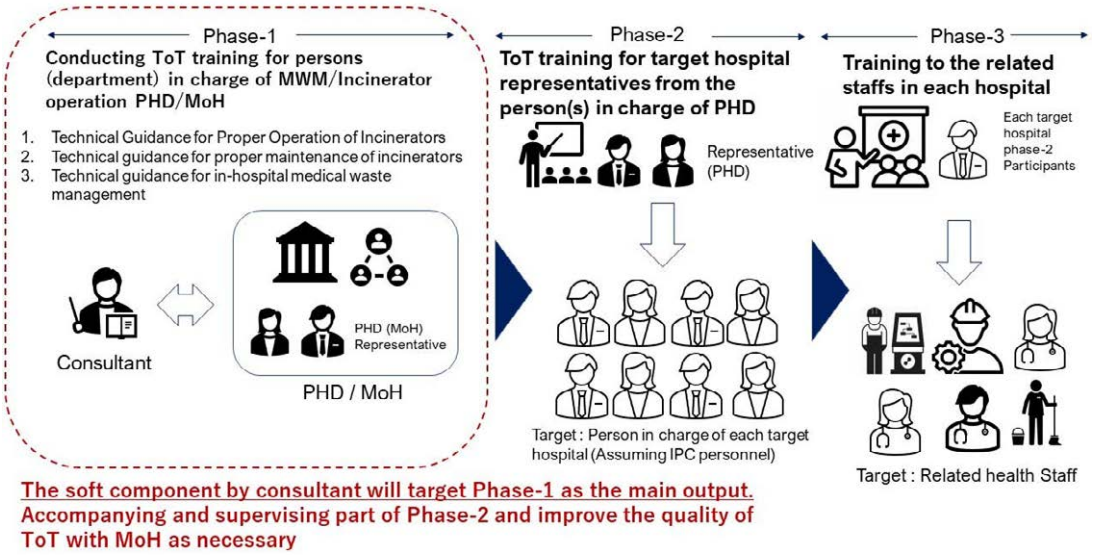

Fig. 1 Overview of the technical guidance system and the scope of coverage in the soft component plan

Due to many target hospitals and multiple delivery times, it was difficult for the consultants to visit all target hospitals and provide technical guidance to all potential target personnel. Therefore, a cascade soft component implementation is planned for sustainability and efficiency. Regarding phase-2 and -3, the Cambodian side has already implemented various training in the health sector, and the Cambodian side has indicated its intention to implement phase-2 and -3 proactively. Therefore, the feasibility of this system is judged to be high. When Phases -2 and -3 are implemented, it is assumed that approximately 650 stakeholders will benefit, including those involved in IPCC and incinerator management and waste management in each hospital.

2.3 Target Period

The project plans to divide the timing of equipment transportation into three rounds. The training for Phase-1 in this soft component is planned to be conducted after the first equipment shipment. The Cambodian side will lead in the subsequent deployment to Phase-2 and Phase-3 training. The goal is to complete Phase-3 training for all target hospitals by the time all equipment is handed over, including equipment transport by the third round. The Consultant shall develop a training plan with the MoH and PHDs.

3. Expected Outputs of Soft Component

This soft component will implement Phase-1 Technical Instruction (ToT) to PHD (and MoH) personnel, and the following outcomes will be achieved for the PHD (and MoH) personnel. To confirm

and improve the quality of results expression, the consultant will participate in and supervise some of the activities in Phase-2 after the training in Phase-1.

- Output for component 1

  To enhance knowledge and technical skills for the safe operation of the provided equipment and to guide appropriate operation management. To prepare simple operation checklists, etc., for maintenance equipment and to provide guidance using such lists. Also, to encourage to make the daily operation report to monitor the amount of disposal and to submit it to the MoH and the PHDs.

- Output for component 2:

  To increase the awareness of the importance of equipment maintenance and management, encourage to conduct periodic inspections, calibration, and record in the equipment ledger, write a summary in an annual report and submit it to the MoH and the PHD.

- Output for component 3:

  To understand basic knowledge and techniques for medical waste management and be able to provide appropriate technical guidance. In addition, the participants will be able to provide technical guidance on waste management by preparing and utilizing in-hospital simplified waste management manuals and check sheets such as "Ten (10) items that must be implemented in waste management at all target hospitals (draft)" through the workshops. The participants will be able to provide guidance on making a summary of the medical waste management in an annual report and submitting it to the MoH and the PHD.

4. Expected Outcome of Soft Component

The expected outcomes to be achieved through continued implementation of activities are as follows (Assuming a three-year timeframe).

- Strengthen medical waste management at target hospitals through proper operation and maintenance of incinerator.
- Improve infection prevention capabilities through proper medical waste management and use of incinerator.
- Reduce the environmental burden on the surrounding area through proper medical waste management and use of incinerator.

5. Means of checking achievement of results

The following methods are used to verify the results of the soft components.

Table 1 Means of checking achievement of results

Component	Output	Means of the Confirmation
Component 1: Technical guidance on the proper operation of incinerator	・ The proper operation and management of the incinerators is guided.	・ Conduct skill evaluations before and after technical guidance to confirm understanding.

Component	Output	Means of the Confirmation
	・ Be able to instruct on the preparation of appropriate daily operation reports.	・ Conduct skill evaluations before and after technical guidance to confirm understanding.
Component 2: Technical guidance on proper maintenance of incinerators	・ Be able to instruct the creation of appropriate equipment management ledgers.	・ Conduct skill evaluations before and after technical guidance to confirm understanding.
Component 3: Technical guidance on medical waste management and behavior change	・ Understand basic knowledge and techniques for medical waste management and be able to provide appropriate guidance. ・ Understand and be able to teach the fundamentals of behavior change for proper medical waste management ・ Be able to provide guidance on waste management using the simple in-hospital waste management manual/checklist that has been created.	・ Conduct skill evaluations before and after technical guidance to confirm understanding. ・ A simple manual/check sheet will be prepared, and its contents and utilization will be checked.

The progress of training in Phases-2 and 3 shall be reported by each hospital to the PHDs and the MoH, and the MoH shall share the implementation status with the consultants. It is assumed that the method of reporting and sharing will be through the use of a web-based questionnaire, etc.

6. Soft Component Activities (Input Plan)

The input for each activity is as follows.

6.1 Lecturer

The two training lecturers are planned

- Consultant on incinerator operation and maintenance plans (Japanese)
  The Consultant shall be an expert with experience and knowledge in incinerator operation and maintenance planning. (Component 1 and Component 2 responsible)
- Consultant in medical waste management (Japanese)
  The Consultant shall be an expert with knowledge of behavior change in handling, management, and sorting of pharmaceuticals and in-hospital medical waste through 5S-KAIZEN TQM and behavior change approaches, etc., in domestic and overseas medical facilities, etc. (Component 3 responsible)

6.2 Activity Plan

The detail of activity such as (1) Preparation work in Japan, (2) Activity in Cambodia, (3) Conclusion Work is below.

(1) Preparation work in Japan

Lecture materials such as guidelines and textbooks will be prepared in English, along with scheduling arrangements with the authorized person. The prepared materials will be translated into Khmer, and the completed translation will be sent to the MoH representative in advance to request confirmation of the training's purpose and content, including the quality of the translation. After obtaining the consent, the actual schedule for the technical training will be coordinated. The number of days required for domestic preparation work shall be as follows. In addition, the time required for translation is expected to be about two weeks.

- Consultant for incinerator operation and maintenance plans : 6 days

Table 2 Preparation work in Japan (Incinerator operation and maintenance plans)

Day	Contents
1	Preparation of materials explaining the contents of software components and various coordination tasks
2	Preparation of training lecture materials and various coordination tasks
3	Preparation of training lecture materials and various coordination tasks
4	Preparation of training lecture materials and various coordination tasks
5	Preparation of training lecture materials and various coordination tasks
6	Preparation of training lecture materials and various coordination tasks

- Consultant for technical guidance on medical waste management : 6 days

Table 3 Preparation work in Japan (Medical waste management)

Day	Contents
1	Preparation of materials explaining the contents of software components and various coordination tasks
2	Preparation of training lecture materials and various coordination tasks
3	Preparation of training lecture materials and various coordination tasks
4	Preparation of training lecture materials and various coordination tasks
5	Preparation of workshop materials and various coordination tasks
6	Preparation of workshop materials and various coordination tasks

(2) Implementation in Cambodia

For the on-site guidance (corresponding to phase-1), which is the main output of the consultant under this soft component, the representatives of the PHD (and MoH) will be targeted for ToT training, as shown in the table below. In these three components, the survey revealed that the departments for incinerators' operation and maintenance and medical waste management are primarily responsible to the Department of Hospital Services in the MoH and to the Department of Infection Control in the PHD. The contents of this training course are considered to be mutually complementary in terms of appropriate medical waste management in hospitals. It can bring the synergistic effects of learning

both contents consecutively. Therefore, it is planned to conduct both courses together. As for the ToT training for supervisors in the target hospitals in Phase-2, it is also desirable from the viewpoint of efficiency that the personnel in charge of PHD should collaboratively conduct the training on the same day. Therefore, the MoH and the Health Department will discuss and coordinate the schedule with details of the training structure.

Table 4 On-site guidance (phase-1)

Component	Output	Activity Plan		
		Lecturer	Overview	Participants
		Phase-1 ToT training for Provincial Health Department personnel		
1. Technical guidance on the proper operation of incinerator	・The proper operation and management of the incinerators is guided.	Consultant for incinerator operation and maintenance plans	・How to create a simple checklist before and after use	Personnel of PHD, Department of Hospital Service(MoH) MoH will serve as facilitator/observer PHD：9-18 persons 9 provinces x 1-2 persons MoH：2-3 persons
	・Be able to instruct on the preparation of appropriate daily operation reports.		・How to create a daily operation report	
2. Technical guidance on proper maintenance of incinerators	・Be able to guide the creation of appropriate equipment management ledgers.		・How to create an equipment control ledger	
3. Technical guidance on medical waste management and behavior change	・Understand basic knowledge and techniques for medical waste management and be able to provide appropriate guidance.	Consultant for technical guidance on medical waste management	・Acquisition of basic knowledge of medical waste management and segregation based on infection prevention, 5S-KAIZEN, behavior change theory, etc., and guidance related to behavior change ・Creation of a simple manual/checklist through workshops	Same as above
	・Understand and be able to teach the fundamentals of behavior change for proper medical waste management.			
	・Be able to provide guidance on waste management using the simple manual/checklist for in-hospital waste management that has been created.			

The table below shows the expected content and number of subjects for Phase-2 ToT training for representatives of the target hospitals and Phase-3 technical guidance for hospital staff, which will be implemented after this technical guidance.

Table 5 Phase-2 ToT training and Phase-3 technical guidance

<table>
<tr><th rowspan="2">Component</th><th colspan="2">Activity Plan</th></tr>
<tr><th>Phase-2
ToT training for Hospital Representatives</th><th>Phase-3
For Related Hospital Staff</th></tr>
<tr><td>1.Technical guidance on the proper operation of incinerator</td><td rowspan="3">• Member of infection prevention control committee (IPCC) at each target hospitals
• Number: Total 58 persons
(29 target hospitals x 2 persons = 58 persons)

*Team determines that it is appropriate for the same in-hospital supervisor to take Components 1-3. To be finalized in consultation with the MoH and the PHD.</td><td rowspan="2">Members of the hospital’s IPCC and incinerator personnel

Number:
• 58-145 persons: Members of hospital IPCC (2~5) who did not participate in Phase-2 x 29 target hospitals
• 29-58 persons：1-2 incinerator personnel x 29 target hospitals

Note: The number of participants was calculated based on the number of staff at the time of the survey. The number may increase or decrease at the time of implementation.</td></tr>
<tr><td>2. Technical guidance on proper maintenance of incinerators</td></tr>
<tr><td>3. Technical guidance on medical waste management and behavior change</td><td>Members of hospital IPCC and staff related to medical waste management

Number：
• 58~145 persons：Members of hospital IPCC (2~5) who did not participate in Phase-2 x 29 target hospitals
• Max about 390 people: total number of staff at the 29 target hospitals involved in medical waste management.

Note: The number of participants was calculated based on the number of staff at the time of the survey. The number may increase or decrease at the time of implementation.</td></tr>
</table>

The lecturers expected for each technical guidance and the duration of on-site work are as follows.

- Component 1 and 2

Lecturer	Consultant for incinerator operation and maintenance plans: One (1) person
Working Period in Cambodia	Fifteen (15) days
Contents	・The training will include lectures and practical training on the handling and operation of incinerators, appropriate checklists including simple inspections before and after use, and record management in daily operation reports.
Target Person	Personnel of PHD and MoH The Department of Infectious Disease Control (Department of Health) and the Department of Hospital Services (Department of Health) are assumed. *Ministry of Health will serve as facilitator/observer.
Assumed Number	Approximately Two (2) persons each are expected. The number of participants is calculated based on the current number of staff, but may increase or decrease at the time of implementation.

Location	MoH/Target hospital (PHD)
Implementation period	Phase-1 will be implemented after the completion of the first delivery and initial operational guidance. Details are shown in the timetable below. Phases-2 and-3 are to be completed by the time of delivery of all equipment under the leadership of the MoH.

- Component 3

Lecturer	Consultant for technical guidance on medical waste management: One (1) person
Working Period in Cambodia	Fifteen (15) days
Contents	The training will consist of lectures, discussions, and practical training on the following four points ・Overview of medical waste (types of waste, environmental impact, etc.), basic knowledge of medical waste management and segregation methods (disposal methods for each type, segregation, transportation, storage, and other management methods) and instruction methods etc. ・Acquisition of the skills in basic knowledge, guidance, and utilization methods related to behavior change to promote behavior change for appropriate medical waste management. ・Creation of a simple manual/checklist through workshops and acquiring instructional methods for its use. ・Formulation of the implementation plan including securing budgets for phases-2 and -3. In addition, individual and focus group interviews will be considered as necessary to obtain information on problems and issues from MoH target persons and target hospital personnel in advance, and the content of lectures and practical training will be planned based on the issues obtained from the interviews.
Target Persons	Personnel of PHD and MoH Assumed to be the Department of Infectious Disease Control (Department of Health) and the Department of Hospital Services (Department of Health). *Ministry of Health will serve as facilitator/observer.
Assumed Number	Approximately Two (2) persons each are expected. *The number of participants is calculated based on the current number of staff, but may increase or decrease at the time of implementation.
Location	MoH/Target hospital (PHD)
Implementation Period	Phase-1 will be implemented after the completion of the first delivery and initial operational guidance. Details are shown in the timetable below. Phases-2 and-3 are to be completed by the time of delivery of all equipment under the leadership of the MoH.

Table 6 Schedule

Day	Day of Week	Contents	Lecturer/Staff	Participants
1	Sun	From Tokyo to Phonm Penh		
2	Mon	・MoH, Contents Discription ・Target hospitals on the 10th day: scheduling, participant coordination, and ・Coordination of training location, procurement of materials and supplies needed		
3	Tue	・Set up the training venue, confirm the list of participants, and explain the training process and content to the person in charge.		

Day	Day of Week	Contents	Lecturer/Staff	Participants
		・Preparation work such as optimization of training materials, printing of training materials, etc.		
4	Wed	Schedule draft 【Day 1】 ・Training briefing (explanation of training schedule, materials, etc.) ・Pre-test and questionnaire **Component 1, 2** <u>Lecture</u> ・Overview of equipment ・Guidance on operation plan ・Guidance on maintenance and management plans ・Question and answer session **Component 3** <u>Lecture</u> Overview of medical waste management and sorting Knowledge of medical waste management and sorting methods etc. (types of waste, disposal methods for each type, and management methods such as sorting, transportation, storage, etc.) and acquisition of instructional methods Acquisition of basic knowledge, guidance, and skills for behavior change to promote behavior change for appropriate medical waste management, and Q&A session.	・Consultant for incinerator operation and maintenance plans ・Consultant for technical guidance on medical waste management	・Target PHDs : 9-18 9 target provinces x 1-2 persons ・Department of Health Department of Hospital Services, MoH The number of participants was calculated based on the number of staff at the time of the survey. The number may increase or decrease at the time of implementation.
5	Thu	【Day 2】 ・Practical training **Component 1,2** ・Under guidance, prepare a simple checklist before and after use and manage the records. ・Prepare daily operation reports with guidance and manage records ・Under instruction, prepare equipment control ledgers and conduct record management.		
6	Fri	【Day 3】 ・Practice **Component 3** ・Creation of a simple manual/checklist through workshops ・Facilitate the creation of check sheets and provide practical guidance on how to use them. ・Formulate an implementation plan including budget for phases-2 and -3. ・Exchange of opinions ・Post-test and questionnaire implementation ・Presentation of post-test results and analysis of		

Day	Day of Week	Contents	Lecturer/Staff	Participants
		responses		
7	Sat	・Preparation work, including optimization of training materials and printing of training materials		
8	Sun	Travel day		
9	Mon	・Set up the training venue, confirm the list of participants, and explain the training process and content. ・Preparation work such as optimization of training materials, printing of training materials, etc.	・PHD personnel (and from the MoH) who received the above training 4 persons (2 from PHD and 2 from MoH) ・Consultant for incinerator operation and maintenance plans ・Consultant for technical guidance on medical waste management	Estimated participants: 16 persons: Approximately 20 persons in charge of infection control committees at the 10 target hospitals scheduled for delivery in the first phase (10 hospitals x 2 persons = 16 persons) Note: The number of participants was calculated based on the number of staff at the time of the survey. The number may change at the time of implementation, for example, by involving the target hospitals in the second and third deliveries, increasing the number of participants in charge, etc. The number of hospitals will be finalized in consultation with the MoH, considering efficiency, capacity, etc.
10	Tue	【Supervision of training implementation after ToT training - Target: Persons in charge of target hospitals】 Content: Implementation of training content conducted on days 4, 5, and 6 by PHD personnel and follow-up by technical guidance consultants *Administered to several hospitals, with one of the target hospitals as the venue. The PHD will conduct separate training for hospital personnel in the second and third procurement. However, coordination with the MoH and the PHD will be conducted to allow participation if they wish to attend the first session. In addition, to ensure that all relevant personnel receive training within the target period, alternative methods such as recording the training sessions and distributing video materials will be considered with MoH as necessary.		
11	Wed			
12	Thu	・Data organization ・Report writing ・Review with MoH and PHD Personnel		
13	Fri	Report to MoH and JICA office		
14	Sat	Editing and optimization of training materials, preparation of training plans for those not yet trained,		

Day	Day of Week	Contents	Lecturer/Staff	Participants
		etc. Travel from Phnom Penh to Tokyo		
15	Sun	Back to Tokyo		

*Consider flexible backups, such as online, depending on the situation.

(3) Conclusion work in Japan

The results of the guidance shall be organized, and a final report shall be prepared and submitted. The number of days required shall be as follows.

- Consultant for incinerator operation and maintenance plans : Four (4) days
- Consultant for technical guidance on medical waste management : Four (4) days

Table 7 Conclusion work in Japan

Day	Content
1	Attachment of final report is developed.
2	Attachment of final report is developed
3	Draft final report is developed
4	Report to JICA head quarter. Final report is submitted

6.3 Implementation Resources

Communication with relevant organizations, schedule coordination, information, materials collection, equipment procurement, etc. is difficult for Japanese consultants due to the language barrier. Therefore, it will be planned to hire local staff to support the local operations described above. As for the work contents of the assistant, the following work is assumed.

- Khmer interpretation and translation of materials
- Acquisition of materials, etc., and local procurement of training equipment
- Training support, contact with related organizations, appointments, schedule coordination, etc.

Table 8 Implementation Resources

Member	Number	Period
Consultant for incinerator operation and maintenance plans	One (1) person	Domestic: Ten (10) days (Preparation work: Six (6) days, Conclusion work: Four (4) days) Cambodia : Fifteen (15) days
Local staff supporting consultant for incinerator operation and maintenance plans	One (1) person	Preparation work: Ten (10) days Cambodia: Fifteen (15) days *Schedule shall be in accordance with the Japanese schedule.
Consultant for technical guidance on medical waste management	One (1) person	Domestic: Ten (10) days (Preparation work: Six (6) days, Conclusion work: Four (4) days) Cambodia: Fifteen (15) days
Local staff supporting consultant for technical guidance on medical waste management	One (1) person	Preparation work: Ten (10) days Cambodia: fifteen (15) days *Schedule shall be in accordance with the Japanese schedule.

7. Procurement of implementation resources

All guidance for the implementation of this soft component will be provided by a Japanese consultant with expertise in incinerator or medical waste management. Local staff will be used to assist.

8. Implementation schedule of the Soft Component

The draft implementation schedule is as follows.

Table 9 Implementation Schedule Draft

	Total months	1	2	3	4	5		14	15	16	17	18	19	20	21	22	23
Implementation	Procurement process																
	Soft Component																
	1. Technical guidance on the proper operation of incinerator 2. Technical guidance on proper maintenance of incinerators										Guidance						
	3. Technical guidance on medical waste management and behavior change										Guidance						
Consultant	1. Technical guidance on the proper operation of incinerator 2. Technical guidance on proper maintenance of incinerators								Preparation work			Conclusion work					
	3. Technical guidance on medical waste management and behavior change								Preparation work			Conclusion work					
Deliverable												Final Report					

9. Deliverables of the Soft Component

Soft component deliverables are as follows.

Table 10 Deliverables of the Soft Component

Component	Guidance Items	Deliverable
1. Technical guidance on proper operation of incinerators 2. Technical guidance on proper maintenance of incinerators	Acquisition of knowledge and teaching methods for operation and maintenance of incinerators	・Simplified Checklist Form ・Daily Operation Report Form ・Equipment Management Ledger Form ・Pre- and post-tests to evaluate the level of understanding of training participants ・Results of participant questionnaires, etc.
3. Technical guidance on in-hospital medical waste management and behavior change	・Acquisition of knowledge and teaching methods related to medical waste segregation and management methods ・Acquisition of basic knowledge and utilization skills to promote behavior change for appropriate medical waste segregation and management ・Creation of simple manuals and check sheets through workshops and acquisition of facilitation skills for their use	・Pre- and post-tests to assess training participants' level of understanding ・Results of questionnaires ・Simple manuals/checklists, etc.

10. Responsibilities of the Recipient Country

This soft component will include preparing a training plan for phase-2 and -3 at the time of the implementation of phase-1. The contents will include the schedule for the completion of phase -3, the reporting system, and budgetary measures. In addition, a monitoring and reporting system will be established through the MoH and the PHD to enable the consultants to confirm progress. Therefore, the personnel at the MoH, PHD, and target hospitals will be required to do the following in accordance with the relevant consultations and the training plan that has been developed. 1) coordinating the schedule 2) providing the venue for this technical guidance 3) selecting the target participants and having them participate in the technical guidance 4) conducting and reporting on each training program within the target period after implementing this soft component.

The target hospitals will also be required to promptly implement the necessary actions to operate and enforce the facility, such as staff training, budgetary measures, and procurement operations, based on the result of the soft component. Considering the current covid-19 situation etc., an alternative such as online training will continue to be considered flexibly.

6 Other Relevant Data

6a Stake Holder Meetings

6b Map around the Hospital Facility (300m radius)

6c Result of Noise Baseline Survey

Preparatory Survey for the Project for the Improvement of Infectious Waste Management

In the Kingdom of Cambodia

Hospital Stakeholders Meeting

Meeting Minute

Date	01st November, 2022	Time	9:00 – 11:00
Place	Mong Russei RH		
Organization	Battambong		
Attendance	Total: 19 participants (05 female, 14males) • Mong Russei RH: one deputy director, 9 chief of service (3 female and 7 male) • Hospital Stakeholder: one commune chief, one village chief and 4 people who live around hospital (one female, 5 male) **Consultants:** • Mr. Arai Takatoshi, Team Leader of consultant team • Mr. Chhoun Pheak, Local consultant • Ms. Heang Mouyim, Local consultant		

1. The objective of the meeting:

- To explain the contents of the project to Stakeholders
- To obtain the opinions and feedback from Stakeholders on the project

2. Contents of the Discussion:

After the self-introduction session, a quick introduction about the purpose of the meeting was made by the local consultant team then, followed by the detailed contents as below;

2.1 A presentation about the structure of the project by Mr. Arai Takatoshi

- The project aims to improve medical waste management at healthcare facilities in Cambodia. It is formed in response to the request from the MoH to JICA to support this project. JICA contracted a consultant team to conduct the initial survey and formulate this project. At first, MoH requested a proposed 53 hospitals; after the technical group accessed the hospitals, we selected 29 hospitals to receive incinerators under this project.
- The main project component includes providing incinerators to the hospital with a soft component, including technical guidance for the proper operation of incinerators, technical advice for proper maintenance of incinerators, and technical guidance for in-hospital medical waste management.
- Specifications of the medical waste incinerator include a combustion temperature of 800°C or higher and a minimum of 4 meters of the chimney.

- There are three sizes of medical wastes incinerator; small, medium, and large—the criteria to give incinerators are based on the amount of medical waste the hospitals make per day. The incinerator's capacity is 20, 30, and 50kg per hour for small, medium, and large incinerators, respectively.
- Expected timeline: In November, the minister of the Japanese government is processing the meeting to approve this project. The technical team will choose the factory to produce the medical incinerator and transfer it to Cambodia, and hopefully, the incinerator can be operated in early 2024.

Detail presentation slide deck is attached as the annex of this minutes

2.2 Discussing: Question and Answer

- **Suggest:** To construct the smoke-tube incinerator of medical wastes as high as possible (the height of old incinerator is 8 meters)
- **Question 1 (Maternity staff)**: For maternity department have many wastes fully bacterial which is using for labor or operation that is effect to material full of bacterial. So, this incinerator will burn both of cover and needles?
- **Answer**: Of course, just be sure, it is medical wastes. 1) Incinerator of medical wastes have temperature 8000 Celsius (for needles that has already killed bacterial or residual wastes, the health ministry will discuss about the method to destroy or the policy of keeping wastes) and the ash from medical wastes will not have any affection.
- **Question 2**: How many kilograms that incinerator will destroy medical wastes?
- **Answer**: According to technical, the incinerator will be burned for 5 hours, around 150 kilograms. Hence, it is going to burn 30 kilograms for 1 hour.
- **Question 3 (Deputy director of hospital):** 1) For wastes that has already burned, how to throw away? How many stakeholders do you want to join training course related the management of wastes?
- **Answer by Mr. Arai:** For wastes (needles or ash) shall be killed bacterial or safety. For the way to caring of residual wastes after burning, it is depending on ability of hospital or guideline of health ministry.
- **Question 4 (Deputy director of hospital):** How many stakeholders do you want to join training course related the management of wastes?
- **Answer :** It has 2 training courses (1, the factory will process the incinerator, and the staff will be able to join training course depending on responsivity for each hospital to learn about processing of incinerator (maybe 4 to 5 people) and 2) the method of manage medical wastes, consult about method, we will train to hospital-staff (TOT) by health ministry and health department will do training course at hospital…)

3. Conclusion

- Co-director of hospital: Thank you to JICA for funding this incinerator. And Our referral hospital will work so hard to be better both of quality and valuable.
- Commune Chief : Thank you to owner project and participants that advertise to stakeholder and get this funding.
- Mr. Arai: Thank you to Governor of the municipality, director of hospital, commune chief and all staffs of hospital for join this meeting. It's my pleasure to cooperate to hospital to

	construct incinerator medical wastes. Hope, hospital and stakeholders will happy and safety after install medical wastes incinerator.

Preparatory Survey for the Project for the Improvement of Infectious Waste Management in the Kingdom of Cambodia

Hospital Stakeholders Meeting

Meeting Minute

Date	02nd November, 2022	Time	9:00 – 11:00
Place	Serei Sorphorn hospital Meeting room		
Organization	Serei Sorphorn RH, BT-Meanchey		
Attendance	Total: 09 participants (02 female, 07 males) • Serei Soephorn RH: 1 hospital director, 3 chief of service (3 males) • Hospital Stakeholder: 1 Serei Sorphorn city governor and 1 commune chief **Consultants:** • Mr. Arai Takatoshi, Team Leader of consultant team • Mr. Chhoun Pheak, Local consultant • Ms. Heang Mouyim, Local consultant		

1. The objective of the meeting:

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- To obtain the opinions and feedback from Stakeholders on the project

2. Contents of the Discussion:

After the self-introduction session, a quick introduction about the purpose of the meeting was made by the local consultant team then, followed by the detailed contents as below;

2.1 A presentation about the structure of the project by Mr. Arai Takatoshi

- The project aims to improve medical waste management at healthcare facilities in Cambodia. It is formed in response to the request from the MoH to JICA to support this project. JICA contracted a consultant team to conduct the initial survey and formulate this project. At first, MoH requested a proposed 53 hospitals; after the technical group accessed the hospitals, we selected 29 hospitals to receive incinerators under this project.
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- Specifications of the medical waste incinerator include a combustion temperature of 800°C or higher and a minimum of 4 meters of the chimney.
- There are three sizes of medical wastes incinerator; small, medium, and large—the criteria to give incinerators are based on the amount of medical waste the hospitals make per day. The

incinerator's capacity is 20, 30, and 50kg per hour for small, medium, and large incinerators, respectively.

- Expected timeline: In November, the minister of the Japanese government is processing the meeting to approve this project. The technical team will choose the factory to produce the medical incinerator and transfer it to Cambodia, and hopefully, the incinerator can be operated in early 2024.

Detail presentation slide deck is attached as the annex of this minutes

2.2 Discussing: Question and Answer

- **City Governor remark:** Thankfully and pleasure that JICA provide incinerator to hospital to solve issue of medical wastes, that is really useful, hygiene and safety to people. This type of incinerator is so important. Its capacity and ability with smokeless, no smell, long chimney, and fast burning are the great capacity and would help both the hospital and city and people in this city. The old incinerator spent much time to destroy medical wastes and affect the people around the hospital. As expectation, our referral hospital has already changed location just because of we want to be a high quality both of equipment and also good staff too.
- **Question 1 (IPC staff of RH):** How the incinerator burns the waste, can it burn the general waste or only medical waste?
- **Answer:** The ability of this incinerator will burn for all types of wastes, but it just may spend longer than if we burn general wastes and it is recommended to only use with medical waste.
- **Question 2: (Serei Sorphorn city governor):** What kind of energy that this incinerator needs?
- **Answer:** We need electricity for manage the method and fuel for burning.
- **Question 3:** How long will incinerator be last, both of using and taking care of it?
- **Answer:** It depend on how proper is it operated and it will be about 8 to 10 years

3. Conclusion

- **Commune Chief:** O'Ambel commune People's Representative would like to thank JICA.
- **Mr. Arai Takatoshi**: Thank you to Governor of the municipality, director of hospital, commune chief and all staffs of hospital for join this meeting. It's my pleasure to cooperate to hospital to construct incinerator medical wastes. Hope, hospital and stakeholders will happy and safety after install medical wastes incinerator.

Preparatory Survey for the Project for the Improvement of Infectious Waste Management in the Kingdom of Cambodia

Hospital Stakeholders Meeting

Meeting Minute

Date	31st October 2022	Time	9:00 – 11:00
Place	Kampong Chhnang PRH		
Organization	Kampong Chhnang		
Attendance	Total: 22 participants (12 female, 10 males) • Kompongchhang PRH: one deputy director, one admin (2 male) • Hospital Stakeholder: one commune council, one village chief, 16 people (11 females and 5 males) **Consultants:** • Mr. Arai Takatoshi, Team Leader of the consultant team • Mr. Chhoun Pheak, Local consultant • Ms. Heang Mouyim, a Local consultant		

1. The objective of the meeting:

- To explain the contents of the project to Stakeholders
- To obtain the opinions and feedback from Stakeholders on the project

2. Contents of the Discussion:

After the self-introduction session, a quick introduction about the purpose of the meeting was made by the local consultant team then, followed by the detailed contents as below;

2.1 A presentation about the structure of the project by Mr. Arai Takatoshi

- The project aims to improve medical waste management at healthcare facilities in Cambodia. It is formed in response to the request from the MoH to JICA to support this project. JICA contracted a consultant team to conduct the initial survey and formulate this project. At first, MoH requested a proposed 53 hospitals; after the technical group accessed the hospitals, we selected 29 hospitals to receive incinerators under this project.
- The main project component includes providing incinerators to the hospital with a soft component, including technical guidance for the proper operation of incinerators, technical advice for proper maintenance of incinerators, and technical guidance for in-hospital medical waste management.
- Specifications of the medical waste incinerator include a combustion temperature of 800°C or higher and a minimum of 4 meters of the chimney.

- There are three sizes of medical wastes incinerator; small, medium, and large—the criteria to give incinerators are based on the amount of medical waste the hospitals make per day. The incinerator's capacity is 20, 30, and 50kg per hour for small, medium, and large incinerators, respectively.
- Expected timeline: In November, the minister of the Japanese government is processing the meeting to approve this project. The technical team will choose the factory to produce the medical incinerator and transfer it to Cambodia, and hopefully, the incinerator can be operated in early 2024.

Detail presentation slide deck is attached as the annex of this minutes

2.2 Discussing: Question and Answer

- **Question 1:** Will the smoke of the new incinerator smell the same old one? She mentions whether it is a new project, which means that the old incinerator is in the hospital. Is the smoke safe for the environment and has a smell or not?
- **Answer:** The smoke that releases from the incinerator is so less because the new technology of incinerator has many steps to filter smoke; it does not affect the environment and is also non-smell.
- **Question 2 (Authority):** To suggest to JICA funding of medical wastes incinerator, please provide medical wastes incinerator with no smell and tubes of smoke high out of people.
- **Answer:** As the technical team has already searched about affection to people surrounding, in new technology, we have already considered the height and tube of the smoke to ensure it will not impact people in the long term.
- **Question 3:** When will the project start? They would like to start the project as soon as possible because the old incinerator is quite affected people's lives.
- **Answer:** We are waiting for a meeting with The Minister of Japan in December. After that meeting and approval, we will process this project with the government of Cambodia. The project is going to start firstly in 2024.
- **Question 4 (Commune chief):** The suggestion to construct the tube of smoke (old incinerator) is higher than to reduce the smell and affection to people surrounding; therefore, the new incinerator will start construction in 2004.
- **Answer:** At this stage, our Japanese team could not help anything until we processed our project, a new one.
- Question 5: How many percentages will we get for the medical waste incinerator in the first month of 2024?
- **Answer 5:** Honestly, it is a high expectation from approval by Minister. Because he has agreed as policy, but we need a specific meeting.
- **Question:** Does the hospital have any responsibility to reduce smell or increase the height of the smoke tube to release this affection nowadays? Every single day, it is a

horrible smell. Could the hospital reduce destroying of medical waste? Because nowadays, the hospital has burned for 24 hours, and it is a horrendous smell. Does the hospital have any transferring medical waste out to reduce this affection?

- **Answer (Chief of Admin hospital):** The hospital has two types of waste: They are household wastes and medical wastes (filled with bacterial and non-bacterial) that we cannot throw outside. Because it has residual wastes (high shape…) cannot allow being transferred outside of the hospital. In hospital has two places for stock waste, Every two days, the transferring team will bring it outside. Nowadays, the oldest incinerator can destroy 5 kilograms per hour.
  But the hospital always burns a time for three days, but a time burns for 24 hours.
- **Question 7:** When we have a new one, will JICA have some insurant to health people if it impacts health?
- **Answer:** For the medical waste incinerator will affect so less. JICA will fund the incinerator with method technical. It is the responsibility of the Government of Cambodia.
- **Suggestions from people:** When we are going to get a new one, we close the old one.
- **Chief of Admin hospital:** Absolutely, yes.

3. Conclusion

- Representation to hospital: Thankfully, JICA provides medical wastes incinerator and taking care. Thank you to people who spend their time listening about affection for the environment to improve and develop and know about the offering.
- Mr. Arai Takatoshi: Thank you very much to the hospital authority and people surrounding here for joining the meeting to develop.
- Mr. Chhoun Pheak: Thank you to the hospital for preparing this meeting and the people surrounding for spending your time to join about affection and worrying about the medical wastes incinerator.

Preparatory Survey for the Project for the Improvement of Infectious Waste Management in the Kingdom of Cambodia

Hospital Stakeholders Meeting

Meeting Minute

Date	15th November 2022	Time	9:00 – 11:00
Place	Kratie PRH		
Organization	Kratie		
Attendance	**Total: 28 participants** • Kratie PRH: one director, one deputy director, two staffs and 8 cleaners of hospital • Hospital Stakeholder: 12 People who live around hospital in Kratie village Kratie commune kratie distric Kratie province. **Consultants:** • Mr. Arai Takatoshi, Team Leader of consultant team • Mr. Kenji Yosida, Member of Consultant Team • Mr. Chhoun Pheak, Local consultant • Ms. Heang Mouyim, Local consultant		

1. The objective of the meeting:

- To explain the contents of the project to Stakeholders
- To obtain the opinions and feedback from Stakeholders on the project

2. Contents of the Discussion:

After the self-introduction session, a quick introduction about the purpose of the meeting was made by the local consultant team then, followed by the detailed contents as below;

2.1 A presentation about the structure of the project by Mr. Arai Takatoshi

- The project aims to improve medical waste management at healthcare facilities in Cambodia. It is formed in response to the request from the MoH to JICA to support this project. JICA contracted a consultant team to conduct the initial survey and formulate this project. At first, MoH requested a proposed 53 hospitals; after the technical group accessed the hospitals, we selected 29 hospitals to receive incinerators under this project.
- The main project component includes providing incinerators to the hospital with a soft component, including technical guidance for the proper operation of incinerators, technical advice for proper maintenance of incinerators, and technical guidance for in-hospital medical waste management.
- Specifications of the medical waste incinerator include a combustion temperature of 800°C or higher and a minimum of 4 meters of the chimney.

- There are three sizes of medical wastes incinerator; small, medium, and large—the criteria to give incinerators are based on the amount of medical waste the hospitals make per day. The incinerator's capacity is 20, 30, and 50kg per hour for small, medium, and large incinerators, respectively.
- Expected timeline: In November, the minister of the Japanese government is processing the meeting to approve this project. The technical team will choose the factory to produce the medical incinerator and transfer it to Cambodia, and hopefully, the incinerator can be operated in early 2024.

Detail presentation slide deck is attached as the annex of this minutes

2.2 Discussing: Question and Answer

- **Director of hospital and Deputy:** Very thank this offer to hospital and princely inform to the president why it is important and they are making this clear this project. They are so happy with this kind of incinerator with Japanese technology (negative effect).
- Question 1: What kind of wastes that can burn in this incinerator for particular?
- Answer : The incinerator can burn for all of solid medical wastes, but we should determine the type of medical wastes or separate medical wastes.
- Question 2: How much of fuel that will use per an hour?
- Answer : It is depending on type of wastes (dry or wet). For estimation, The Usage of the incinerator of destroy medical wastes for every single day, maybe it has to spend $6000.
- Question 3: For glass bottle medical wastes, electronic bulbs, will it burn as well?
- Answer : Ability of this incinerator will burn it as well, but it will not melt it. It will burn at high temperature and kill bacterial too.
- **Director of hospital and Deputy:** In Kratie's hospital must have incinerator for destroy medical wastes (for burning needles, iron, pieces of glass, …) and also incinerator for burning a normal waste.

3. Conclude the meeting

- Director of the hospital: thank for giving support from JICA and consultant team for working hard and also coming/join the meeting. He said this is kind of good new support to improve for the qulity of medical waste management in hospital.
- Arai Takatoshi: Thank you very much for participant.

Preparatory Survey for the Project for the Improvement of Infectious Waste Management in the Kingdom of Cambodia

Hospital Stakeholders Meeting

Meeting Minute

Date	16th November 2022	Time	9:00 – 11:00
Place	Chhlong RH		
Organization	Chhlong RH, Kratie Province		
Attendance	**Total: 25 participants (11 female, 14 males)** • Chhlong RH: one director, two deputy director 6 chief of services (3 female,6 male) • Hospital Stakeholder: Representatives of Chhlong commune, one village chief one teacher of high school, 4 students, one monk ,5 People who live around hospital (7female, 5male) **Consultants:** • Mr. Arai Takatoshi, Team Leader of consultant team • Mr. Kenji Yosida, Member of Consultant Team • Mr. Chhoun Pheak, Local consultant • Ms. Heang Mouyim, Local consultant		

1. The objective of the meeting:

- To explain the contents of the project to Stakeholders
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2. Contents of the Discussion:

After the self-introduction session, a quick introduction about the purpose of the meeting was made by the local consultant team then, followed by the detailed contents as below;

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- The project aims to improve medical waste management at healthcare facilities in Cambodia. It is formed in response to the request from the MoH to JICA to support this project. JICA contracted a consultant team to conduct the initial survey and formulate this project. At first, MoH requested a proposed 53 hospitals; after the technical group accessed the hospitals, we selected 29 hospitals to receive incinerators under this project.
- The main project component includes providing incinerators to the hospital with a soft component, including technical guidance for the proper operation of incinerators, technical advice for proper maintenance of incinerators, and technical guidance for in-hospital medical waste management.

- Specifications of the medical waste incinerator include a combustion temperature of 800°C or higher and a minimum of 4 meters of the chimney.
- There are three sizes of medical wastes incinerator; small, medium, and large—the criteria to give incinerators are based on the amount of medical waste the hospitals make per day. The incinerator's capacity is 20, 30, and 50kg per hour for small, medium, and large incinerators, respectively.
- Expected timeline: In November, the minister of the Japanese government is processing the meeting to approve this project. The technical team will choose the factory to produce the medical incinerator and transfer it to Cambodia, and hopefully, the incinerator can be operated in early 2024.

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2.2 Discussing: Question and Answer

- **Question of Student:** For incinerator for medical wastes, will it be using in only hospital? Or will the community use it too?
- **Answer:** This Incinerator is going to use only for destroy the medical wastes, so community will not allow to use.
- **Question of High School teacher:** What is different between incinerator for medical waste and incinerator for destroy general waste?
- **Answer:** In generally, for technical is not much different, but it different about temperature killing bacterial and neutralize chemical because filter toxic system and chemical before release smoke. For Chhlong Referral Hospital will get small standard that can destroy medical wastes approximately 20 kilograms per an hour.
- **Question:** How to use incinerator for destroy medical wastes? Is it using electric or fuel?
- **Answer:** Though estimation, it will spend around 5$ per an hour.
- **Question:** How long will incinerator be been? (Maybe 7 to 10 years)
- **Question and commend from deputy director of hospital:** How far? And how is the affection of smoke?
- **Answer:** In Generally the filter toxic system will not release much of smoke, and for chimney of cinerator is lower than 4 meter that will not affect to atmosphere, people around there indeed. Smoke is very thin…

3. Conclusion

- Director of hospital: Very thank to JICA and please all the people here are kindly to tell people around you as, The Burning of medical wastes in incinerator is not have any affection. Thank you to JICA team and everyone that join meeting.
- Mr. Pheak: Thank you so much to hospital which is kindly prepare meeting
- Mr. Arai: Thank You very much for the meeting.

Hospital Stakeholders for Medical Waste Management Project will be Supported by JICA in Kingdom of Cambodia

Meeting Minute

Date	17th November 2022	Time	9:00 – 11:00
Place	Neak Loeung RH		
Organization	Neak Loeung, Prey Veng		
Attendance	**Total: 27 participants (10 female, 17 males)** • Neak Leung RH: 3 males (one director, one deputy director, one admin) • Hospital Stakeholder: 9 females and 13 males (one commune council, one village chief, 20 people of Tibey village **Consultants:** • Mr. Arai Takatoshi, Team Leader of consultant team • Mr. Kenji Yosida, Member of Consultant Team • Mr. Chhoun Pheak, Local consultant • Ms. Heang Mouyim, Local consultant		

1. The objective of the meeting:

- To explain the contents of the project to Stakeholders
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incinerator's capacity is 20, 30, and 50kg per hour for small, medium, and large incinerators, respectively.

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Detail presentation slide deck is attached as the annex of this minutes

2.2 Discussing: Question and Answer

- Question 1: Will this incinerator bore by noise or affect to health?
- Answer by Chhoun Pheak: It is kind of medical waste incinerator; it will not have any noise as an incinerator for destroying general wastes. It has less affection and less smoke because of filter. For noise, it is maybe not too much, because we use monitor to release smoke. But we will be careful by measure the noise before we are going to install by standard of ministry of environment. We are believable as, it will not impact as your worry.
- Question 2: This kind of incinerator has been producing use in other country or in Japan that can prove/prose they technical and quality can be prose, kind of experimental and make sure that is not the first time that they use this kind of incinerator in Cambodia and just one to test. Has this incinerator ever produced any country?
- Answer 2: This incinerator is produced by medical wastes' incinerator factory by auction company. All companies are high of ability and high experiences. For technology is also upgrade to high level too.

3. Conclusion

- Director of hospital: Thankfully to JICA and consultant team that provide medical wastes' incinerator and taking care. Thank you to people that spend your time to listen about affection to environment to improve and develop, also know about the offering. He reconfirms this incinerator will not have any negative impact to the residential.
- Mr. Arai: Thank you very much for director of Neak Loeung hospital who organized this meeting and the authorities, commune chiefs, village chiefs and all the people who participated in this meeting. Join in the management of medical waste to improve and reduce the negative effects.

Preparatory Survey for the Project for the Improvement of Infectious Waste Management in the Kingdom of Cambodia

Hospital Stakeholders Meeting

Meeting Minute

Date	04th November, 2022	Time	9:00 – 11:00
Place	Ou Chrov Referral Hospital		
Organization	BT-Meanchey		
Attendance	Total: 38 participants (17 female, 21males) • Ou Chrov RH: one director and 4 staff (2 female,3 male) • Hospital stakeholder: one member of commune, one police, two village chiefs, and 25 people who live around hospital (14female, 15male) **Consultants:** • Mr. Arai Takatoshi, Team Leader of consultant team • Mr. Chhoun Pheak, Local consultant • Ms. Heang Mouyim, Local consultant		

1. The objective of the meeting:

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Detail presentation slide deck is attached as the annex of this minutes

2.2 Discussing: Question and Answer

- **Question 1**: Can this incinerator burning general wastes?
- Answer: Honestly, it is going to burn for only medical wastes or divide the right type of wastes.
- **Question 2**: For incinerator need a hall or roof?
- Answer: For roof of incinerator of destroy medical wastes will expend by project, it is caring incinerator. As an opinion, this incinerator will not allow to burn any general wastes, it will be easy to damage. And incinerator can use both of fuel and electric.
- **Information from the director hospital and deputy** is mention as this location of installation incinerator fill flood this year but he said he will refill soil on field for the project this year will be better.
- Answer: Noted: For the place to install incinerator fill by flood, Japanese project will not expend on land-fill, it is expending by hospital.
- **Comment of village chief** "Hospital is really needing a fund", he continued "In 2024, he hopes, hospital at his province will get new building for patients for staying there". And he is really happy for funding of incinerator"
- Answer: Honestly, Japanese Project want to install the incinerator of destroy medical wastes as soon as possible. But it cannot release as fast, they need time to choose a factory to produce this incinerator with the best technical and try to test it again and again before we bring it to install in each hospital. So we need times.
- **Question 3 (From commune's chief):** how height the incinerator is? And how size the incinerator is?
- Answer: It is depending on technology of factory. But the sample of incinerator for destroy medical wastes is smaller than 2 meter (length and width) and the height is around 4 meters. (to measure from incinerator)

3. Conclude the meeting

- Director of hospital First he would like to thank the benefit of incinerator for the hospital and also residential who live around the hospital and also local thank for the patriciate and JICA consultants Team, and keeping support this wish you and everyone all the best.
- Ms. Arai: Finally, we are really thanks to authorities, teacher, and people for attend in meeting today. We will be consideration after get this feedback. We hope, it is apart to help government of Cambodia and also to hospital as useful too

Preparatory Survey for the Project for the Improvement of Infectious Waste Management in the Kingdom of Cambodia

Hospital Stakeholders Meeting

Meeting Minute

Date	14th November, 2022	Time	9:00 – 11:00
Place	Pouk RH		
Organization	Siem Reap		
Attendance	Total: 23 participants (09 female, 14males) • Pouk RH: one director and one admin (2 male) • Hospital stakeholder: one commune chief, 3 village chief, one of director of high school, one deputy of primary school and 11 people who live around hospital (8 female,9 male **Consultants:** • Mr. Arai Takatoshi, Team Leader of consultant team • Mr. Kenji Yosida, Member of Consultant Team • Mr. Chhoun Pheak, Local consultant • Ms. Heang Mouyim, Local consultant		

1. The objective of the meeting:

- To explain the contents of the project to Stakeholders
- To obtain the opinions and feedback from Stakeholders on the project

2. Contents of the Discussion:

After the self-introduction session, a quick introduction about the purpose of the meeting was made by the local consultant team then, followed by the detailed contents as below;

2.1 A presentation about the structure of the project by Mr. Arai Takatoshi

- The project aims to improve medical waste management at healthcare facilities in Cambodia. It is formed in response to the request from the MoH to JICA to support this project. JICA contracted a consultant team to conduct the initial survey and formulate this project. At first, MoH requested a proposed 53 hospitals; after the technical group accessed the hospitals, we selected 29 hospitals to receive incinerators under this project.
- The main project component includes providing incinerators to the hospital with a soft component, including technical guidance for the proper operation of incinerators, technical advice for proper maintenance of incinerators, and technical guidance for in-hospital medical waste management.

- Specifications of the medical waste incinerator include a combustion temperature of 800°C or higher and a minimum of 4 meters of the chimney.
- There are three sizes of medical wastes incinerator; small, medium, and large—the criteria to give incinerators are based on the amount of medical waste the hospitals make per day. The incinerator's capacity is 20, 30, and 50kg per hour for small, medium, and large incinerators, respectively.
- Expected timeline: In November, the minister of the Japanese government is processing the meeting to approve this project. The technical team will choose the factory to produce the medical incinerator and transfer it to Cambodia, and hopefully, the incinerator can be operated in early 2024.

Detail presentation slide deck is attached as the annex of this minutes

2.2 Discussing: Question and Answer

- Question 1 : Have the incinerator have smoke and smell?
- Answer : Yes, it has less smoke and less smell. The property of incinerator is high temperature and filter smoking system that will convert the smell.
- Question 2 : What level of smell will lease when we are burning medical wastes? And how far is the smoke and smell release?
- Answer : For releasing of smoke is so less and we are not really sure how far will smoke fly.
- **Some of Ladies said**: They are very happy about new incinerator which release less smoke and smell, It is really support to hospital. Then, while hospital is going to burn, they are just going to close the door, that is enough.
- Question 3 : If we are going to burin 20 kilogram of medical wastes for an hour, so how many kilograms of electric will we spend?
- Answer : Through estimation, if hospital will burn 3 hours for every single day and full days of week, we have to spend around $ 6000 per year. Or one day, we have to spend 5$ per an hour. (Expending on water, fuel, and electric)

3. Conclude the meeting

- Comment from the chief of commune：He said very happy to hear the hospital will get the new incinerator with this kind specific capacity (less smoke and smell) and this is good support to the hospital and people in the village. He happy and thank to JICA team.
- Chhoun Pheak: Thank you to the director of the hospital for organizing this meeting and the commune chief and the people who attended the meeting.

Preparatory Survey for the Project for the Improvement of Infectious Waste Management in the Kingdom of Cambodia

Hospital Stakeholders Meeting

Meeting Minute

Date	03rd November, 2022	Time	9:00 – 11:00
Place	Malai Santepheap RH		
Organization	BT-Meanchey		
Attendance	Total: 40 participants (26 female, 14males) • Malai Santepheap RH: one director and 3 staff • Hospital Stakeholder: five village chiefs, and 29 people who live around hospital (24 female, 10 male) **Consultants:** • Mr. Chhoun Pheak, Local consultant • Ms. Heang Mouyim, Local consultant		

1. The objective of the meeting:

- To explain the contents of the project to Stakeholders
- To obtain the opinions and feedback from Stakeholders on the project

2. Contents of the Discussion:

After the self-introduction session, a quick introduction about the purpose of the meeting was made by the local consultant team then, followed by the detailed contents as below;

2.1 A presentation about the structure of the project by Mr. Arai Takatoshi

- The project aims to improve medical waste management at healthcare facilities in Cambodia. It is formed in response to the request from the MoH to JICA to support this project. JICA contracted a consultant team to conduct the initial survey and formulate this project. At first, MoH requested a proposed 53 hospitals; after the technical group accessed the hospitals, we selected 29 hospitals to receive incinerators under this project.
- The main project component includes providing incinerators to the hospital with a soft component, including technical guidance for the proper operation of incinerators, technical advice for proper maintenance of incinerators, and technical guidance for in-hospital medical waste management.
- Specifications of the medical waste incinerator include a combustion temperature of 800°C or higher and a minimum of 4 meters of the chimney.
- There are three sizes of medical wastes incinerator; small, medium, and large—the criteria to give incinerators are based on the amount of medical waste the hospitals make per day. The

incinerator's capacity is 20, 30, and 50kg per hour for small, medium, and large incinerators, respectively.

- Expected timeline: In November, the minister of the Japanese government is processing the meeting to approve this project. The technical team will choose the factory to produce the medical incinerator and transfer it to Cambodia, and hopefully, the incinerator can be operated in early 2024.

Detail presentation slide deck is attached as the annex of this minutes

2.2 Discussing: Question and Answer

- **Question 1 (Interim commune chief):** How height of small standard of incinerator at Malai Referral hospital?
- **Answer** : It has not yet managed the height of incinerator. But it is maybe 2 meters for size and 5 meters for height that is less of smoke because it has filter reduce of smoke releasing (the old of incinerator is 2 meters)
- **Question 2 (Director of hospital) :** How many types of wastes that this incinerator can burn? (High shape equipment, wastes fully of bacterial … wastes' family)
- **Answer** : The ability of incinerator will burn all type of wastes and will kill bacterial too, but glass bottle and needles will not melt but it will kill bacterial. And For burning will need a bit long time.
- **Question 3 (residence):** Can we change incinerator to another place?
- **Answer of director of hospital :** No, we are not. The Campus of hospital is small and close to road that is easy to transfer wastes, another one we keep free land for construct new building.
- **Interim commune chief:** The problem is about people close to incinerator. Through my opinion, It should be no problem, because of the standard of incinerator and technical.

3. Conclusion

- **Director of hospital** Thank you to JICA for funding this incinerator. And Our referral hospital will work so hard to be better both of quality and valuable.

6 Other Relevant Data

6a Stake Holder Meetings

6b Map around the Hospital Facility (300m radius)

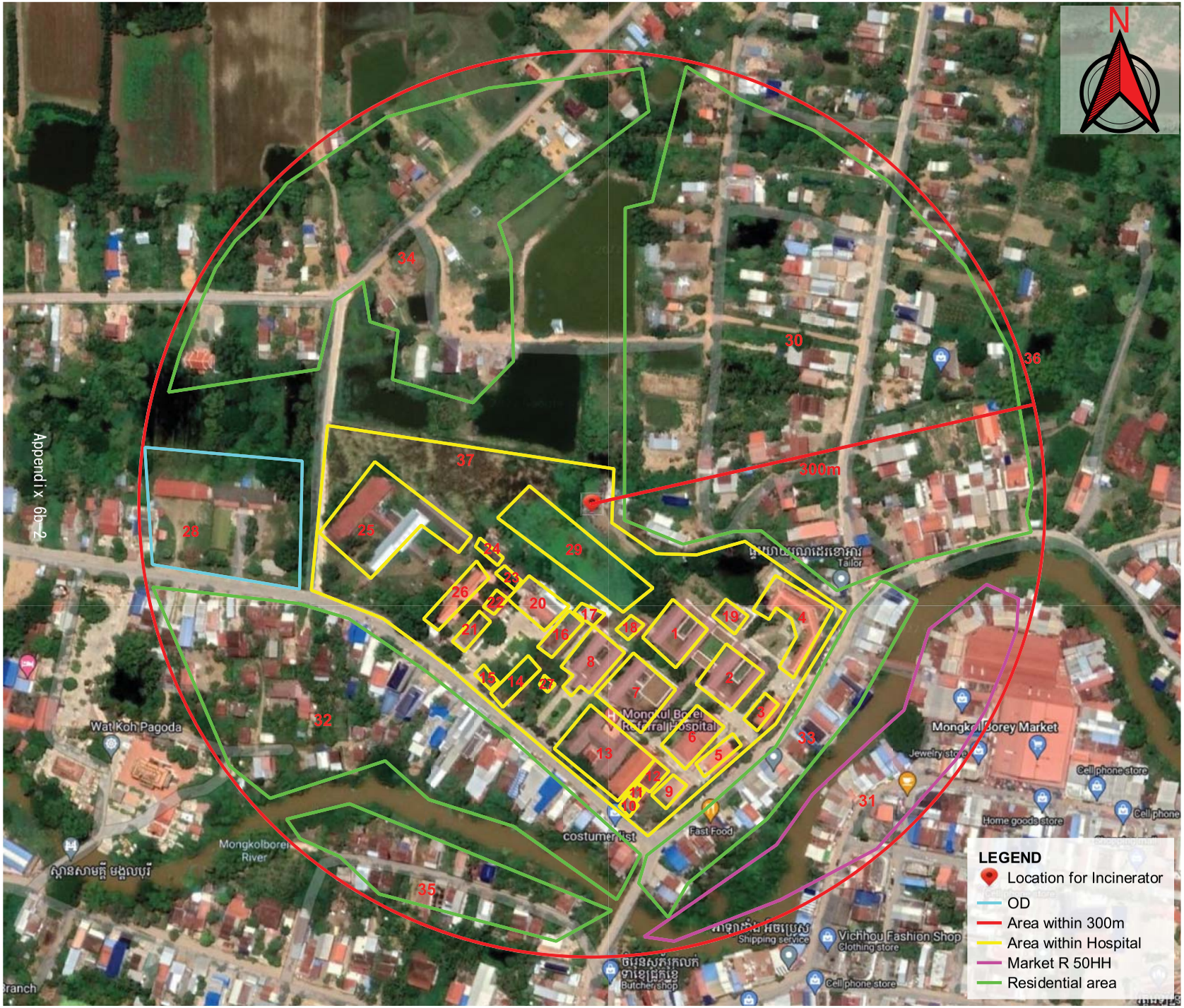
6c Result of Noise Baseline Survey

Appendix 6b-1

Details of the Establishments within 300m radius

No	Province	Hospital Name (English)	No. of Residential Est.	No. of Commercial Est.	No. of Governmental Est.	No. of Religious Est.	Types of Agricultural Lands	Types and Areas of Agricultural lands	No.of Other Facilities Est.	Types of Other Facilities
1	Banthey Meanchey	Sere Sophorn RH	386	28	3	-	-	-	-	-
2		Thmor Puk RH	488	19	3	-	1	Paddy Fields - 11,807 sq.m	-	-
3		Svay Chek RH	630	18	2	-	1	Farm - 12620 sq.m	-	-
4		Cambodia-Japan Frienship Hospital, Mongkul Borey	390	26	2	-	-	-	-	-
5		Phnom Srok RH	490	12	3	-	-	-	-	-
6		Mailai RH	498	10	1	-	-	-	-	-
7		Ov Chrov RH	120	8	2	-	1	Paddy Fields - 65974 sq.m	-	-
8		Poit Pet RH	850	16	3	-	-	-	-	-
9	Siem Reap	Ang Korchum RH	30	22	2	-	1	Paddy Fields - 110495 sq.m	-	-
10		PhuK RH	580	11	3	-	-	-	-	-
11	Kratie	Kratie RH	65	26	4	-	-	-	-	-
	Kratie	Chholng RH	300	19	1	-	-	-	-	-
12	Kampong Cham	Batheay RH	43	7	5	-	1	Farm - 125457 sq.m	-	-
13	Kampong Chhnang	Kampong Chhnang PRH	1310	28	3	-	-	-	-	-
14	Battambang	Thmor Kul RH	150	21	3	-	1	Faddy Fields - 90156 sq.m	-	-
15		Roka RH	85	12	2	1	1	Farm - 24227 sq.m	-	-
16		Moung Russey RH	968	22	4	1	-	-	-	-
17	Prey Veng	Pearaing RH	137	17	4	-	1	Farm - 33787 sq.m	-	-
18		Kampong Trobek RH	65	21	1	-	1	Paddy Fields - 188752 sq.m	-	-
19		Neak Loeung RH	340	29	5	-	-	-	-	-
20		Prey Veng PRH	620	22	8	1	-	-	-	-
21	Svay Rieng	Romeas Hek RH	270	17	2	-	1	Paddy Fields - 57940 sq.m	-	-
22		Chiphou RH	180	11	2	-	1	Farm - 26250 sq.m	-	-
23		Svay Tep RH	50	11	3	-	-	-	-	-
24		Svay Chrum RH	350	7	4	-	1	Farm - 56010 sq.m	-	-
25	Kampot	Bunrany Hsen Koh Sla RH	15	10	3	1	1	Paddy Fields - 104147 sq.m	-	-
26		Kmapong Trach RH	225	18	1	-	1	Paddy Fields - 17174 sq.m	-	-
28	Kandal	Takhmao PRH	810	34	4	1	-	-	1	Non Governmental Organization
29		Koh Thom RH	485	4	5	-	1	Farm - 45211 sq.m	-	-

1- Stakeholder Map of Mongkol Borei RH

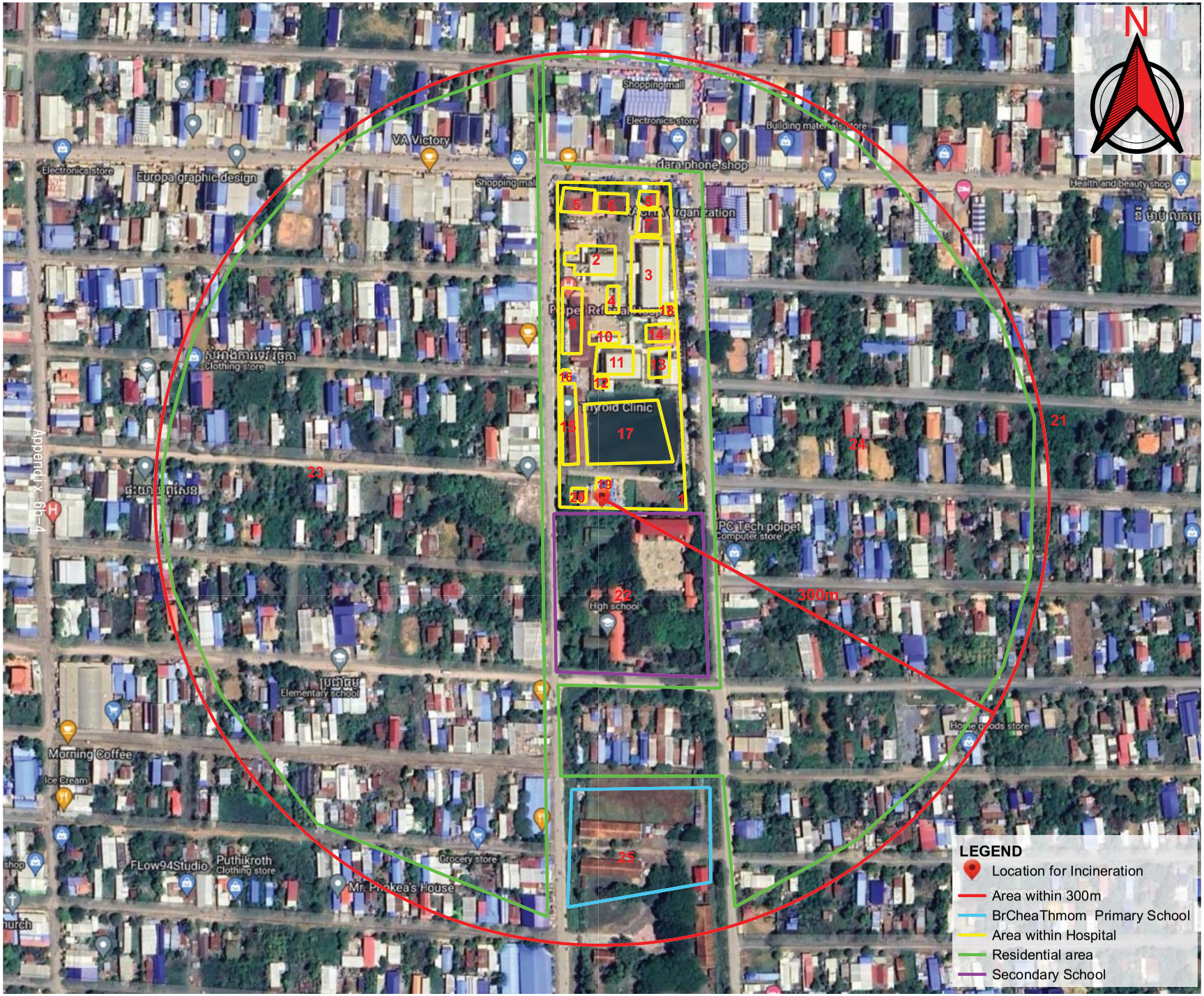


Area within 300m	
ID	name
1	Surgical ward
2	Maternity ward
3	Laboratory
4	Ophthalmology
5	Laboratory
6	Pediatric Ward
7	Surgical ICU
8	ICU and Imagery
9	Halas Building
10	Kitchen
11	WC
12	HIV/AIDS
13	General Medicine
14	ENT and Physiotherapy
15	Parking
16	Admin and OPD
17	Cantine
18	Medical Waste Storage
19	Water Tank
20	Meeting Room and Pharmacy
21	Mental Health and Health Equity Fund
22	Imagery
23	Director Room
24	Store Pharmacy
25	Covid
26	Covid and TB
27	WC
28	OD
29	Lake
30	Residential area 250HH
31	Market R 50HH
32	Residential area 50HH
33	Residential area 30HH
34	Residential area 30HH
35	Residential area 30HH
36	Area within 300m
37	Hospital Border

2- Stakeholder Map of Serei Sorphorn RH

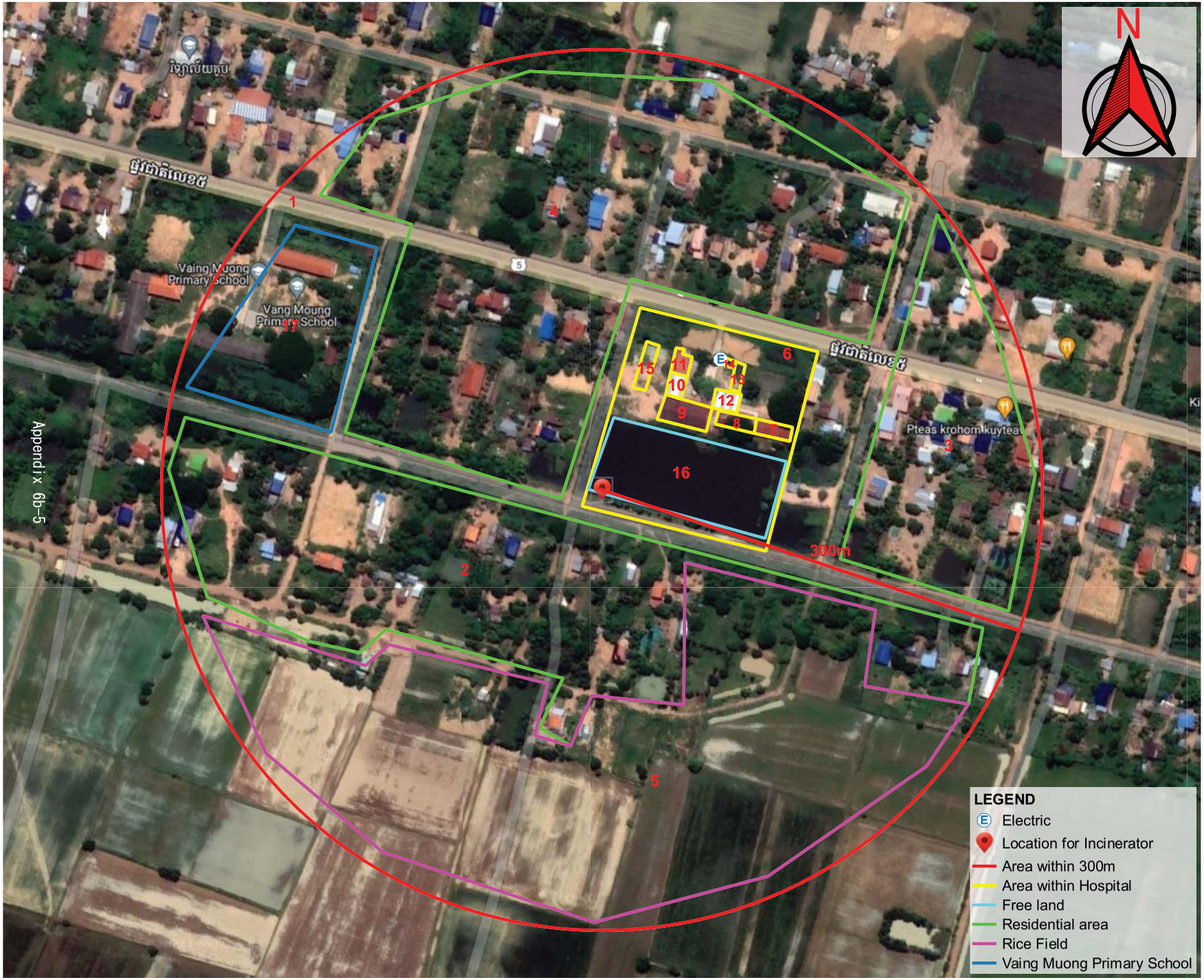
Area within 300m	
ID	name
1	Hospital border
2	TB Ward
3	HIV/AIDS
4	Equipment Storage
5	WC
6	Isolation Room
7	WC
8	WC
9	Maternity
10	Finance
11	Kitchen
12	Admin
13	ER and Labo
14	OPD and Pharmaey
15	STI
16	Badminton
17	Car Park
18	drug store
19	kitchen HR
20	food court
21	HC
22	Garden
23	Incinerator
24	waste storage
25	WC
26	Old Building
27	OD
28	Pediatric Ward
29	Residential area 100HH
30	Residential area 60HH
31	Residential area 200HH
32	Residential area 10HH
33	Residential area 3HH and gas station
34	Residential area 5HH and Gas station
35	Serey Sophorn High School
36	Hun Sen Sophy Primary School
37	Gas Station
38	Residential area 8HH
39	area within 300m

3- Stakeholder Map of Poy Pet RH



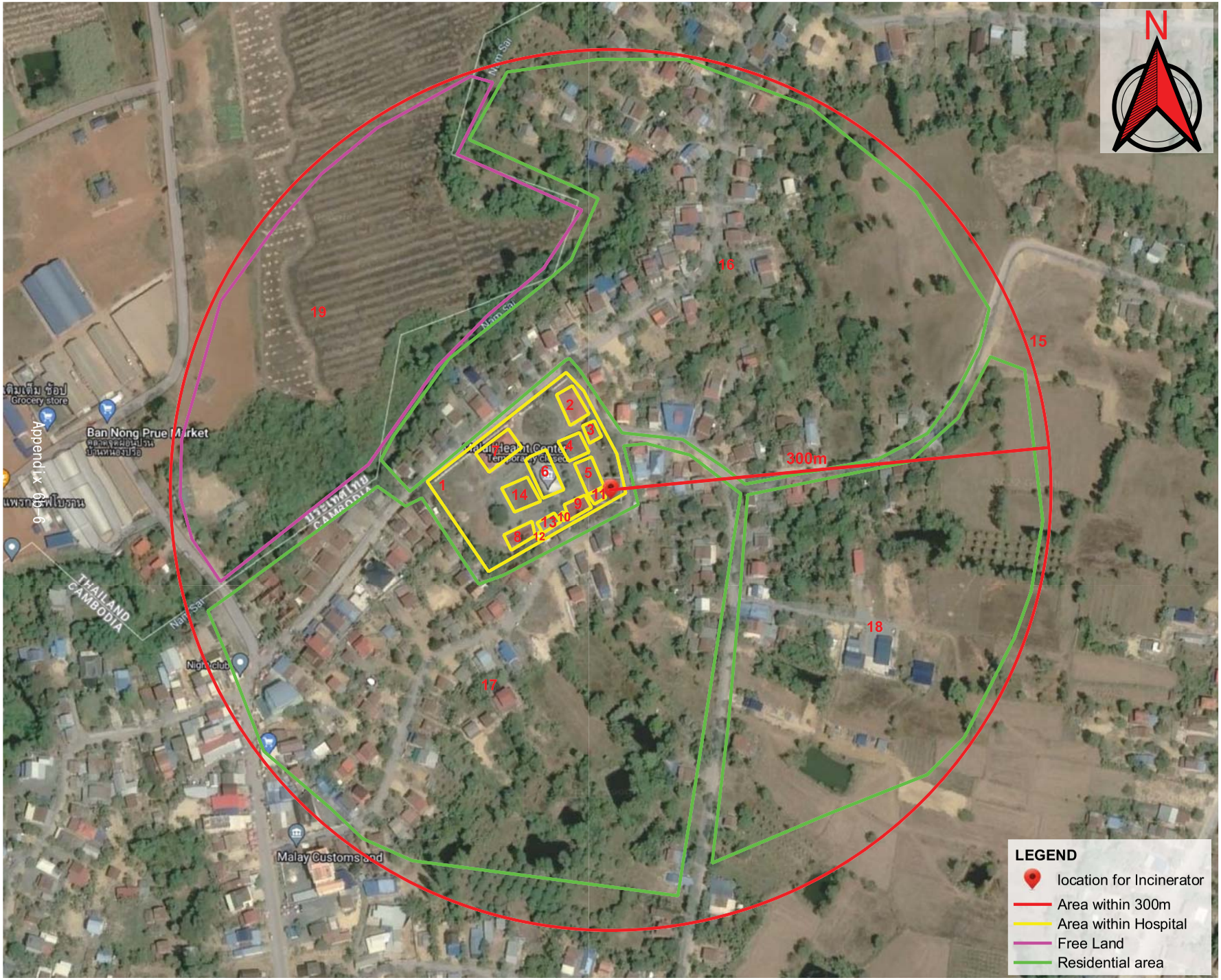
Area within 300m	
ID	**name**
1	Hospital border
2	X-ray
3	Maternity
4	Car Parking
5	OD
6	Store Pharmacy OD
7	HC
8	Generator
9	OI
10	Car parking
11	PCR
12	Kitchen
13	Pediatric Ward
14	Covid Building
15	TB and HIV/AIDS
16	Laundry
17	Lake
18	Kitchen
19	Incinerator
20	Mortuary
21	Area within 300m
22	Secondary School
23	Residential area 400HH
24	Residential area 450HH
25	BrCheaThmom Primary School

4- Stakeholder Map of Ou Chrov RH



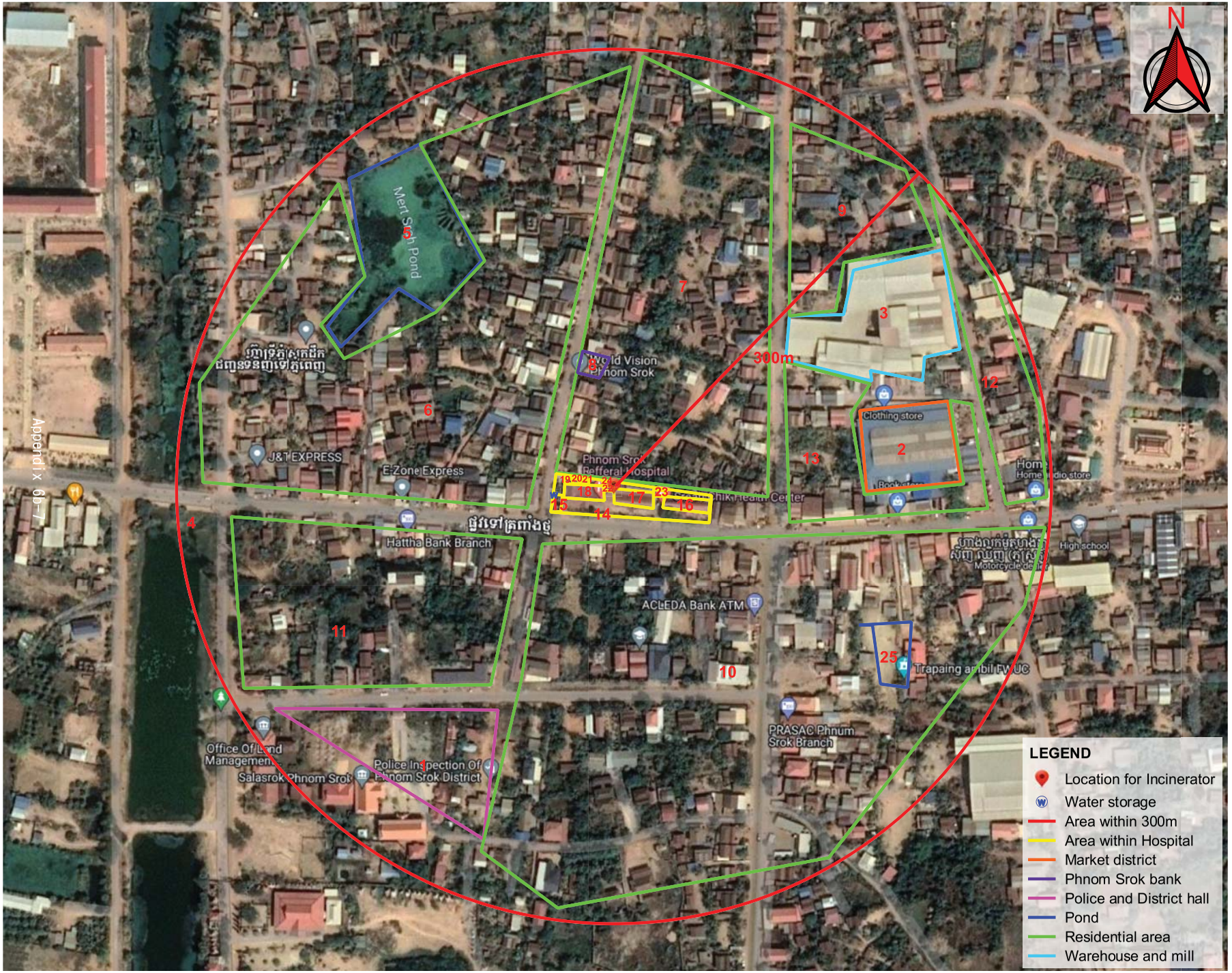
Area within 300m	
ID	name
1	Area within 300m
2	Residential area 30HH
3	Residential area 20HH
4	Residential area 70HH
5	Rice Field
6	Bolder Hospital
7	Health Center Kork
8	Sterilizer
9	Medicine
10	Admin
11	Maternity
12	Place for Vaccination
13	New meeting room
14	Moto parking
15	New maternity
16	Free land
17	Vaing Muong Primary School

5- Stakeholder Map of Malai Santepheap RH



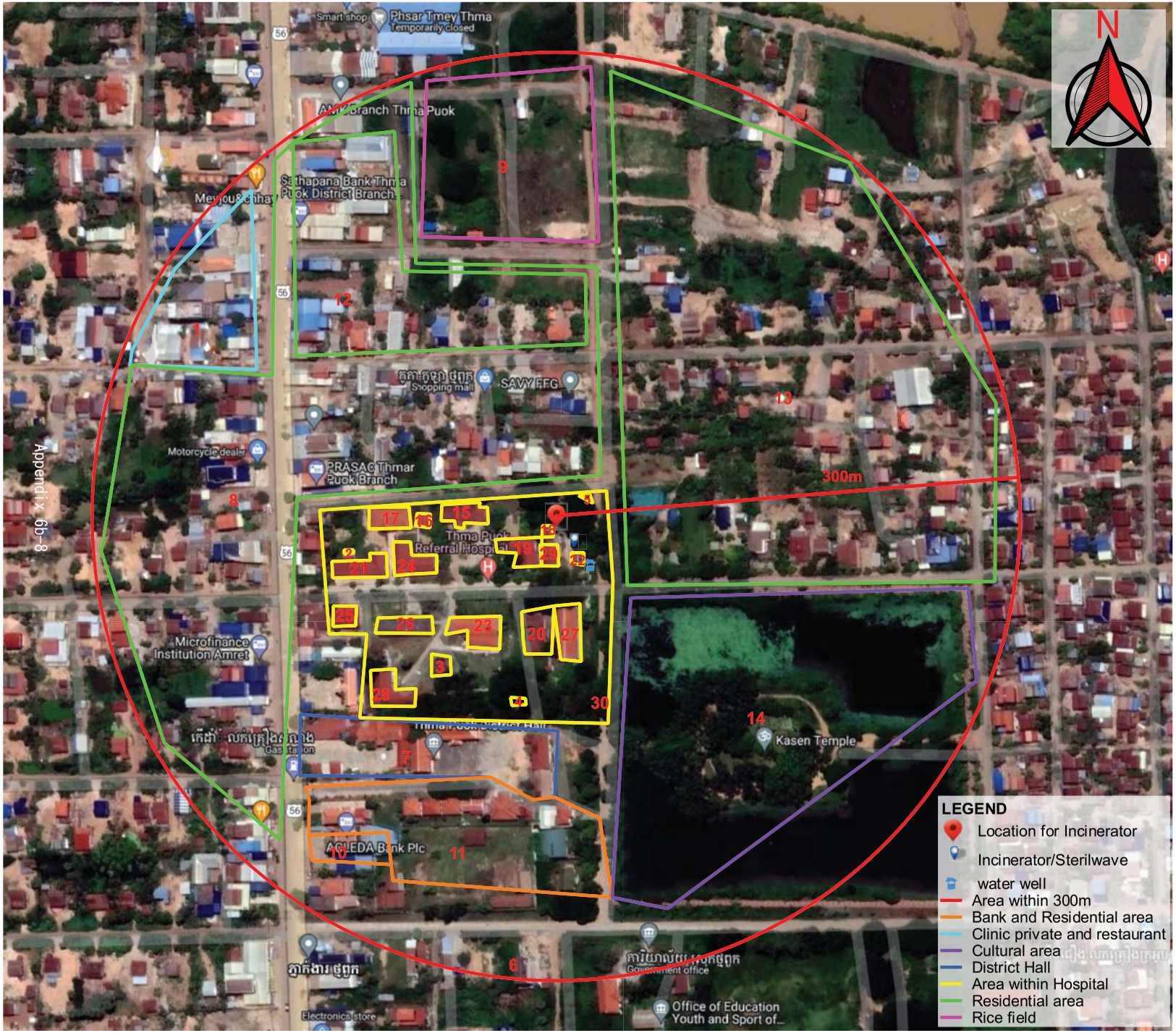
Area within 300m	
ID	name
1	Hospital Border
2	HC
3	OD
4	X-Ray
5	Isolation Building
6	Lab
7	Pediatry
8	Medicine
9	Car Parking
10	Incinerator
11	Kitchen
12	WC
13	Admin
14	Garden
15	Area within 300m
16	Residential area (228HH)
17	Residential area (210HH)
18	Residential area (60HH)
19	Free Land

6- Stakeholder Map of Phnom Srock RH



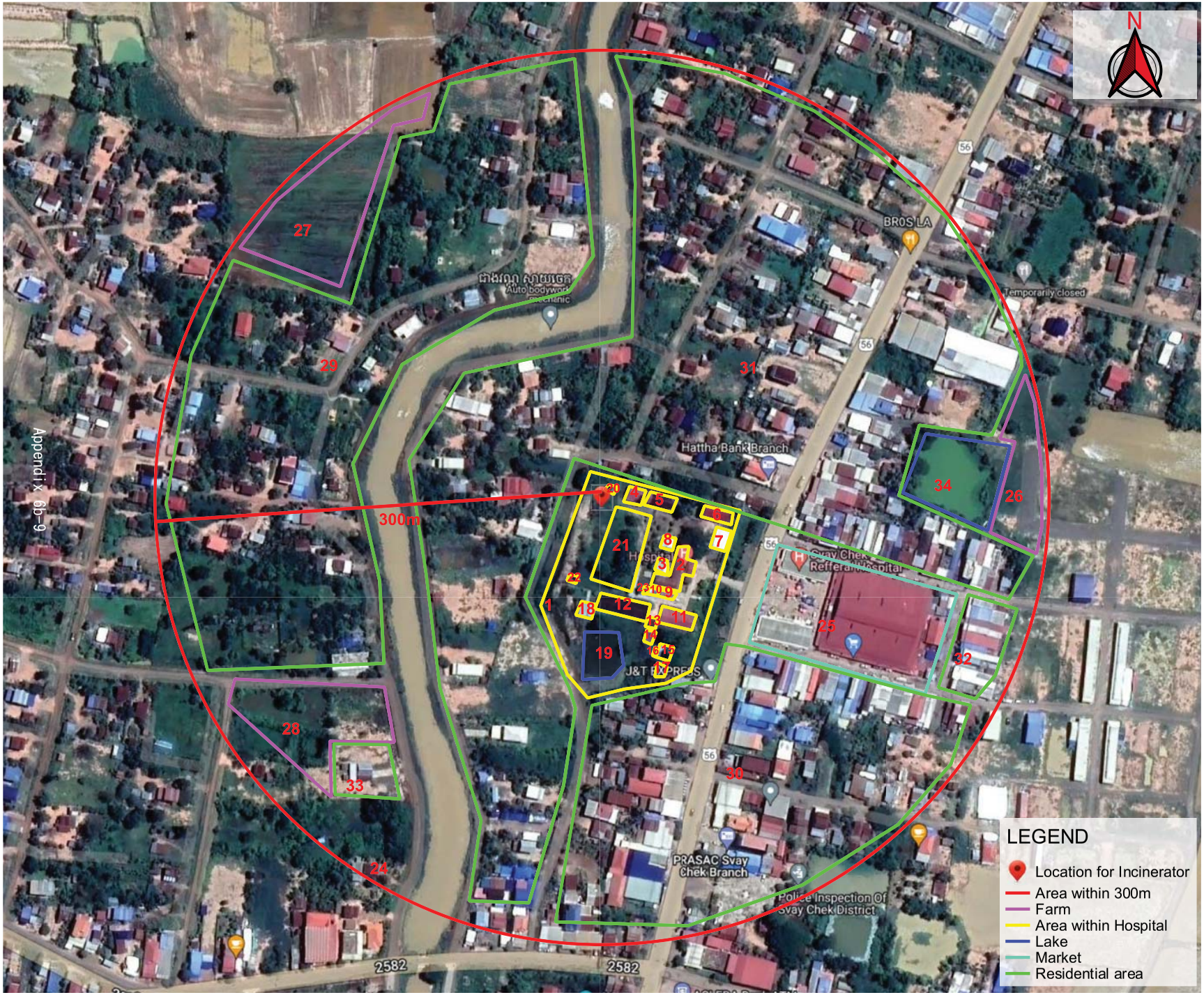
Area within 300m	
ID	name
1	Police and Distric hall
2	Market distric
3	Warehouse and mill
4	Area within 300m
5	Pond
6	Residential area 180 HH
7	Residential area 80HH
8	Phnom Srok bank
9	Residential area 15HH
10	Residential area 150HH
11	Residential area25HH
12	Residential area 15HH
13	Residential area 25HH
14	Hospital border
15	HC
16	Pediatry
17	ER
18	Admin
19	Cleaning
20	Labo
21	X-ray
22	Meeting room
23	Kitchen
24	Material storage
25	Protected Pond

7- Stakeholder Map of Thma Puok RH



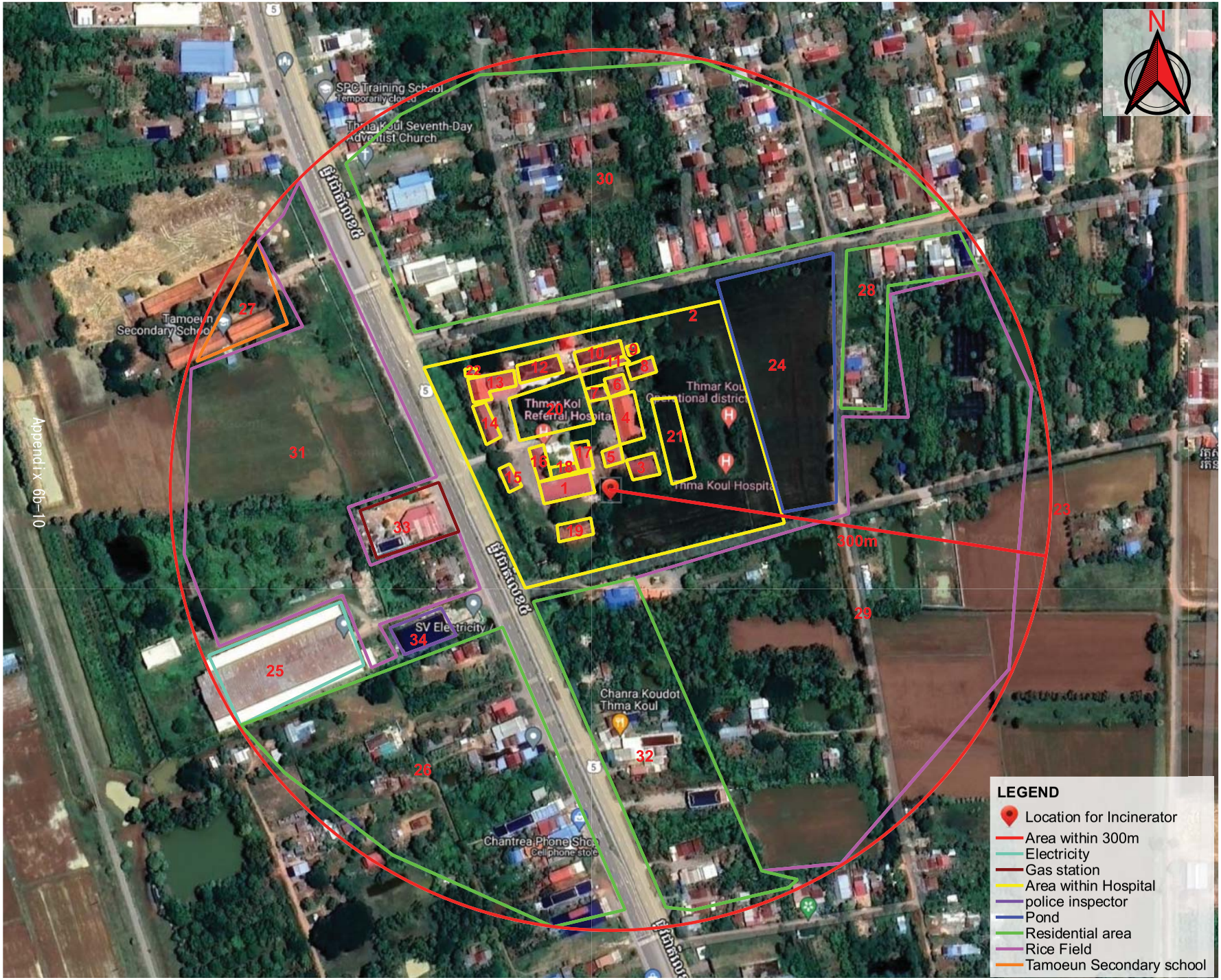
Area within 300m	
ID	**name**
1	Clinic private and restaurant
2	WC of ER
3	kitchen
4	Toliet
5	Unused old incinerator
6	Area within 300m
7	District Hall
8	Residential area 270HH
9	Rice field
10	Bank
11	ACLEDA Bank and Residential area 25HH
12	Residential area 60HH
13	Residential area 125HH
14	Cultural area
15	OD
16	Kitchen
17	Pediatry
18	Mortuary
19	OD Drug store and Hospital
20	Sample Health center
21	PMRS
22	Generator electric
23	Operation Theater
24	Maternity
25	Car parking
26	Admin
27	TB
28	Medicine
29	Car parking
30	Hospital Border

8- Stakeholder Map of Svay Chek RH



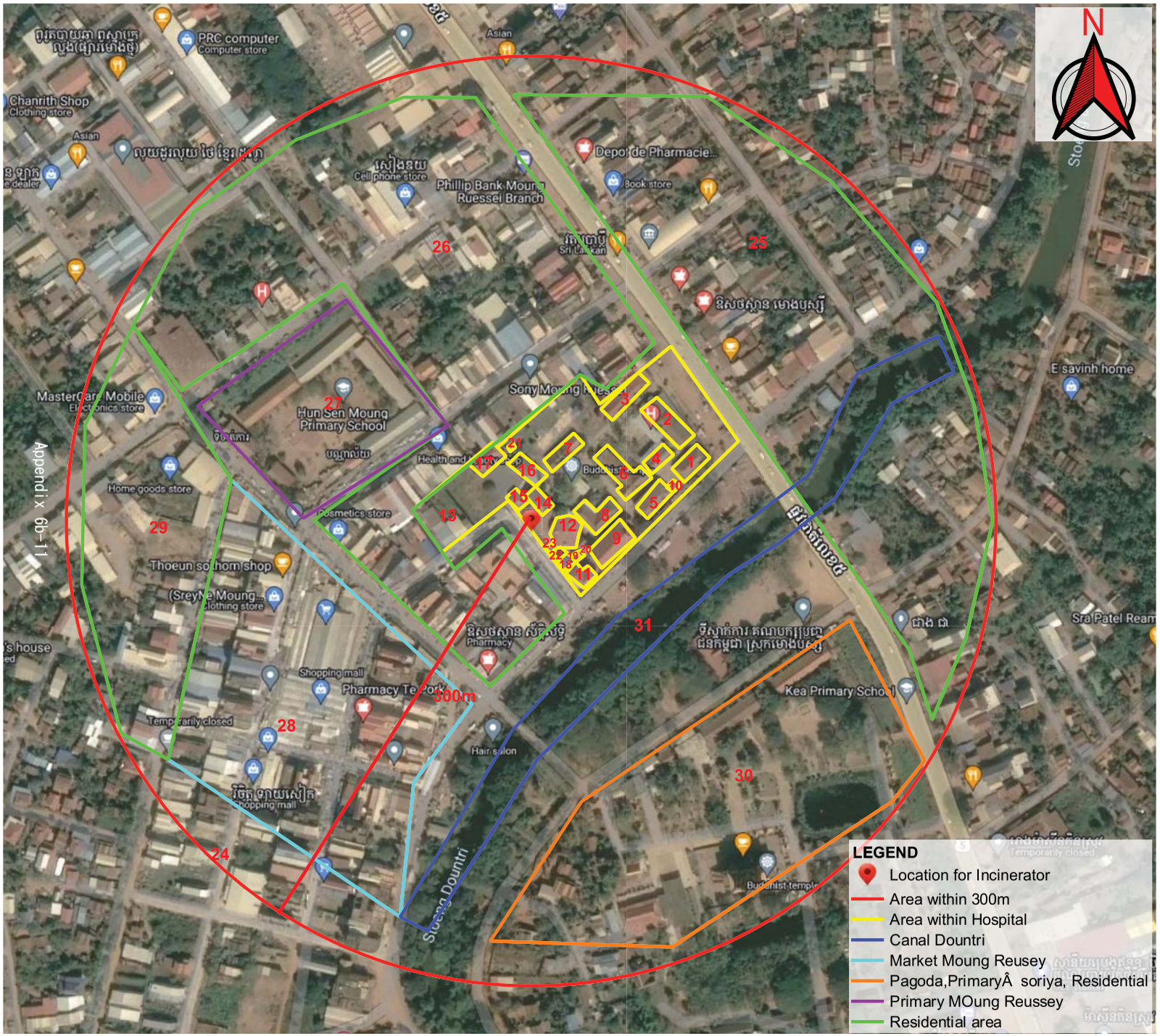
Area within 300m	
ID	name
1	Hospital border
2	ER
3	Maternity
4	Isolation building
5	HC
6	Admin Meeting Room and Labo
7	Car Parking
8	CSSD
9	STD
10	WC
11	Pediatric Ward
12	Medical Ward
13	Cleaning
14	Store
15	General waste storage
16	Old Incinerator
17	Placenta
18	Kitchen
19	Lake
20	Water Tank
21	Garden
22	WC
23	Hand cleaning
24	area within 300m
25	Market
26	Farm
27	Farm
28	Farm
29	Residential area 200 HH
30	Residential area 70 HH
31	Residential area 350HH
32	Residential area 7HH
33	Residential area 5HH
34	Lake

9- Stakeholder Map of Thma Koul RH



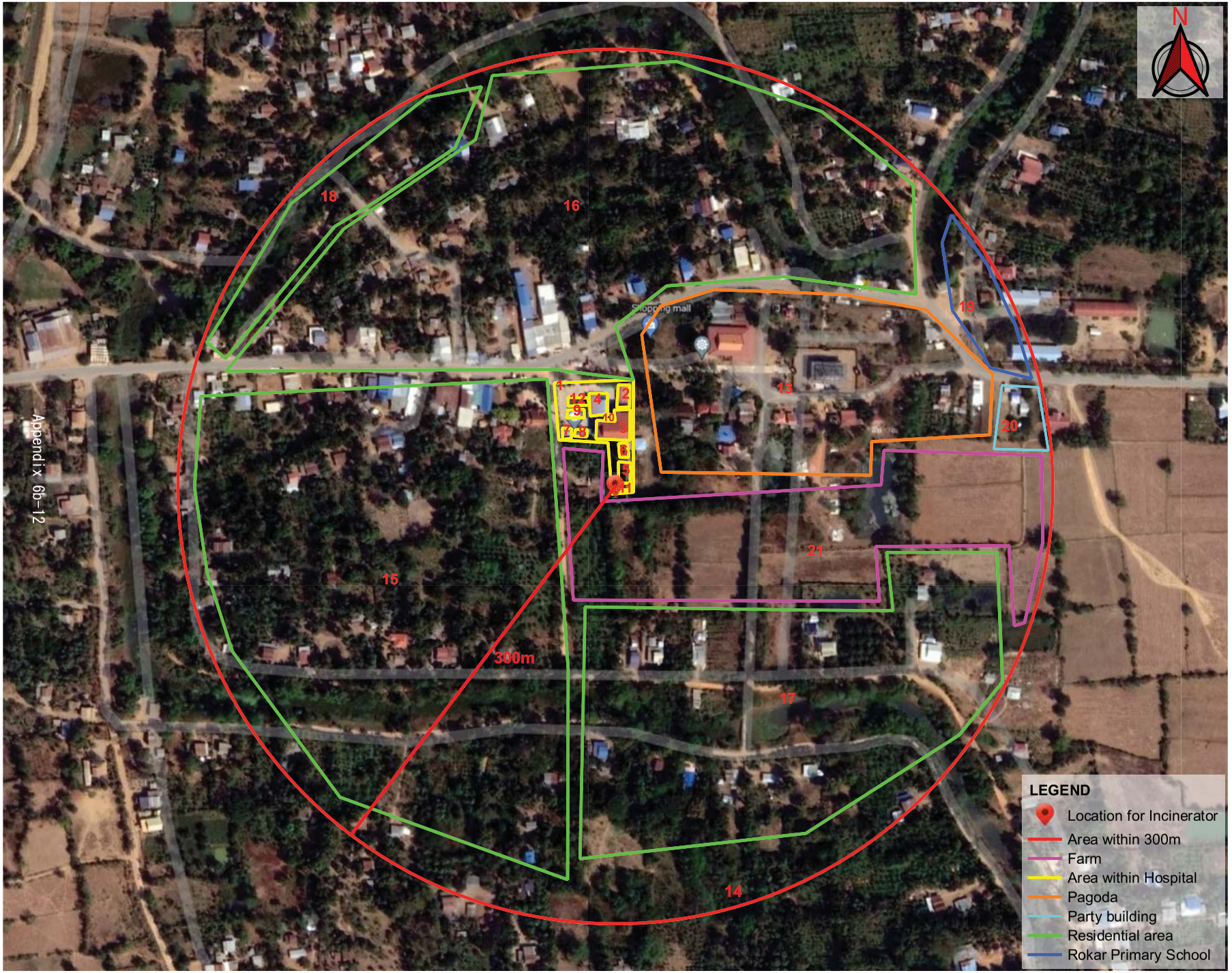
Area within 300m	
ID	**name**
1	Building
2	Hospital Bolder
3	Car parking
4	OD
5	RHAC
6	OD drug store
7	Labo
8	kitchen
9	generator
10	Emergency and Injury
11	New Toilet
12	Pediatric
13	Maternity
14	Motor parking
15	Hospital canteen
16	Triage
17	Meeting OD
18	PRMS
19	Infectious diseases
20	Garden
21	Old lake
22	Water storage
23	Area within 300m
24	Pond
25	Electricity
26	Residential area 25HH
27	Tamoeun Secondary school
28	Residential area 10HH
29	Rice Field
30	Residential area 100HH
31	Rice Field
32	Residential area 15HH
33	Gas station
34	police inspector

10- Stakeholder Map of Mong Russei RH



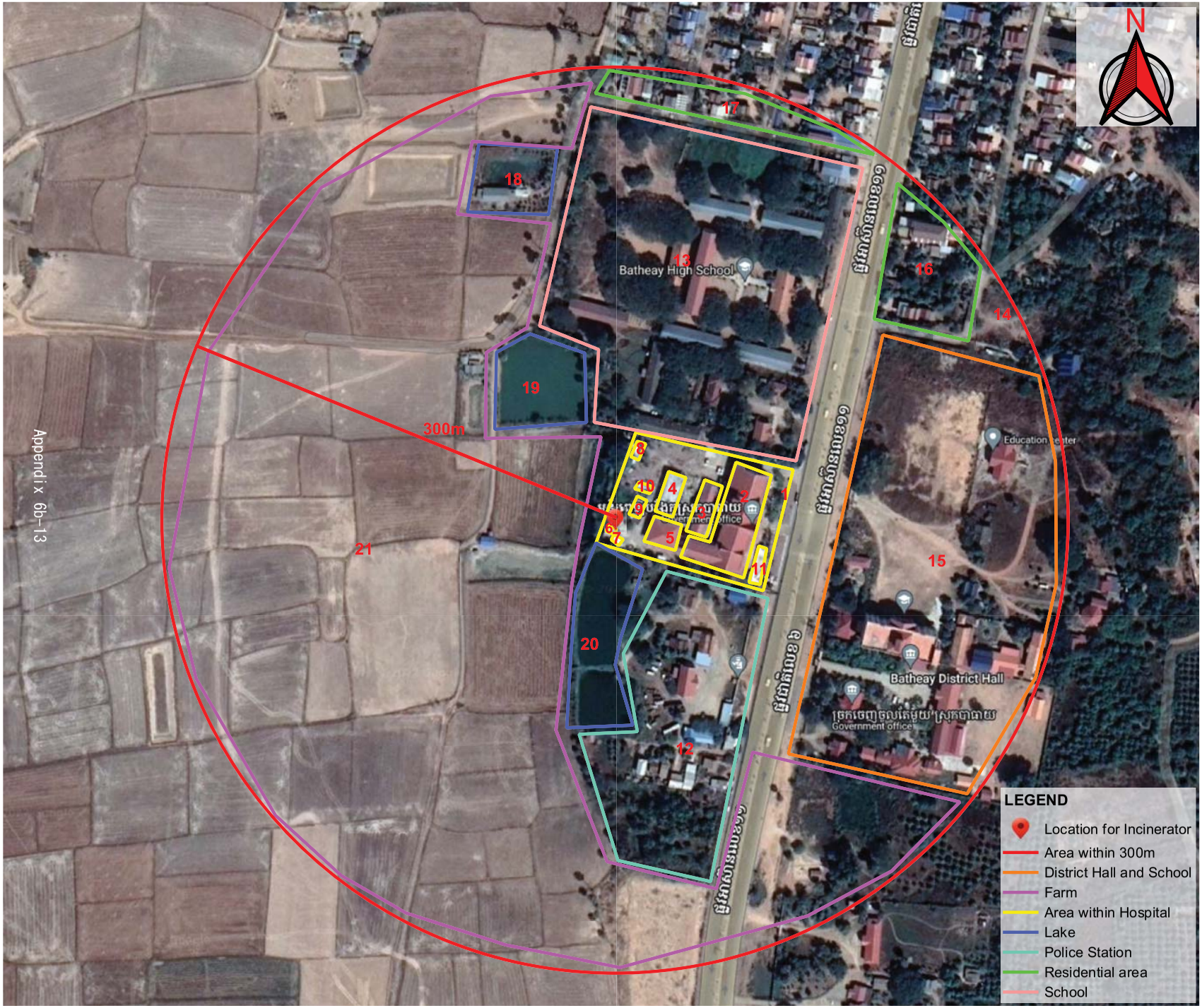
Area within 300m	
ID	**name**
1	Labo
2	OPD,PMRS,OD drug store
3	HIV
4	Health center Moung
5	Pediatric
6	Medicine,Â Emergency for children, the elderly
7	Amin Hospital, X-ray, Drug store
8	Injury and surgery hall
9	Maternity, Gynecology, operation theater
10	kitchen
11	TB
12	Operation Theater
13	Bolder Hos
14	Separate room
15	wc
16	Kitchen, meeting room, OD material storage
17	OD
18	Microwave sterilizer
19	Old Incinerator
20	generator
21	water storage
22	Sterilizer
23	Cleaning
24	Area within 300m
25	Residential area 200HH
26	Residential area 400HH
27	Primary MOung Reussey
28	Market Moung Reusey 250HH
29	Residential area 100HH
30	Pagoda,PrimaryÂ soriya, Residential 10 HH
31	Canal Dountri

11- Stakeholder Map of Rokar RH



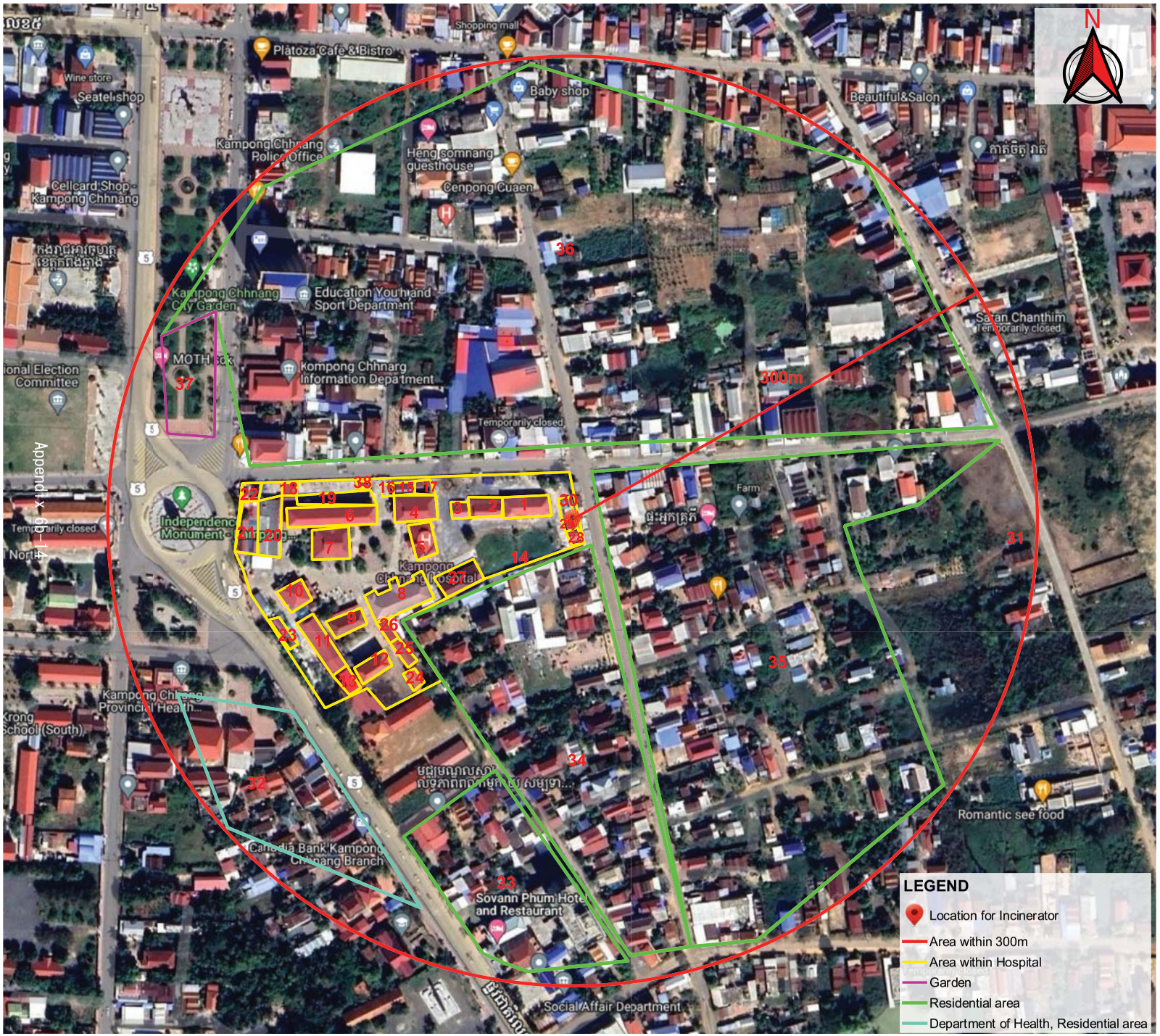
Area within 300m	
ID	name
1	Hospital Border
2	Laboratory
3	Admin
4	MCH Triage
5	Isolation Building
6	WC and Laundry
7	Kitchen
8	Vaccination
9	Vaccination
10	CSSD
11	WC, Waste storage
12	Garden
13	Pagoda
14	Area within 300m
15	Residential area 30HH
16	Residential area 40HH
17	Residential area 10HH
18	Residential area HH 5HH
19	Rokar Primaay School
20	Party building
21	Farm

12- Stakeholder Map of Batheay RH



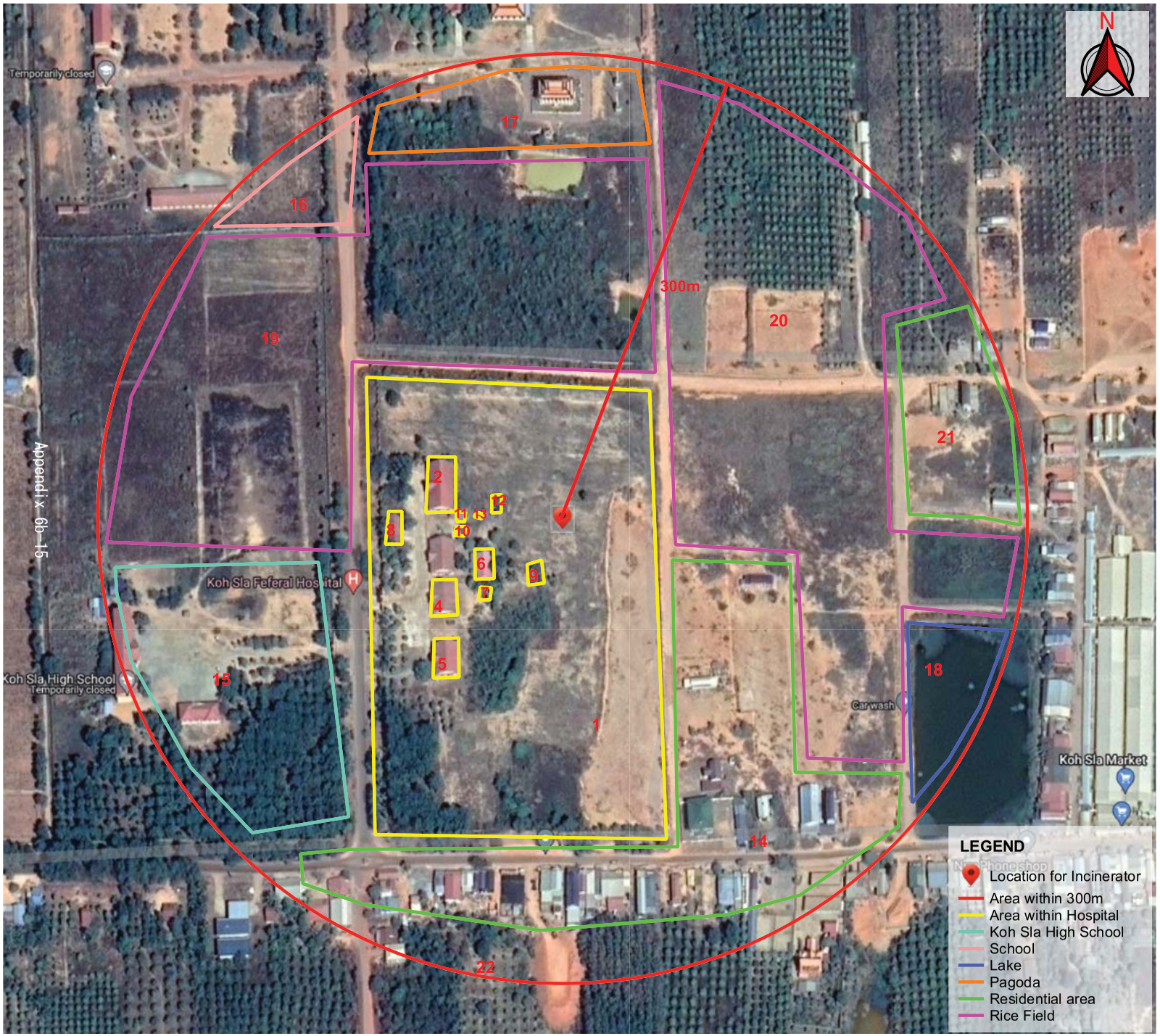
Area within 300m	
ID	**name**
1	Hospital Border
2	Maternity
3	HC HIV Admin and Room Director
4	Drug Store, Medicine & NCD
5	Kitchen
6	Old Incinerator
7	Waste Drying Place
8	Worker's Place
9	Car Parking
10	Placenta Pit
11	Parking
12	Police Station
13	School
14	Area within 300m
15	District Hall and School
16	Residential area 3HH
17	Residential area 40HH
18	Fish Lake
19	Lake
20	Fish Lake
21	Farm

13- Stakeholder Map of Kampong Chhnang RH



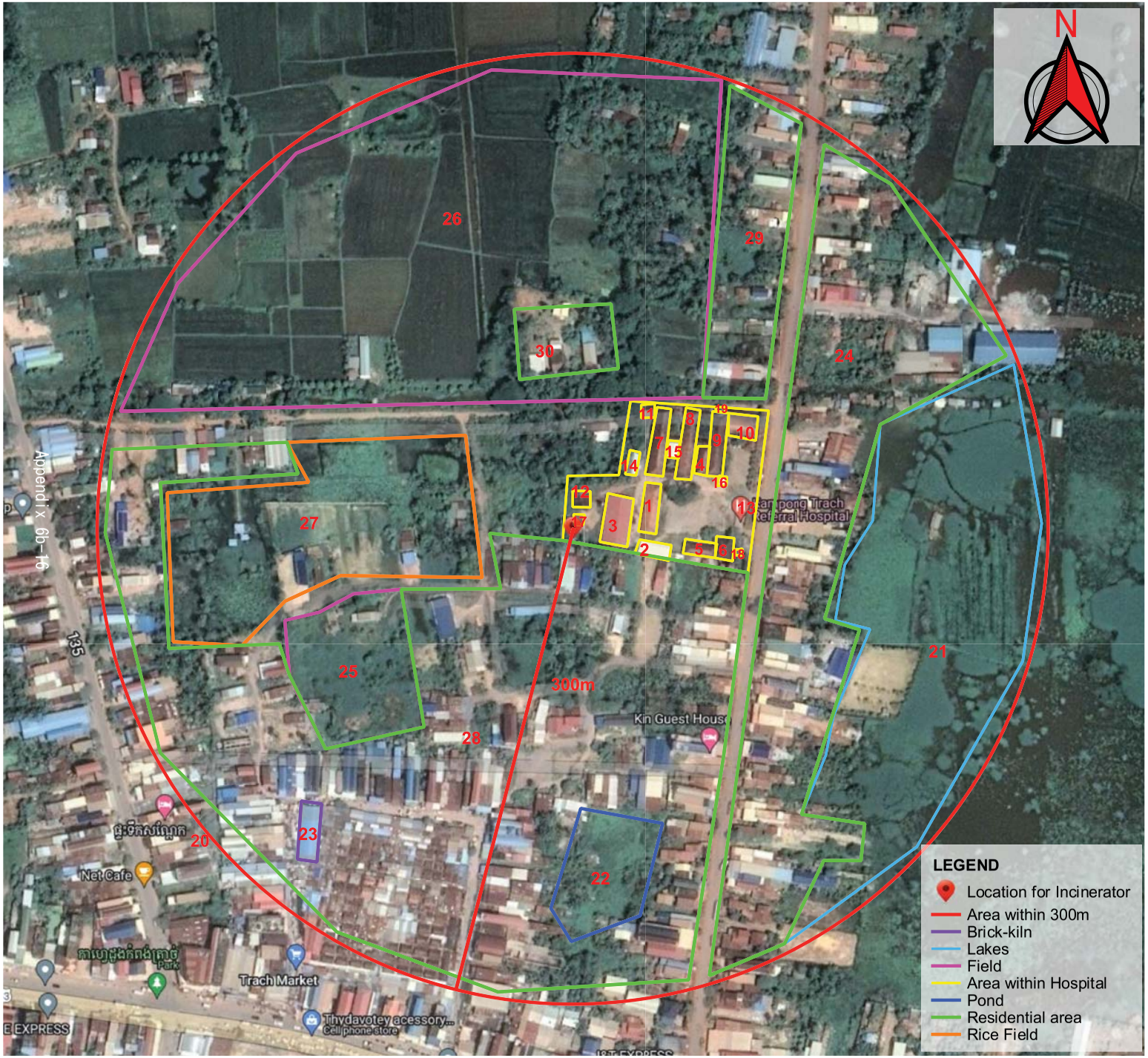
Area within 300m	
ID	name
1	TB
2	Infectious diseases
3	Isolation room
4	Medicine
5	Gynecology ,STIs
6	Operation Theater and drug storage
7	Emergency
8	Maternity
9	Labo
10	Admin
11	Pediatric
12	Ophthalmology
13	Newborn disease
14	Border Hospital
15	sterilizer
16	Water filtration system
17	Toilet and water storage
18	Toilet and cleaning
19	New Bulding(Operation Theater)
20	Outpatient consultation
21	Canteen and Moto parking
22	Public toilet
23	Car Parking
24	Toilet
25	Old material storage
26	Kitchen
27	OI/HIV
28	Mortuary
29	Microwave sterilizer
30	Waste storage
31	Area within 300m
32	Department of Health, Residential area 10HH
33	Residential area 200HH
34	Residential area 300HH
35	Residential area 300HH
36	Residential area 500HH
37	Garden
38	WC

14- Stakeholder Map of Bunrany Hsen Koh Sla RH



Area within 300m	
ID	name
1	Hospital Border
2	Maternity, Echography, OBGY, & Labáž šáž¸
3	General medicine, small surgery, pediatry
4	Triage, OPD, Pharmacy, Admin, and Finance
5	HC
6	Kitchen
7	Meeting Room and Drug Store
8	Car Parking
9	WC
10	WC
11	Cleaning
12	Waste Pit
13	Incinerator
14	Residential area
15	Koh Sla High School
16	School
17	Pagoda
18	Lake
19	Rice Field
20	Rice Field
21	Residential area (10HH)
22	Area within 300m

15- Stakeholder Map of Kampong Trach RH



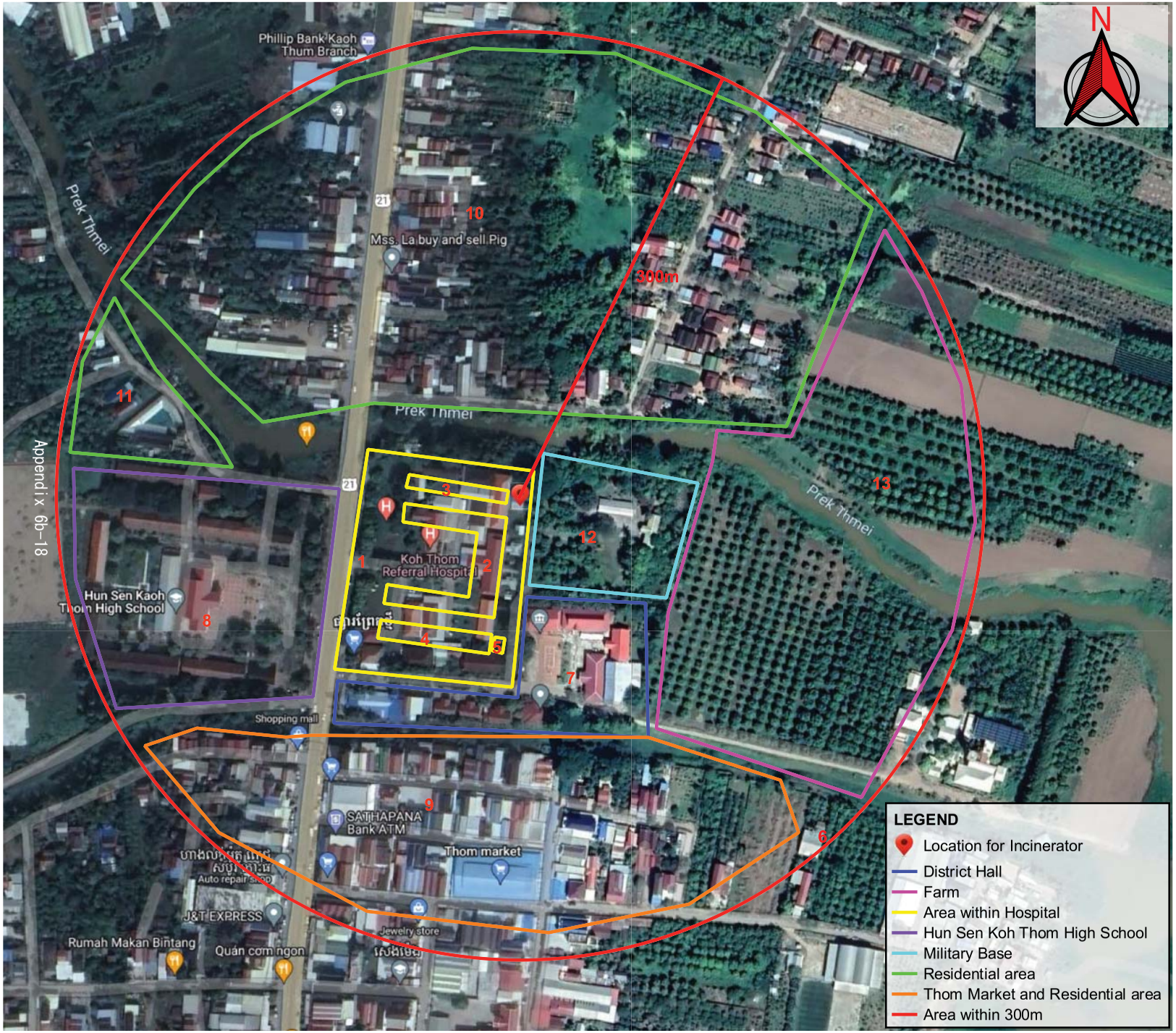
Area within 300m	
ID	**name**
1	OD
2	Car parking
3	Maternity
4	HIV
5	Labo
6	Health Center
7	Medicine, Pediatric, TB, Ophthalmology, Diabetes
8	Emergency,Injury, X-ray,Operation Theater
9	Drug storage OI and medicine,Consultation,admin
10	Meeting room, ART Register, OI, Material storage
11	WC
12	Infectious diseases/Isolation room
13	Hospital bolder
14	Kitchen
15	Staff room
16	Waiting place
17	Microwave sterilizer
18	water system, water storage and well
19	Toilet
20	Area within 300m
21	Lakes
22	Pond
23	Brick-kiln
24	Residential area 60HH
25	Field
26	Field
27	Rice Field
28	Residential area 125 HH
29	Residential area 30HH
30	Residential area 10 HH

16- Stakeholder Map of Takhmau PRH

ID	name
42	Residential area 30HH
43	Area within 300m
44	Kandal Provincial Prison
45	Provincial Police Commissioner
46	Residential area 100HH
47	Residential area 80HH
48	Residential area 500HH
49	Residential area 100HH

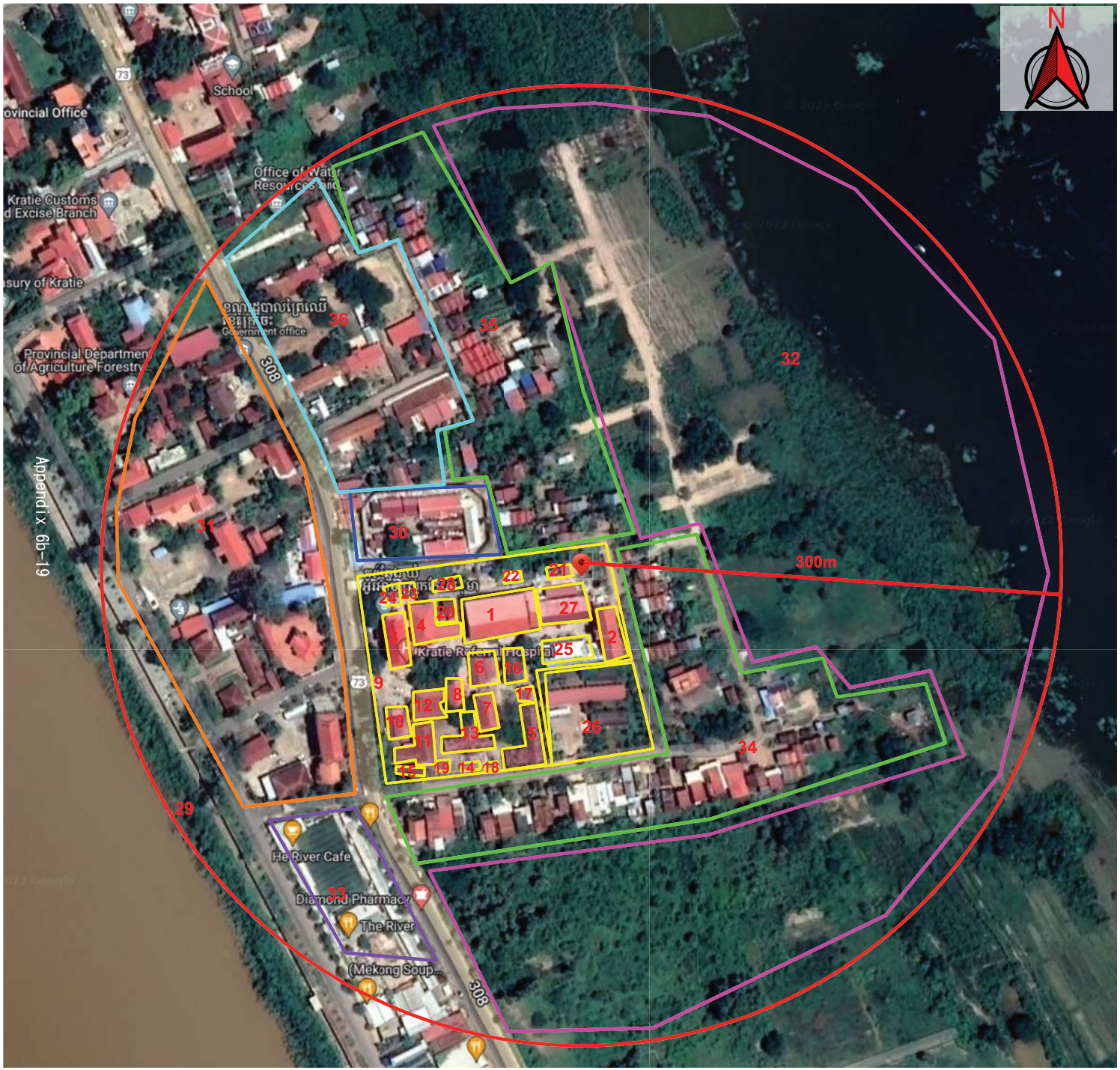
Area within 300m	
ID	name
1	ENT
2	Bloodletting/Haemodialysis
3	Physical therapy
4	Car Parking
5	Accounting, PMRS,Phamacy, Diabetes,
6	Emergency
7	Surgery
8	General Medicine
9	Covid19
10	Covid19
11	Maternity
12	Kitchen
13	Generator
14	NGO(Impact(ENT))
15	Old material storage(Unused)
16	Admin
17	Mental health of children
18	OD
19	Dentist
20	Health Center Takhmao
21	Kitchen
22	Mental health of childrens
23	MDR (វ៉ាយរចោល)
24	Drug storage
25	Bolder Hos
26	old Labo
27	New Labo
28	Lungs
29	Accounting
30	Meeting room
31	Old surgery (not use)
32	Moto Parking
33	Eye
34	NCD clinic, Diabetes
35	OD
36	OI
37	OPD
38	Workers and staff accommodation
39	Mental health
40	Pagoda Krapeu Ha
41	Krapeu Ha Primary school

17- Stakeholder Map of Koh Thom RH



Area within 300m	
ID	**name**
1	Hospital Border
2	ER, OT, OPD , Lab, Medicine, Admin
3	Kitchen wc Restaurant Store Janitor
4	SAMU + Technical work shop
5	Store
6	Area within 300m
7	District Hall
8	Hun Sen Koh Thom High School
9	Thom Market and Residential area 200 HH
10	Residential area 250HH
11	Residential area 35HH
12	Military Base
13	Farm

18- Stakeholder Map of Kratie PRH



Area within 300m	
ID	**name**
1	Maternity and Obstetric
2	ER
3	Pediatric Ward
4	OT
5	Covid
6	Material Storage
7	Labo
8	Admin and Account
9	Hospital Border
10	SCD
11	Building Eye
12	STD
13	Medical Ward
14	Waste Storage
15	Dental
16	Equipment Storage
17	WC
18	WC
19	Kitchen
20	Store
21	Incinerator
22	Generator
23	Workshop
24	Equipment Storage
25	Rehabilitation
26	Military Hospital
27	Maternity and OBGY
28	Kitchen
29	Area within 300m
30	Prison
31	Department of Agriculture Forestry and Fisheries and Commissariat
32	Land (Free)
33	Sport area
34	Residential area 40HH
35	Residential area 25HH
36	Office of Water Resources and Meteorology

LEGEND

- Location for Incinerator
- Area within 300m
- Agriculture Forestry and Fisheries and Commissariat
- Area within Hospital
- Land (Free)
- Office of Water Resources and Meteorology
- Prison
- Residential area
- Sport area

19- Stakeholder Map of Chhlong RH

Area within 300m	
ID	**name**
1	Border hospital
2	Health Center
3	Emergency, Labo Outpatient consultation, Drug storage
4	Water storage
5	Pediatric and Emergency
6	WC
7	old Incinerator
8	Mortuary
9	New Building
10	Isolation building
11	Kitchen
12	Medicine and TB
13	Surgery and Injury
14	WC
15	Surgery and Radiology
16	Maternity and Gynecology
17	Generator and Material storage
18	Store Pharmacy OD
19	WC
20	Placenta pit
21	Admin Meeting room and Standing post
22	Parking
23	Area within 300m
24	Residential area 200HH
25	Residential area 100HH
26	free land
27	River

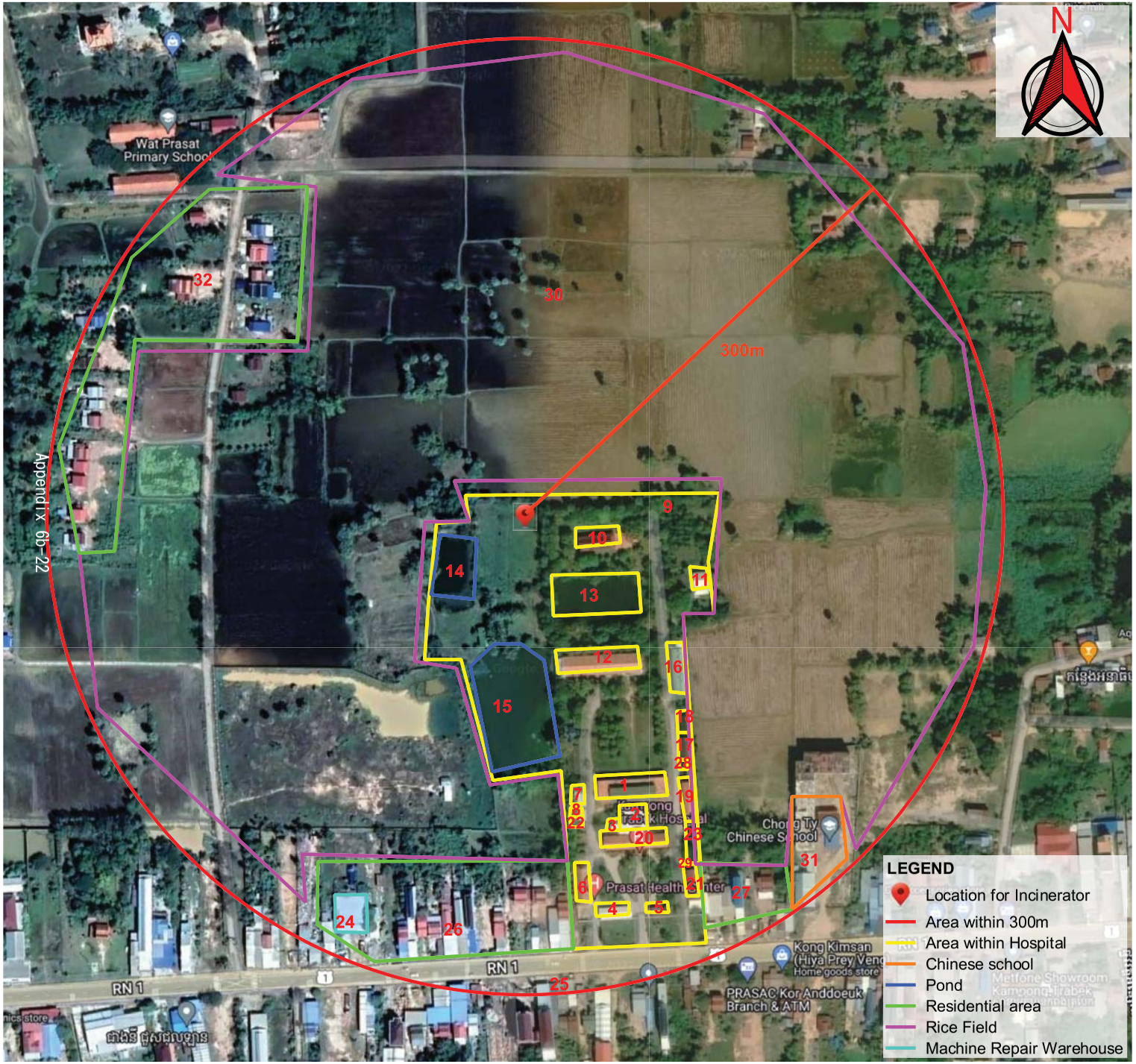
20- Stakeholder Map of Prey Veng PRH

Area within 300m	
ID	name
1	Outpatient consultation, Dentist, Eye, cervical ,Diabetes,
2	Maternity, Gynecology
3	Infectious diseases/ Isolation room
4	Medicine
5	Border Hospital
6	Emergency, Register patient, Payment place
7	CT scan
8	Sterilwave
9	Mortuary
10	Material storage
11	Covid19
12	Operation Theater
13	Postpartum surgery
14	Pediatric
15	Admin
16	Drug storage
17	Canteen
18	Labo
19	Toilet
20	Area within 300m
21	Residential area 20HH
22	Market and Residential 500HH
23	Residential area 100HH
24	Prey veng market
25	Sung Samy Pagoda
26	Prey Veng City Primary school
27	Prey veng Tax Branch
28	National bank of prey Veng
29	Prey Veng province hall
30	Department of Education Youth and Sport
31	Coffee place
32	Department of Culture and the Arts of Prey Veng
33	Department of Agriculture
34	Kitchen

LEGEND

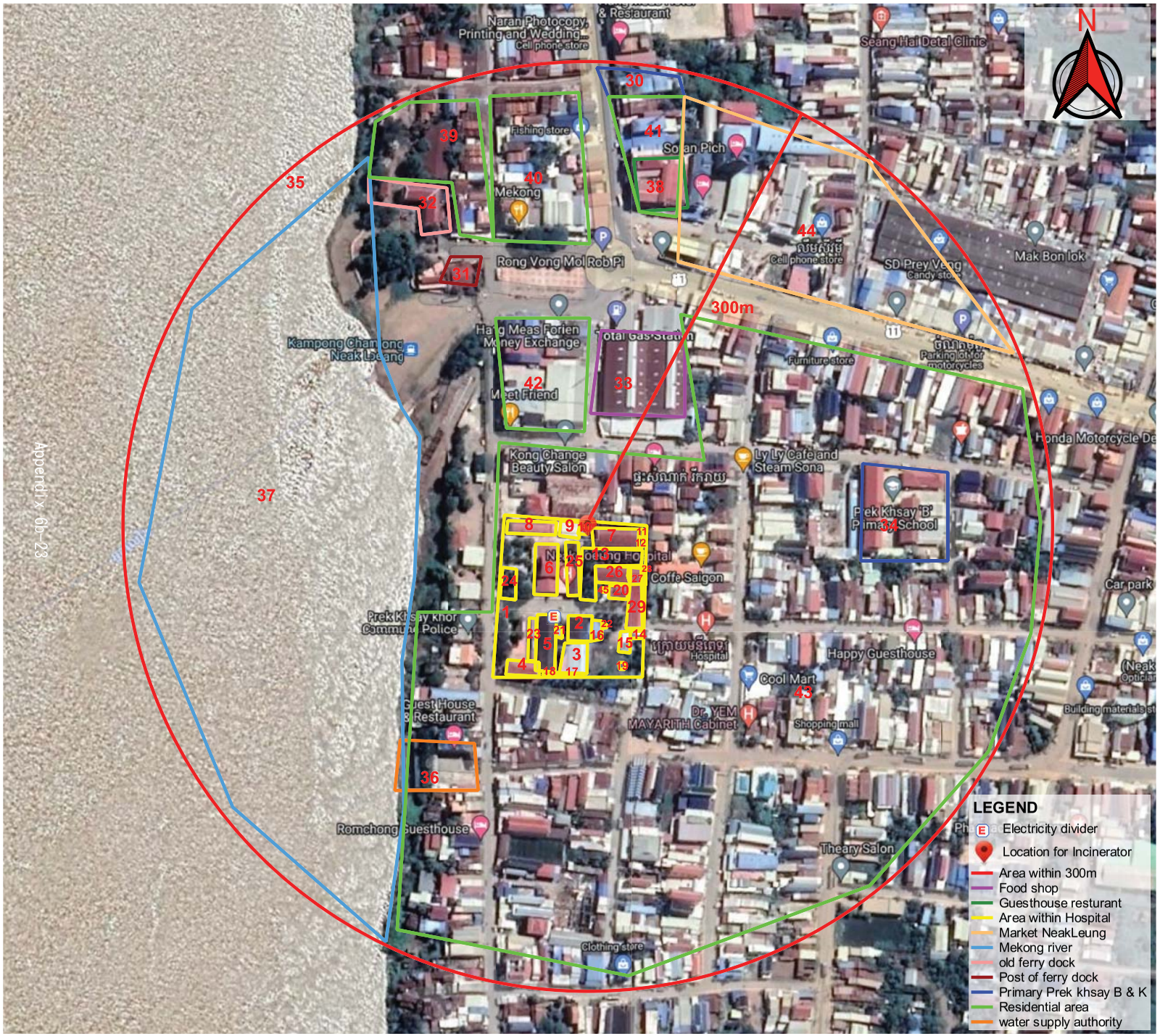
- Location for Incinerator
- Area within 300m
- Culture and the Arts
- Area within Hospital
- Coffee place
- Sung Samy Pagoda
- National bank
- Prey veng Tax Branch
- Department of Agriculture
- Education Youth and Sport
- Prey Veng City Primary school
- Prey Veng province hall
- Residential area
- Market and Residential
- Prey veng market

21- Stakeholder Map of Kampong Trabek RH



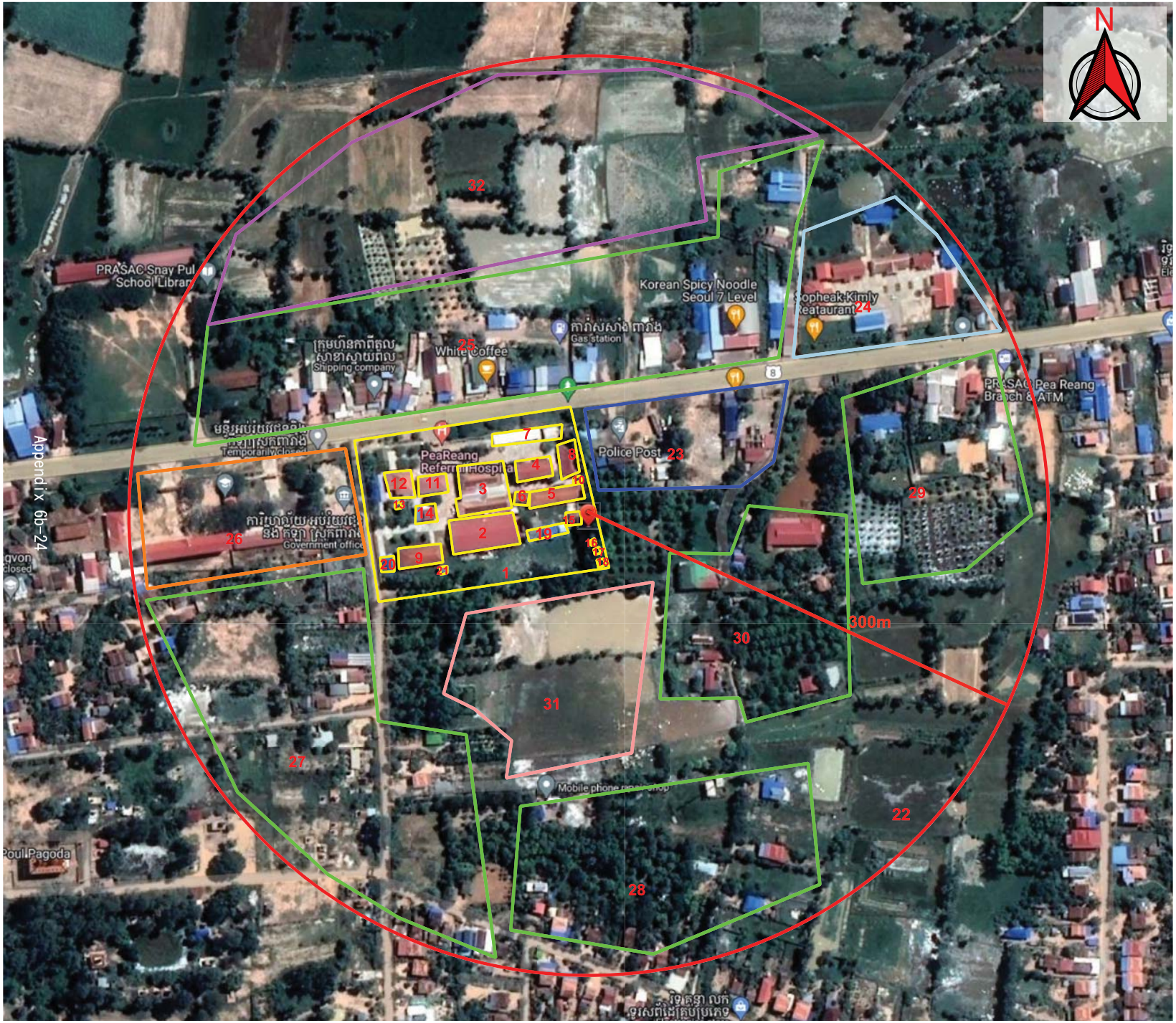
Area within 300m	
ID	name
1	Drug ediction treatment,Operation Theater, Isolation room, X-ray
2	Triage, PMRS,Equity Fund,OPD, Echo, Cervical cancer
3	Staff room and Cervical room
4	Moto parking
5	Security
6	Health center Prasat
7	Worker room
8	CHC NGO,Expert
9	Borlder Hospital
10	Monk's Meditation Place
11	Microwave sterilizer
12	Maternity, Gynecology, cleaning, sterilizer
13	Sewage pond
14	Pond
15	Pond
16	OD Drug store
17	Car parking
18	workshop(រោងជាង)
19	Meeting room and kitchen
20	Labo, Drug storage Hospital,Admin, Hospital Chief's Room
21	Electricity Association (Rent)
22	Car parking
23	Car parking
24	Machine Repair Warehouse
25	Area within 300m
26	Residential area 22HH
27	Residential area 10HH
28	Water storage
29	Electricity
30	Rice Field
31	Chinese school
32	Residential area 33HH

22-Stakeholder Map of Neak Loeung RH



Area within 300m	
ID	name
1	Hospital Border
2	Hospital chef´s room, Material storage, Admin,X-ray
3	Operation Theater
4	Ophthalmology
5	Labo,TB,NGO Partner),Admin,Drug storage, Medicine
6	OD, Meeting OD, OD drug storage,PMRS
7	HIV/OI
8	Health Center Prek Khsay B
9	Car parking
10	Incinerator
11	water storage
12	waste storage
13	Garden
14	Material OD storage
15	Kitchen
16	Meeting room
17	cleaning
18	WC
19	mortuary
20	OD storage and Hospital
21	Oxygen, chair or Material storage
22	Generator
23	Car parking
24	Motor parking
25	Echo, Dentist, ER
26	Podiatry, children' AIDs
27	Covid-19 treatment room
28	WC, Placenta pit
29	Maternity, Gynecology
30	Primary Prek khsay k
31	Post of ferry dock
32	old ferry dock
33	Food shop
34	Primary Prek khsay B
35	Area within 300m
36	water supply authority
37	Mekong river
38	Guesthouse resturant
39	Residential area 25HH
40	Residential area 30HH
41	Residential area 10HH
42	Restaurant and residential area 5HH
43	Residential area 270HH
44	Market NeakLeung
45	Unused water storage

23- Stakeholder Map of Peareang RH

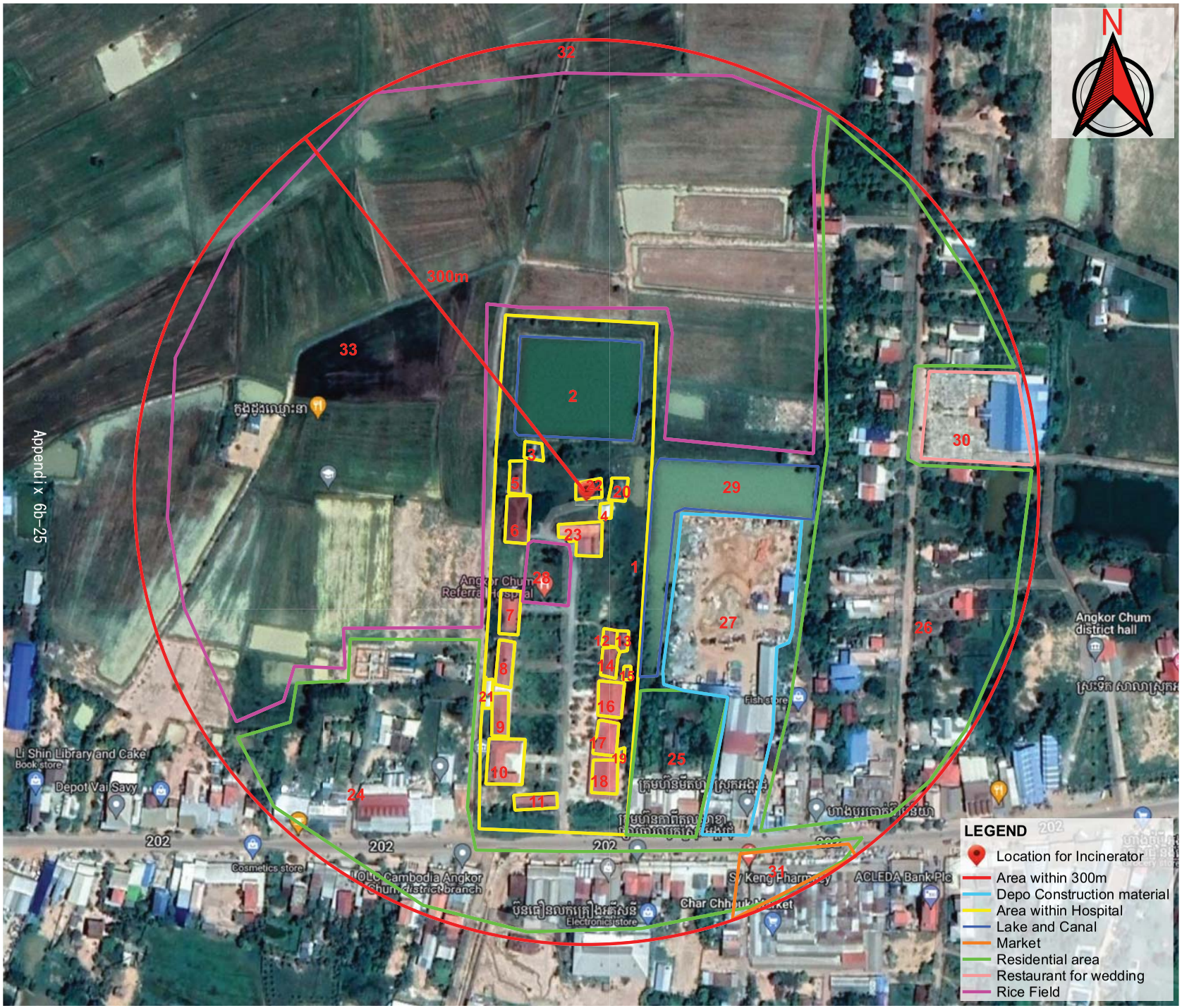


Area within 300m	
ID	**name**
1	Hospital Border
2	Maternity
3	labo, pharmacy, OPD, meeting room, drug store
4	Emergency, Medicine
5	Surgery and Radiology
6	Director Room
7	Car Parking
8	Operation Theater
9	Infectious diseases/Isolation
10	WC
11	Admin OD
12	Health Center
13	Water storage
14	Material storage
15	Microwave sterilizer
16	Incinerator
17	Incinerator
18	Generator
19	Canteen, Kitchen, Cleaning
20	Generator
21	WC
22	area within 300m
23	Police
24	District Hall
25	Residential area 25 HH
26	Samdach Techo HunSen Snay Pol primary school
27	Residential area 50HH
28	Residential areaN15HH
29	Residential area 30HH
30	Residential area 7HH
31	Free land
32	Farm

LEGEND

- Location for Incinerator
- Area within 300m
- District Hall
- Farm
- Free land
- Area within Hospital
- Police
- Residential area
- Samdach Techo HunSen Snay Pol primary school

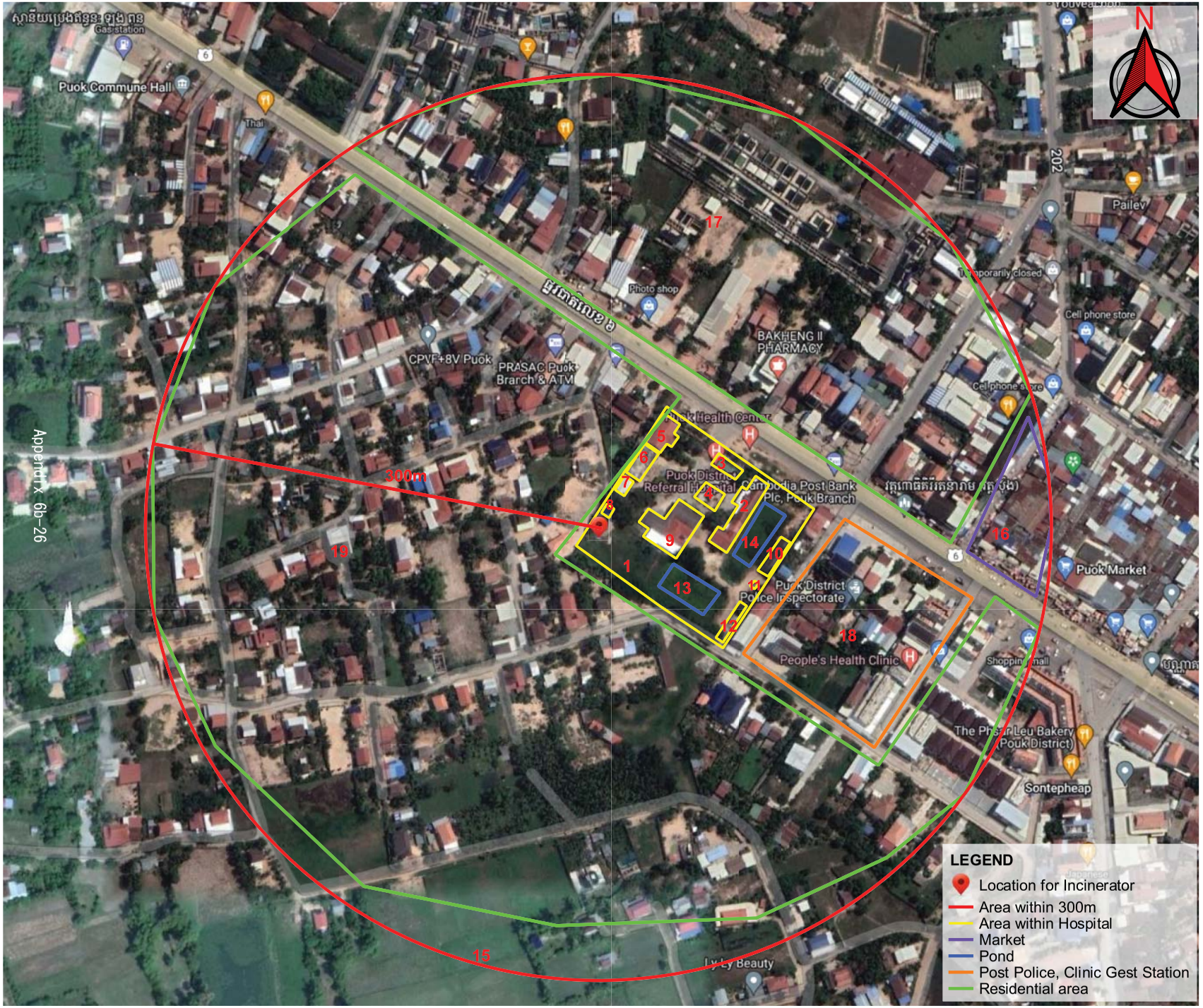
24- Stakeholder Map of Angkor Chum RH



Appendix 6b-25

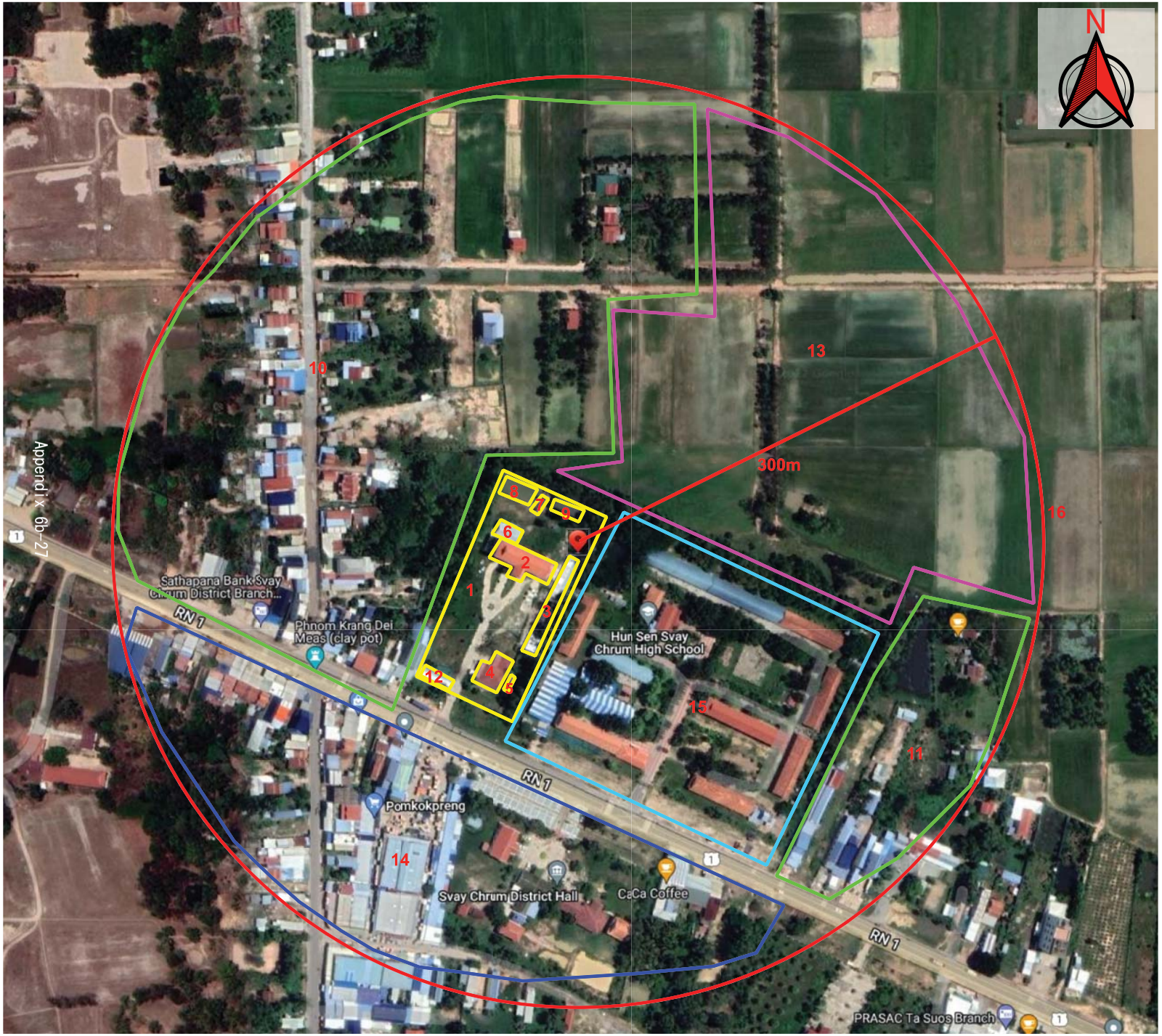
Area within 300m	
ID	name
1	Hospital Border
2	Lake
3	Water storage
4	Waste Storage
5	Toilet and Kitchen
6	Medicine
7	OD drug store
8	Maternity & OBGY
9	Pediatry & Vaccination
10	OD Building
11	Motor bike parking
12	Kitchen
13	WC
14	Admin
15	Cleaning
16	Operation Theater
17	Labo, Pharmacy, Dentist, X-ray
18	Triage & ER
19	WC
20	Incinerator, Placenta pit, Bottle Storage
21	WC and Water Purifier
22	New incinerator
23	NCD clinic, mental health, Ophthalmology
24	Residential area 25HH
25	Residential area 5HH
26	Residential area 30HH
27	Depo Construction material
28	Rice Field
29	Lake and canal
30	Restaurant for wedding
31	Market
32	Area within 300 m
33	Rice Field

25- Stakeholder Map of Puok RH



Area within 300m	
ID	**name**
1	Hospital Border
2	Dentist X-ray, Echo, labo, Pharmacy
3	Moto Parking
4	Garden
5	Maternity and Gynecology
6	Pediatric, Admin, Meeting Room
7	Kitchen
8	Incinerator
9	Emergency, Surgery
10	Infectious diseases/ Isolation
11	WC
12	Meeting room
13	Pond
14	Pond
15	Area within 300m
16	Market
17	Residential area (300HH)
18	Post Police, Clinic Gest Station
19	Residential area (280HH)

26- Stakeholder Map of Svay Chrum RH



Area within 300m	
ID	name
1	Hospital Border
2	Outpatients, labo, X-Ray, Emergency, Store Pharmacy
3	Car parking, Cleaning
4	Health Center
5	WC
6	Isolation bulding (Covid19)
7	Waste storage, Waste Incinerator, Placenta pit,
8	Pond
9	Pond
10	Residential area 125HH
11	Residential area 30 HH
12	Car Parking
13	Farm
14	Residential area 200HH, District Hall, Market
15	Hun Sen Svay Chrum high School
16	Area within 300m

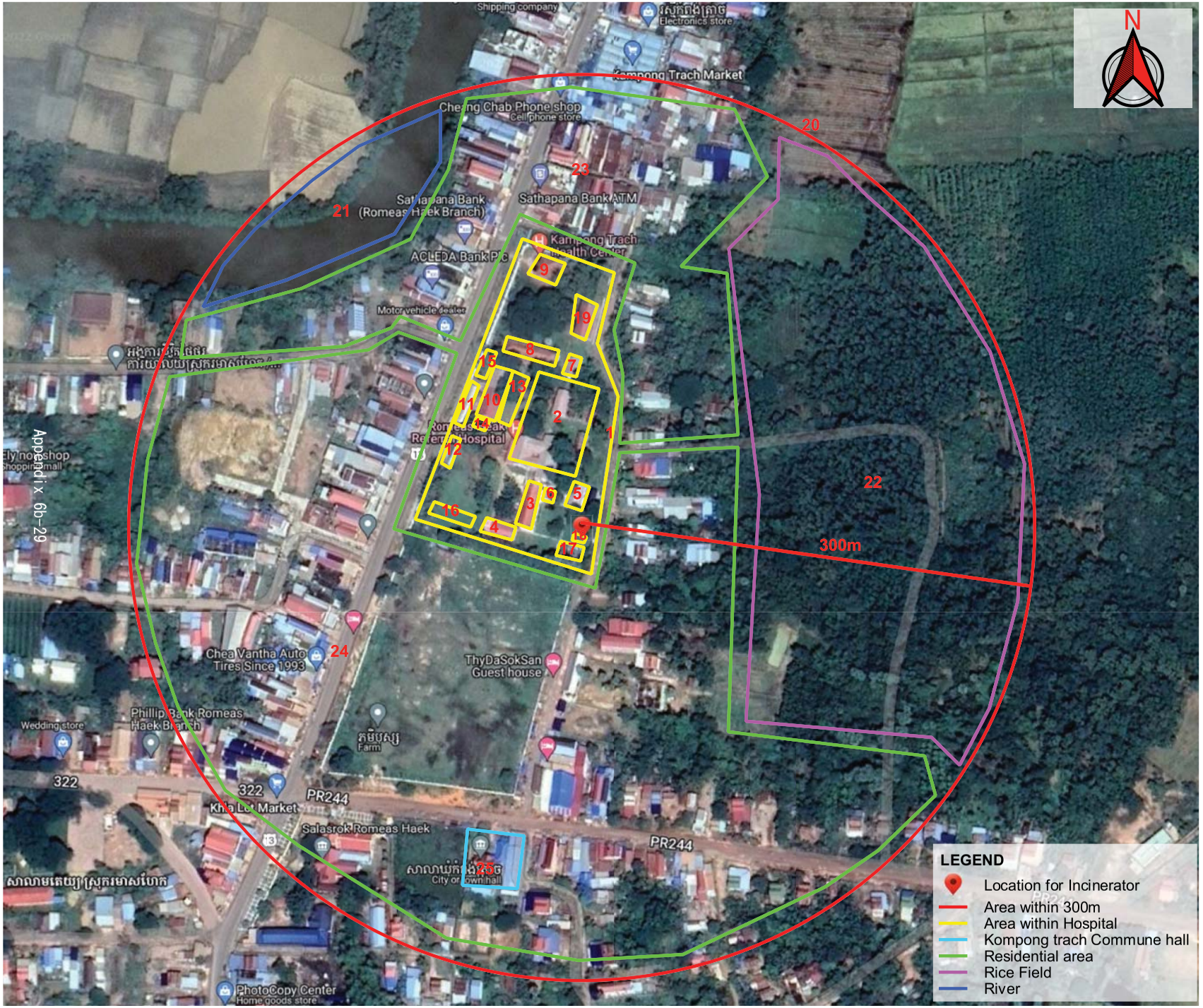
LEGEND

- Location for Incinerator
- Area within 300m
- Farm
- Area within Hospital
- District Hall, Market, Residential area
- Hun Sen Svay Chrum high School
- Residential area

27- Stakeholder Map of Chi Phu RH

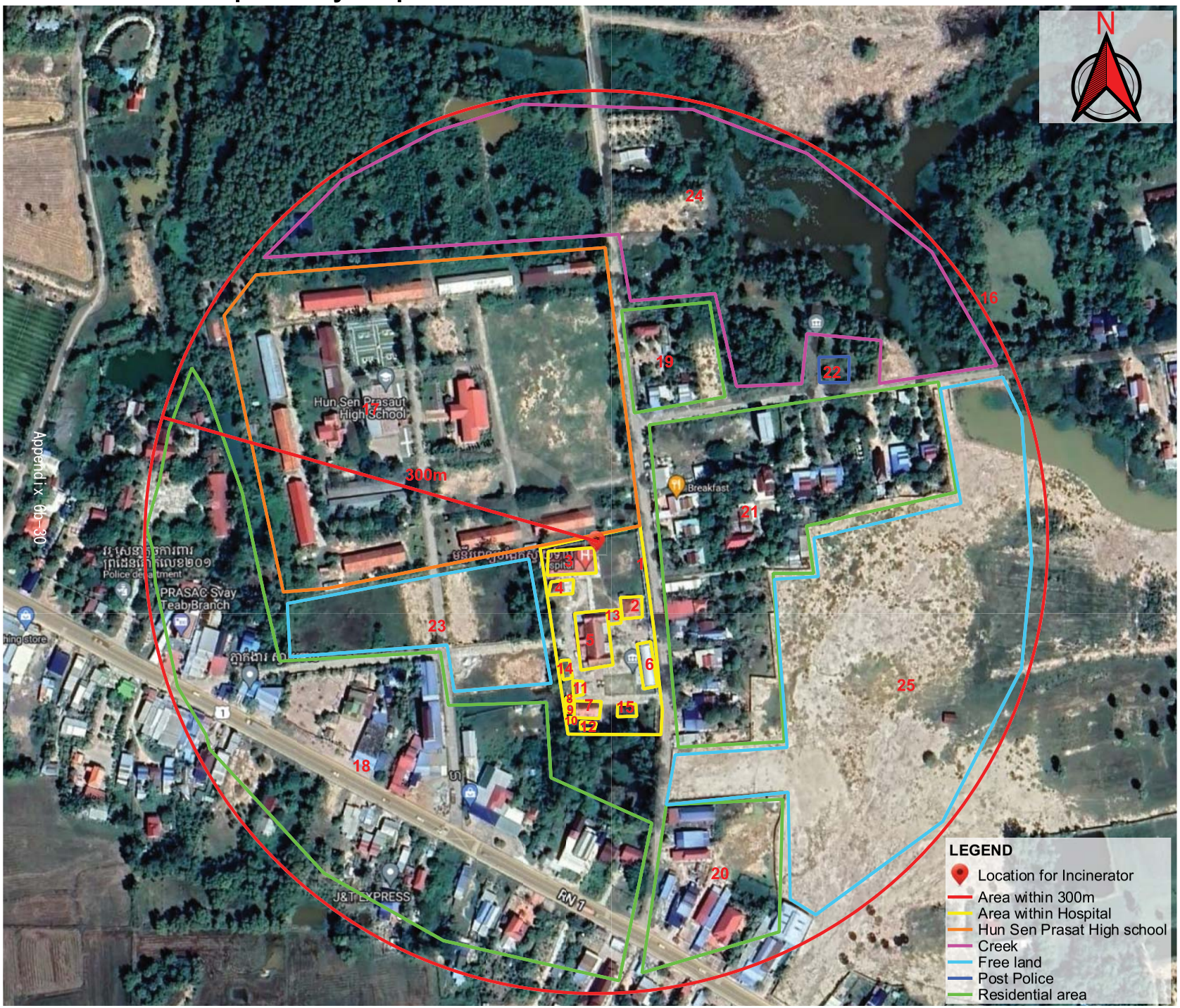
Area within 300m	
ID	**name**
1	Hospital Border
2	Parking
3	HC
4	Surgery, OPD, Triage and NSSF
5	OD
6	Maternity & Pharmacy
7	Stand by room
8	Drug store of OD
9	Isolate Room
10	X-Ray, Labo, Stand by room of Doctor
11	WC
12	Kitchen
13	Admin, meeting room, pediatry
14	Water Tank
15	Laundry
16	Garden
17	Old Incinerator
18	Chi Phu Primary School
19	Residential area 60HH
20	Residential area 80HH
21	Farm
22	Lake
23	Residential area 40HH
24	Area within 300m

28- Stakeholder Map of Romeas Hek RH



Area within 300m	
ID	**name**
1	Hospital Border
2	New Bulling
3	Maternity, Gynecology, Pediatric
4	OD Drug store
5	Separate room/Isolation
6	Water store and WC
7	Labo
8	Surgery
9	Health Center
10	Injury section, Meeting room
11	Motor bike parking
12	Car parking
13	Medicine, Rea
14	OPD
15	Toilet and Kitchen
16	OD
17	Waste Store, Incinerator, Placenta pit
18	MP100, waste store
19	CNPUD
20	Area within 300m
21	River
22	Rice Field
23	Residential area 120 HH
24	Residential area 150HH
25	Kompong trach Commune hall

29- Stakeholder Map of Svay Teap RH



Area within 300m	
ID	name
1	Hospital Border
2	Health Center
3	Maternity, Gynecology,Pediatric,
4	X-Ray ,sterilize
5	ER, Minor surger, Vaccination Covid19 room
6	Moto Parking
7	OD Svay Teap
8	Document room
9	IncineratorÂ and Placenta pit
10	Incinerator
11	Isolation room
12	kitchen
13	Car Parking
14	Sample take and Car Parking
15	Old Building
16	Area within 300m
17	Hun Sen Prasat High school
18	Residential area 25HH
19	Residential area 5HH
20	Residential area 5HH
21	Residential area 15HH
22	Post Police
23	Free land
24	Creek
25	Free land

6 Other Relevant Data

6a Stake Holder Meetings

6b Map around the Hospital Facility (300m radius)

6c Result of Noise Baseline Survey

Appendix-6c Result of Noise Baseline Survey

Using a smart phone application, the Noise Baseline Survey was done at target hospitals. The result is shown in the table below, and the instruction sheet for target hospitals is attached from following pages.

Sub-Decree No. 42 on the air pollution control and noise disturbance says the maximum permitted noise level in the Quiet areas, where hospitals belong, is 45 dB(A) during day time. Comparing the result with the maximum permitted noise level, 3 hospitals are under the level at point 1[*1], No hospital is under the level at point2[*2]. It is possible that the reason why the noise in Pouk hospital was so high is due to 1) this hospital is on the national road and close to crowded area and 2) one build is under construction.

Table Result of Noise Baseline Survey

Hospital	Date	Time	Result (dB)[*3]	
			Point 1[*1]	Point 2[*2]
1. Mongkol Borei	2022/11/16	15:36	54	57
2. Serei Sorphorn	2022/11/15	14:53	58	70
3. Poy Pet	2022/11/22	16:00	68	71
4. Or Chrouv	2022/11/22	14:20	57	62
5. Malai Santepheap	2022/11/15	14:15	40	48
6. Phnom Srock	2022/11/23	11:22	59	69
7. Thma Puok	2022/11/25	14:45	40	54
8. Svay Chek	2022/11/25	13:31	73	60
9. Thma Koul	2022/11/24	14:30	71	67
10. Mong Russei	2022/11/24	13:25	61	74
11. Rokar	2022/11/24	14:29	56	56
12. Batheay	2022/11/25	12:40	62	65
13. Kampong Chhnang	2022/11/15	15:00	51	69
14. Bunrany Hsen Koh Sla	2022/11/22	14:30	46	54
15. Kampong Trach	2022/11/24	15:12	51	64
16. Takhmau PRH	2022/11/17	11:21	58	77
17. Koh Thom	2022/11/17	13:28	50	59
18. Kratie PRH	2022/11/24	15:36	64	69
19. Chhlong	2022/11/16	11:40	55	53
20. Prey Veng PRH	2022/11/17	11:47	60	67
21. Kampong Trabek	2022/11/25	16:11	58	66
22. Neak Loeung	2022/11/25	16:58	70	72
23. Peareang	2022/11/16	13:40	53	67
24. Ankor Chhum	2022/11/22	11:13	52	46
25. Pouk	2022/11/29	15:14	117	121
26. Svay Chrum	2022/11/24	17:34	56	64
27. Chi Phu	2022/11/24	12:10	57	69
28. Romeas Hek	2022/11/16	16:54	59	65
29. Svay Teap	2022/11/21	14:25	39	70

*1: The nearest building in the hospital from the proposed site for the incinerator
*2: The entrance gate of the hospital
*3: Average for five minutes

Baseline survey on Noise

1. Purpose of this survey

In order to monitor the environmental impact of the incinerator to be installed, we are requesting you to conduct a baseline survey on noise.

We really appreciate your corporation.

2. Outline of the survey

(1) Date: one day in week day, Monday to Friday

(2) Time: during 11am to 12am

(3) Measuring Method: Decibel Meter - Sound Meter, App for mobile phone

Decibel Meter-Sound Meter

(4) Places to be measured: 2 points, the nearest building in the hospital and the entrance gate of the hospital

(5) Measurement Time: 5 minutes

(6) Data submission: Google form by November 18th

3. How to measure

(1) Download the App for free

Decibel Meter - Sound Meter

for iPhone:

https://apps.apple.com/jp/app/id1373636871

for Android:

https://play.google.com/store/apps/details?id=com.freemium.android.apps.soundmeter&hl=en_US&gl=US

Decibel Meter - Sound Meter

(2) Select 2 points for measuring

1) The nearest building in the hospital from the candidate place for the incinerator

2) The entrance gate of the hospital

(3) Measure the Noise

Measure the noise using the app for 5 minutes during 11am to 12am.

*Please measure in a hospital working day and time so that all significant variations of noise emission are covered.

(4) Input the data to the Google form

Please input the basic information of the hospital, data from app (min, average, max) and upload photo of 2 point and screenshot of result of measurement.

( )

Google form:

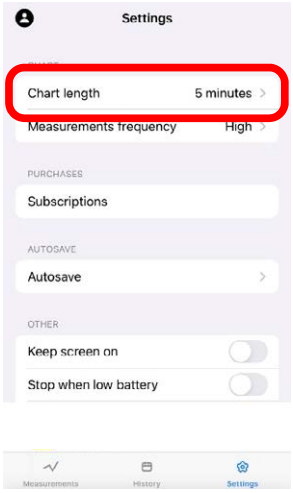
[redacted]

If there are any difficulties to submit via Google form, please email the result to our engineer.

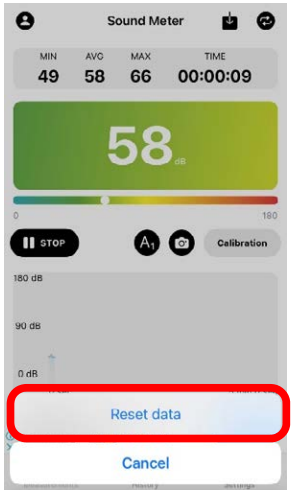
[redacted]

4. How to use the app

(1) Change the chart length to 5 minutes



(2) Reset the data just before starting the measurement at the measuring point and measure for 5 minutes



(3) Keep the record of Min, Avg and Max, if possible capture a screenshot

(4) Submit the data via Google form

5. Google form

Please access to the link below;

[redacted]

Following questions are listed in the Google form, please input the data.

Name of hospital
Name of focal person
Email address or phone number with Telegram
Date of measurement
Time of measurement
Remarks
Result of Point 1 (the nearest building in the hospital from the candidate place for the incinerator) ( )
Min.
Avg.
Max.
Result of Point 2 (the entrance gate of the hospital) ( )
Min.
Avg.
Max.

Photos (If you have a google account you can upload a photo here. If not, please send my Telegram)

(

)

Photo (Point 1) ( )

Photo (Point 2) ( )

Photo (Result of measurement in Point 1) ( )

Photo (Result of measurement in Point 2) ( )

Photo (Others) ( )