Report on Identification and Geographical Information System (GIS) Mapping of Open Spaces for Humanitarian Purposes in Gorkha Municipality

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FOREWORD

I am pleased to present the publication, "*Report on Identification and Geographical Information System (GIS) Mapping of Open Spaces for Humanitarian Purposes in Gorkha Municipality*," funded by the people of Thailand through the Government of Thailand.

IOM – the United Nations Migration Agency – has been supporting the Government of Nepal with the identification, mapping and protection of open spaces to be used for humanitarian purposes since 2013. Floods, earthquakes and landslides are some of the natural hazards that have resulted in the loss of lives, and damage to properties in the Municipality. Open spaces are identified and mapped with the aim to strengthen emergency preparedness and provide the initial response planning framework for local governments and partner agencies. This gives a starting point from which to provide life-saving assistance to those in immediate need of support, including displaced populations.

IOM is also supporting in creating a module on open spaces into the Building Information Platform Against Disaster (BIPAD), owned by the Government of Nepal. BIPAD will display information on all open spaces, including the spaces of Gorkha Municipality, identified and verified by IOM in coordination with local levels and the federal government. I am also glad to announce the launch of Open Space Nepal, which is available in Google Play Store for Android phones and AppStore for the iOS version, developed with the purpose of providing guidance for the public in the event of a disaster.

I express sincere gratitude to the Gorkha Municipality for providing strong leadership that supported in achieving the objectives of the project. Lastly, IOM stands ready to support all three tiers of government to reduce disaster risks and assist vulnerable communities and migrants in building a disaster-resilient society.

Chief of Mission of Nepal
International Organization for Migration (IOM)

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Date: 3rd Nov, 2020

FOREWORD

This report aims to strengthen the disaster preparedness efforts of Gorkha Municipality before, during and after disaster strikes. Following the assessment of 59 suggested open spaces in Gorkha Municipality, 11 open spaces were finalized as suitable to be used in the event of a disaster. Identifying and protecting open spaces serves to capacitate disaster preparedness at a local level.

Gorkha was the first epicenter of 2015 earthquakes and was also among the most hard-hit districts by the 2015 earthquakes. Following the widespread destruction across the district, both governmental and public attention was brought to the role of open spaces in the event of a disaster.

This report was prepared by IOM and Naxa in close coordination with Gorkha Municipality. The report presents detailed information of all identified open spaces of the Municipality including topography, attribute information, environmental checklist and critical infrastructure.

In terms of vulnerability to disaster, some groups and populations such as women, children, elderly and persons with disabilities are likely to be more affected than others due to social, economic and physical factors among others. It is my sincere hope that through the information compiled and presented in this report, the open spaces can immediately be utilized for humanitarian assistance during a disaster to provide the safe temporary shelter and protection for displaced persons and households.

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The "Identification and Geographical Information System (GIS) Mapping of Open Spaces for Humanitarian Purposes in Gorkha Municipality of Gorkha District, Nepal" report is produced as a part of the "People to People Support for Building Community Resilience though Recovery and Reconstruction" project, and made possible through the funding by the people of Thailand through the Government of Thailand

First and foremost, we would like to extend our gratitude to the elected representatives and municipal officials of Gorkha Municipality, Gorkha who actively participated and supported the team in the preparation and validation of this report. Special thanks goes to Rajan Raj Pant, Mayor, and Dhurba Prasad Ghimire, DRR focal person for their support and guidance throughout the study period. Similarly, we would like to thank the Project Steering Committee (PSC) members at the federal level represented by the high levels officials of the Ministry of Federal Affairs and General Administration, Ministry of Home Affairs and Ministry of Urban Development as well the Local Project Steering Committee (LPSC) members at the municipal level for their valuable inputs and comments during the entire study period.

Equally, we would also like to thank all the individuals from the Gorkha Municipality and the humanitarian actors representing different agencies who took time to share their views and gave their valuable feedback continuously during the consultations, via phone and email for the validation of the report which greatly helped us in improving the content of the report.

Lastly, we would also like to thank the team of Naxa for the collection and analysis of data, maps, photos of each identified open space. This report would not be possible without the tireless efforts of the team involved.

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LIST OF ACRONYMS AND ABBREVIATIONS

BIPAD	Building Information Platform Against Disaster
CCCM	camp coordination and camp management
DIMS	disaster information management system
DSM	Digital Surface Model
DTM	Digital Terrain Model
GIS	geographic information system
GPS	Global Positioning System
IDP	internally displaced person
IOM	International Organization for Migration
MoFAGA	Ministry of Federal Affairs and General Administration
MoHA	Ministry of Home Affairs
MoUD	Ministry of Urban Development
VDC	Village Development Committee
WASH	water, sanitation and hygiene

EXECUTIVE SUMMARY

In 2015, the Constitution of Nepal was promulgated and the country initiated its federalization process which divided the Government into three tiers: federal, provincial, and local. Before the federalization, 83 identified open spaces were a national level responsibility and were protected through the publishing of a national gazette in 2013 that listed all open spaces. The national gazette also includes provisions for monitoring of the 83 open spaces to prevent encroachment of the sites. Since the federalization, local governments also have a responsibility for the protection of such areas in their urban or rural municipalities.

In this context, IOM – the UN Migration Agency – as co-lead of the Camp Coordination and Camp Management cluster and with support from the Ministry of Urban Development, Ministry of Home Affairs and Ministry of Federal Affairs and General Administration, undertook a survey to identify suitable open spaces in five municipalities of five earthquake affected districts from Bagmati and Gandaki Provinces. The project aims to enhance the decision-making process at a municipal level to mitigate possible losses during a disaster by identifying and updating open spaces. Identification and mapping of open spaces in Gorkha Municipality of Gorkha District is one of the components of the project.

The scope of this study covers a detailed topographical survey of all identified open spaces, collection of attribute information, environmental checklist, collection of data on critical infrastructures around each identified open space and development of various maps. The scope also includes dissemination of the maps through both digital and hard copy platforms as well as installation of map boards at prominent locations within the Municipality. Further, the study promotes the preparation and use of open data for disaster preparedness as the datasets collected during the project will also be uploaded to the national disaster information management system or Building Information Platform Against Disaster platform developed by the Government of Nepal.

59 locations were suggested as suitable open spaces by local representatives, from which 11 open spaces have been finalized after a detailed field study and series of interactions with elected local representatives, municipal officials and local stakeholders and humanitarian actors. Most of the suggested locations were not considered suitable due to small area, high gradient and difficult access. The 11 identified open spaces have a total area of 88,482.772 m2 and total usable area of 57,585 m2. As per the Sphere Standards (3.5 m2 per person), the total usable area can accommodate at least 16,452 displaced persons. The selection of these open spaces is based on the total area with a slope of 0-5°, road accessibility, distance from settlements, availability of water, sanitation and hygiene facilities, market access and availability of other critical facilities near the open spaces. Besides these 11 finalized open spaces, 74 other locations as suggested by the local population were also surveyed and details on their current land use practice and total usable flat area were collected.

This assessment was conducted as a part of the "People to People Support for Building Community Resilience through Recovery and Reconstruction in Nepal" project, financially supported by the people of Thailand through the Government of Thailand. The project is being implemented in the eight worst 2015 earthquake affected rural and urban municipalities of Bagmati and Gandaki Provinces.

STRUCTURE OF THE REPORT

This report is divided into four chapters. The first chapter is the introductory part of the project which includes details on the background on project development, survey objectives, survey location, the description of open-space selection criteria as per the Sphere Standards and limitations of the study. The second chapter details the open-space identification process for the collection of relevant data and geographic information system (GIS) mapping. The third chapter contains the survey outputs with details of finalized and surveyed open spaces. Conclusion is included in the fourth chapter followed by Annexes.

CHAPTER 1 INTRODUCTION

1.1 Background

Nepal is prone to a multitude of disasters that cause loss of lives, property and infrastructure. Globally, Nepal ranks fourth, eleventh and thirtieth in terms of its vulnerability to climate change, earthquake and flood risk respectively (United Nations Development Programme, 2019). The devastating earthquake that struck Mandre Barpak Village Development Committee (VDC) of Gorkha on 25 April 2015 and subsequent aftershocks resulted in loss of lives, physical infrastructures and cultural monuments, and left thousands of people homeless. 443 people were reported dead and 1,179 people were injured in Gorkha District (National Planning Commission, 2015). Around 98 per cent of houses were damaged and around 55 per cent of houses were reported as destroyed in Gorkha (Nepal Earthquake Assessment Unit, 2015).

Gorkha is one of the most affected districts in terms of damage to shelter by the 2015 earthquakes. 90 per cent of the district population were displaced and took shelters near their houses, mostly on the open lands or grounds.[1] The International Organization for Migration (IOM) activated the Displacement Tracking Matrix which was able to track an estimate of 5,000 displaced individuals in Gorkha District in four temporary sites (IOM Nepal, 2015). Gorkha District is also susceptible to landslides (Shelter Cluster Nepal, 2016). Every year during the monsoon season, there are reports of severe damages and loss of lives caused by the incessant rain and fragile steep slopes of Gorkha (The Kathmandu Post, 2018).

With realization of the significance of open spaces during emergency situations, especially in the urban municipalities like Gorkha, IOM decided to identify and document open spaces that could be used for humanitarian purposes.

The open-space mapping in Gorkha involved a detailed topographical mapping of all the identified spaces using a drone.[2] The high-resolution images have been useful in the preparation of detailed GIS maps. Moreover, both the aerial images and the maps can be used as baseline data during camp management and effectively plan the construction of temporary shelters during a disaster. This project, the first of its kind in Gorkha, also focuses on digitally recording and disseminating the data of both the open spaces and critical facilities through static community map boards and digital tools. The datasets will then be made available to all users in an open data format through the disaster information management system (DIMS) or BIPAD[3] platform, the open space platform for humanitarian assistance and the open space mobile application. The data of open spaces and critical facilities can serve as strong evidence resources to enhance the preparedness of Gorkha Municipality to plan before, during and after a disaster.

1.2 Objectives

One of the primary objectives of this project is to identify and map the most suitable open spaces in Gorkha Municipality that can be used for humanitarian assistance during a disaster. In this respect, the scope of work is designed to achieve the following objectives:

[1] UN, Nepal Earthquake Assessment Unit. (2015). District Profile Gorkha.
[2] A drone, in technological terms, is an unmanned aircraft. Essentially, a drone is a flying robot that can be remotely controlled or fly autonomously through software-controlled flight plans in their embedded systems, working in conjunction with onboard sensors and GPS. https://internetofthingsagenda.techtarget.com/definition/drone
[3] BIPAD plarform can be assessed at https://bipad.gov.np/np/

(a) Topographical surveying and mapping of open spaces in Gorkha Municipality:

(i) Drone based topographical survey of identified open spaces in Gorkha Municipality.

(ii) High-resolution aerial images of each identified and finalized open spaces showing natural and man-made resources as well as structures within the periphery.

(iii) Collection of Global Positioning System (GPS) datasets on critical facilities around the open spaces.

(b) Collection of attribute data and general environmental assessment:

(i) Collection of attribute details (access to market and critical facilities, land use types and so on) of all open spaces.

(ii) Collect cadastral and property information as per land records for each identified open space (if available).

(iii) Assess different environmental aspects for each open space to study the implications of the interventions during a disaster and in the camp management.

(c) Dissemination of open-spaces data and GIS maps:

(i) Preparation of GIS maps of each finalized open space along with vicinity maps showing critical facilities around.

(ii) Development of a web-based open space platform for humanitarian assistance and an open space mobile application which allows users to locate and navigate to the nearest open space during an emergency.

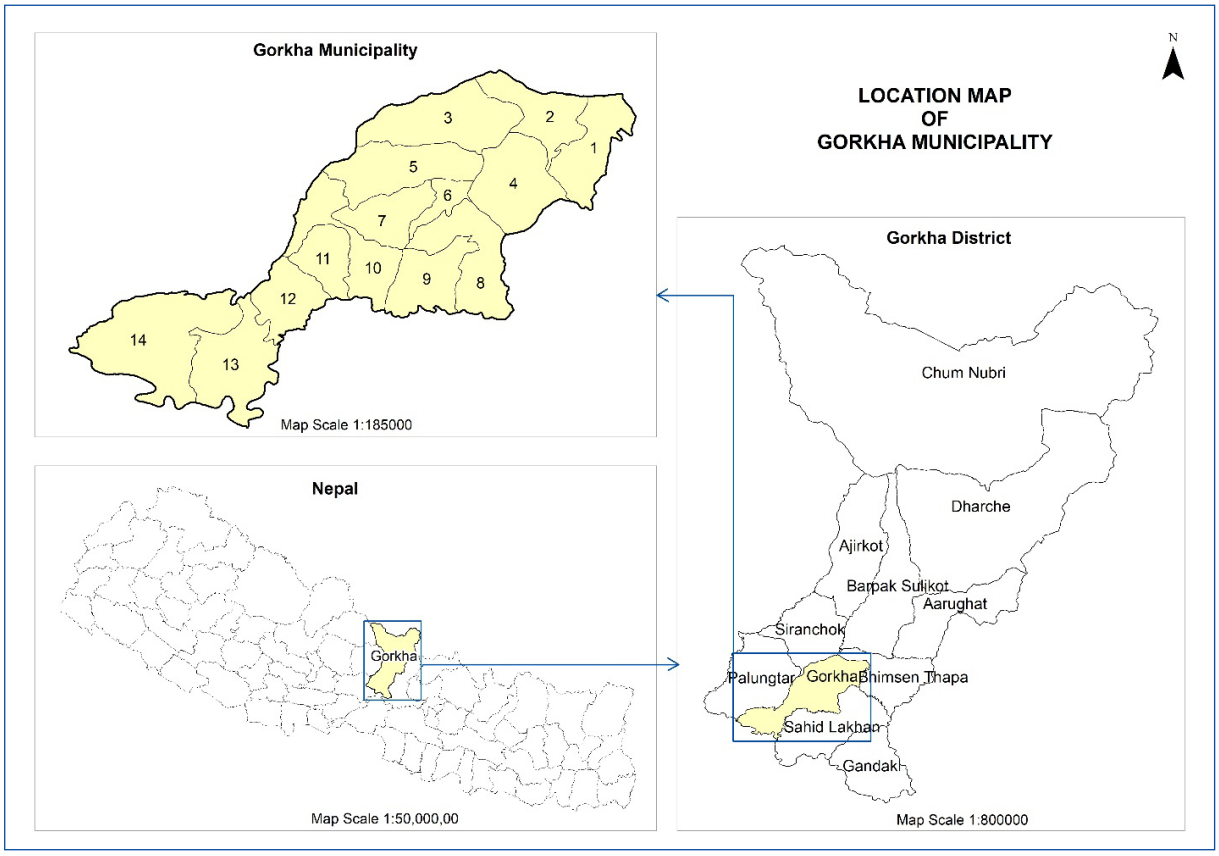
(iii) Installation of community maps with details of open spaces and critical facilities at specific locations in Gorkha Municipality.

(iv) Dissemination of open-spaces and critical facilities data to a wider audience and stakeholders by integrating these datasets in the national DIMS or BIPAD platform.

1.3 Survey location

Gorkha Municipality is situated in Gorkha District of Gandaki Province. The Municipality was established in January 1997 by combining Gorakhkali, Raniswara and Taranagar VDCs. Later, Finam and Nareswor VDCs in 2015 and Taple and Deurali VDCs in 2017 were also merged to Gorkha Municipality. The Municipality has a total area of 131.86 km^2 and 13,146 households. The total population of the Municipality is 50,684 of which 23,161 are male and 27,523 are female. The Municipality consists of 14 wards.

Figure 1: Location map of Gorkha Municipality



The 2015 earthquakes affected 31 districts of which 14 were categorized as severely affected. Gorkha was the epicentre of the tremor that struck Nepal on 25 April 2015 and is one of the severely affected districts in Nepal. In recognition of disaster vulnerability in Nepal and in anticipation of disaster impacts, IOM, as co-lead of the Camp Coordination and Camp Management (CCCM) cluster, undertook a study to identify open spaces in Gorkha and four other earthquake-affected districts in Bagmati and Gandaki Provinces. Disaster management requires a determined and integrated national effort which needs to be well coordinated at all levels: local, provincial and federal. The major reason behind considering the municipalities of the worst affected districts for this project is to reduce risks by mainstreaming disaster management by the concept of open-space identification and protection in these areas. Hence, identification of open spaces in Gorkha is primarily to ensure adequate disaster preparedness and effective response by the Municipality and the local community.

1.4 Open-space selection criteria

Identifying a site as an open space signifies a long-term commitment from the concerned authority and the public to preserve and promote these spaces for future use. The project team thus followed the international standards and national standards developed by IOM for the selection of a site as an open space for humanitarian purposes. As per the Sphere Standards, there are certain criteria to consider for the selection of a suitable open space (Sphere Association, 2018). The area of an open space, availability of water, sanitation and hygiene (WASH) facilities, distance from critical facilities, accessibility and security are some important parameters for selecting an open space. Likewise, environmental suitability of an open space and social and cultural values of different groups of people are also to be taken into consideration during the site selection. Details of these parameters are found in Annex 1 of this document.

However, in the context of a geographically diverse country like Nepal, the international standards may not be feasible for selecting a location as an open space in rural locations. Nepal is extensively diverse in terms of geography and is varied in landscapes. Similarly, human settlements in rural areas can be found in the terraced hillsides, nearby the rivers, mountains or in the plains. With such villages or settlement clusters in varied topography, it is not practical for people to find an open space which has a large area (more than 3,500 m^2) but also located at a distance from their settlements during a disaster. Therefore, it is paramount that the selection of a location as an open space be contextualized as per the geography, area and land surface, population as well as settlement patterns of the region. This survey has included the open spaces which are at least 3,000 m^2 in area and other locations which can be used during an emergency.

1.5 Limitations

There are a number of limitations of the study which are mentioned below.

(a) The selection and finalization of open spaces was mainly decided by considering the proximity to the population density in the area.

(b) There were more open spaces in the Municipality, but the survey was limited to spaces with an area larger than 3,000 m^2.

(c) Limited resources during the field survey narrowed the primary data collection as critical facilities could be located nearby the open spaces only and not in the entire Municipality.

(d) Most of the datasets on critical facilities are based on the inputs provided by respective offices and review of available secondary sources.

(e) As there is no system for digital record keeping in the Municipality, past studies on open spaces after disasters (if any) might have been missed in this survey.

(f) Regarding mapping, the evacuation route mapping does not involve extensive GIS analysis and rather it includes the mapping of possible routes based on the available secondary and open-space datasets.

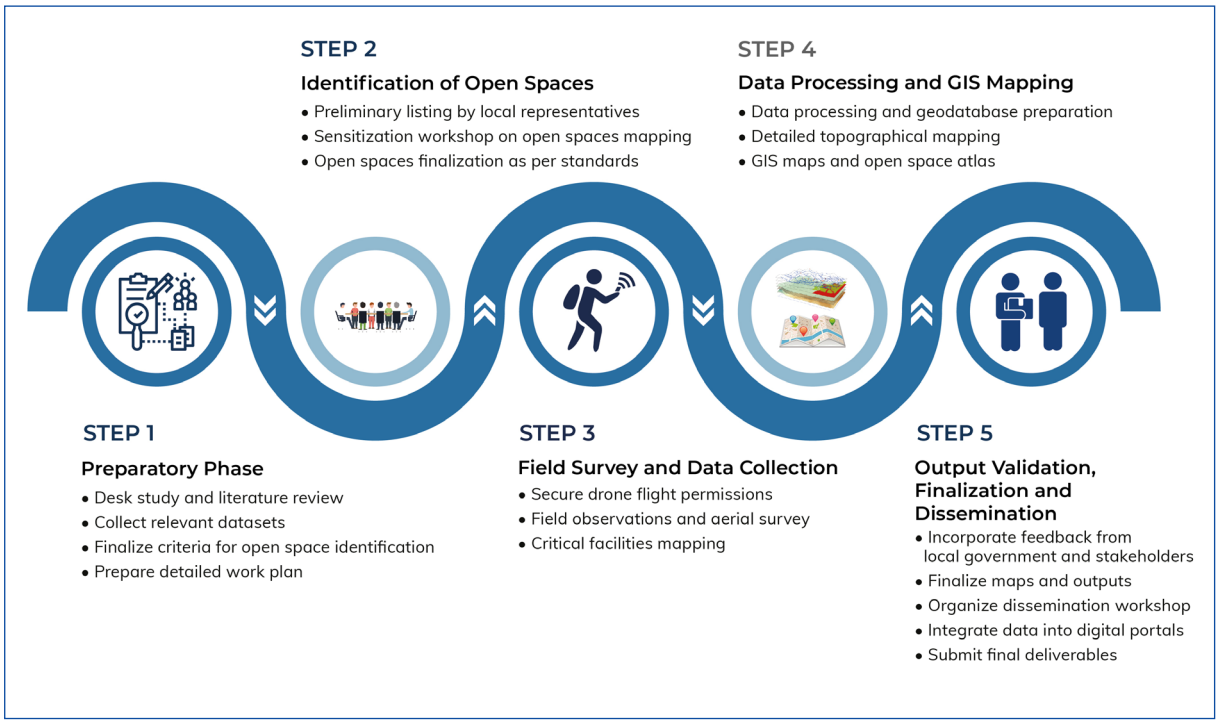
(g) This survey has only identified and mapped open spaces. No further plans have been formulated regarding the construction of any camps or temporary shelters for internally displaced persons (IDPs) in Gorkha Municipality.

(h) Due to the COVID-19 pandemic and travel restrictions to curb the spread of COVID-19 pandemic, the team could not travel to the District Survey Office of Gorkha for the collection of cadastral information of each of the identified open spaces. Thus, the details of land ownership (public or private), type of tenure and current title holders, cadastral maps, boundary data and parcel numbers could not be included in the report.

CHAPTER 2 OPEN-SPACE IDENTIFICATION PROCESS

The project involved the collection of both primary and secondary data. The primary data collection involved field-based surveys in all identified open spaces and examinations of available critical facilities located near the open spaces. The secondary datasets included review of existing municipal profile and other relevant literature on open-space mapping. Secondary data on risk and hazards, data on disaster occurrence from existing local level and vulnerability and capacity assessment (VCA) reports were also intended for review but were not available in the survey location. Further, applicable datasets such as administrative boundary of project location and settlement location from the Survey Department were also collected. Considering all the specific requirements in the project, deliverables expected and time frame, this project was implemented in the following five phases:

Figure 2: Synopsis of open-space identification process



Note: This infographic is made by Naxa based on the data from the 2019 survey.

Step 1. Preparatory phase and desk study

The first step included a desk study and review of relevant past work done by IOM in Kathmandu and the municipalities in the western region of Nepal. The technical team also consulted with IOM for better understanding of the methodologies applied and the outcomes from the previous open-space identification and mapping works. All the relevant datasets including the shapefile of open spaces, attribute data and reports from all relevant past works were collected. Sphere camp standards were used as the baseline for planning further steps. An inception report detailing the scope of work and a detailed work plan to achieve the project deliverables was prepared and submitted to IOM.

Step 2. Identification of open spaces

The finalization of open spaces mainly involved preliminary identification of all open spaces and finalization of the most suitable open spaces through the interaction with locals and a detailed field study.

(a) Preliminary listing of open spaces

The municipal officials shared the preliminary list of all public and private lands which were being used as community gathering spaces, playgrounds and local parks as open spaces available in their community to the technical survey team. The locations mentioned are based on the current use practice of such locations by the public and included several types of locations including community gathering spaces (resting places, chowks), small playgrounds, grazing lands and open areas within office premises as well as other open lands available within and nearby their community.

(b) Interaction with locals and finalization of open spaces

A sensitization workshop was organized in Gorkha Municipality to introduce the concept of open-space mapping, importance of camp management and the need for identification and preservation of open spaces for disaster preparedness. Based on the criteria for the selection of an open space as explained by the project team, the local officials ranked the previously shared list of open spaces. 61 participants worked in different groups and assigned certain weight value to different open spaces based on the selection criteria. The open spaces with a total weight value of 13 and more were selected for further field inspection and mapping. The list of preliminarily identified open spaces along with standard weights given to each open space based on standard criteria are listed in Annex 2.

Figure 3: Sensitization and interaction workshop in Gorkha Municipality

Note: All photos used in this report are owned by IOM Nepal, unless otherwise indicated.

Step 3. Field Survey & Data Collection

(a) Field observations and aerial survey

The technical field survey team in coordination with the municipal officials visited all the open spaces with a weight value of 13 and greater. Based on the observations during the field inspection and the standard open-space criteria, the survey team finalized the open spaces and conducted detailed topographical mapping of each site. An aerial survey using the drone was carried out to capture high-

resolution images of each finalized location. In addition to the spatial data collection, the survey team also collected major attribute details such as land type, current land use, nearby settlements/catchment areas, critical facilities, significant features near the site and ownership status of each identified open space. The template used for collection of detailed attribute datasets for each open space is found in Annex 3.

Figure 4: Drone survey in Rajetar Khel Maidan

The specifications of the drone survey are listed in the table below.

Table 1: Specifications of the drone survey

Serial number	Specification	Parameters
1	Altitude above ground surface	70 m
2	Forward overlap between adjacent images	75%
3	Lateral (sidewise) overlap between adjacent images	70%
4	Spatial resolution of image captured	3 cm

(b) Development of environmental checklist

Finalization of open spaces also requires a proper understanding of the environmental components and potential risks associated with a location selected as an open space. In this regard, a general environmental checklist was used based on the previously prepared questionnaire to understand the context, ecosystems, ecological impact and vulnerability of project sites due to construction of project infrastructure. The checklist is found in Annex 4. The checklist helps to ensure that environmental considerations are included in decisions regarding projects that may impact the environment.

Step 4. Data processing and GIS mapping

The collection of attribute data on critical facilities and infrastructures from sectoral office, census department and municipal profile and primary field survey was followed by multi-source data integration. The team of GIS analysts carried out data cleaning, combining spatial datasets with attribute data and conversion of all spatial data layers from different sources to a single standard data system.

(a) Preparation of geodatabase and topographical maps

The project team had collected datasets of critical facilities, local infrastructures like road networks from both the primary and secondary sources. A municipal geodatabase was prepared with all major datasets. The captured aerial images were processed to form a single georeferenced orthophoto image map for each open space using a high configuration computing device and licensed digital photogrammetry software. The image processing was carried out to generate outputs like contour maps, orthophoto maps and digital surface models. After the generation of map outputs from images, the map features were digitized from the high-resolution georeferenced image in a GIS environment. Standard symbology and appropriate color codes were applied to the generalized data to form a detailed topographical map. The information regarding map projection and coordinate system is listed in Annex 5 of this document.

(b) Calculation of usable open-space area

The technical team calculated the usable area of each open space by deducting the area occupied by the existing ground objects like trees and vegetation, building structures and slope below 5° from the total area of identified open spaces.

Step 5. Output validation, finalization and dissemination

Due to the COVID-19 pandemic and rise in the number of positive cases, the project was unable to organize face to face programs for disseminating the final reports on open spaces. Alternatively, the draft datasets, open-space report, atlas and final maps were shared with the Municipality. Feedback and comments from municipal officials and other relevant stakeholders were incorporated and the project deliverables was finalized accordingly.

The datasets on the open spaces and critical facilities are being integrated to the BIPAD platform after data validation and finalization from the local stakeholders. A physical GIS map has also been installed in the Municipality premises for sensitizing people on the open spaces and critical facilities. The major outputs of the project include an Open Space Map Atlas and report, an open space platform for humanitarian assistance and a physical hard copy map of the Municipality which has been shared and disseminated to the Municipality and all other relevant stakeholders of the project.

CHAPTER 3 SURVEY OUTPUTS

3.1 High-resolution map products

The aerial images captured from the drone were utilized to generate different kinds of map outputs. At the end of the data processing, the following outputs were generated: high spatial resolution (3 cm) georeferenced orthophoto, digital surface model (DSM),[4] digital terrain model (DTM),[5] contour lines of 1 m interval, 3D model and point cloud. These high-resolution map outputs can be utilized by planners and emergency responders during the camp management related activities, but also use as a major resource for development planning at a municipal level.

3.2 Open space map atlas

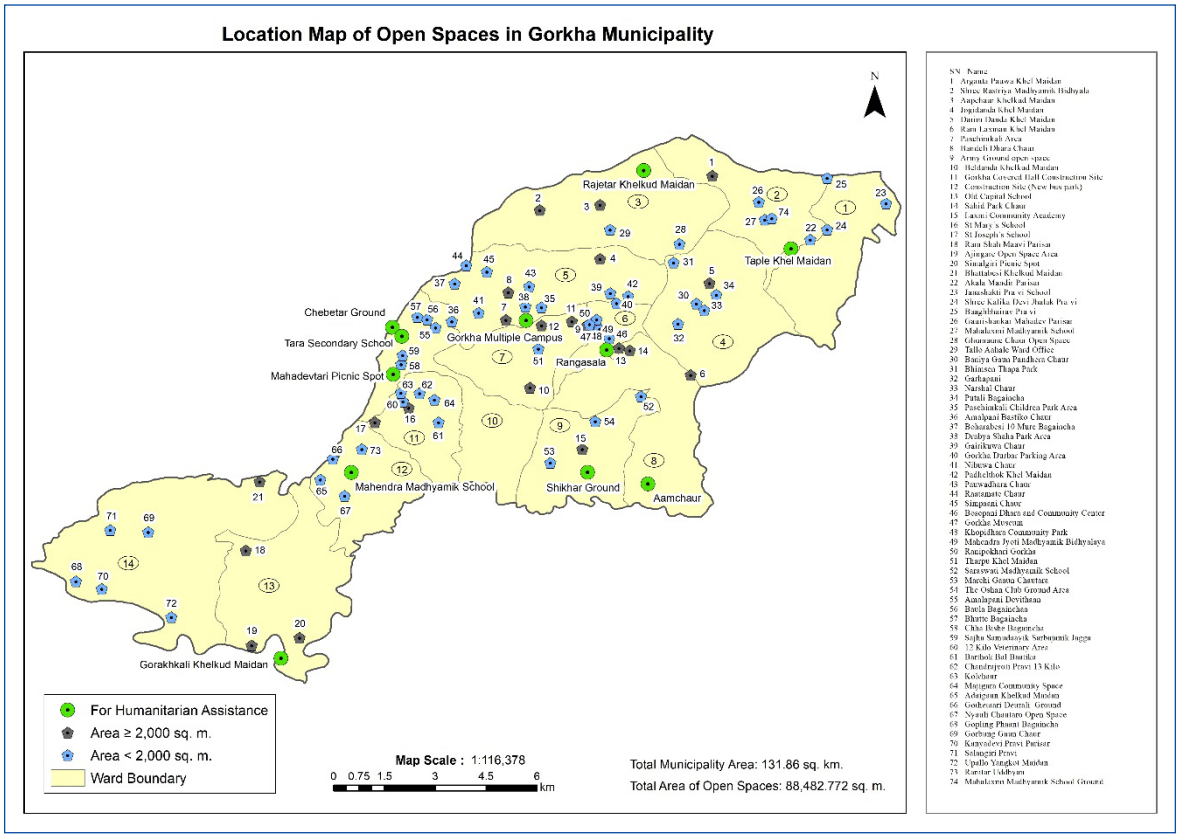
The topographical maps of each finalized open space were prepared and compiled as an Open Space Map Atlas along with other details like description of each open space, photographs captured from the ground and a vicinity map where nearby critical facilities are presented. A map board of the entire Municipality highlighting the detailed information of each finalized open space was also designed for installation within the Municipality.

3.3 Open spaces for humanitarian assistance

A preliminary list of 59 open spaces in Gorkha Municipality was shared by the local and municipal officials. The technical team visited 32 locations which were assigned a total weight of 13 and more during the preliminary workshop. 11 locations were finalized as the most suitable open spaces for humanitarian assistance based on the standard selection criteria (minimum area 3,000 m^2), slope (less than 5°), access, security and safety, availability of critical facilities and other resources, social and cultural values and environmental suitability. The total usable open-space area is 57,585 m^2 which can accommodate 16,452 displaced persons during a disaster as per the Sphere Standards which estimate 3.5 m^2 per person. Of the 11 finalized open spaces, Gorakhkali Khelkud Maidan of Ward number 13 has the largest usable area with a capacity to accommodate 2,761 displaced persons during a disaster.

[4] The DSM represents the elevation of ground surface features which is generated by the software itself but is not recommended for representing ground elevation.
[5] DTM represents the elevation of bare earth surface excluding the ground features.

Figure 5: Location map of humanitarian open spaces in Gorkha Municipality



Note: This figure is made by Naxa on a GIS platform and is based on the data from the 2019 survey.

The list of initially identified and mapped suitable open spaces in Gorkha Municipality is mentioned in the table below:

Table 2: Generic details of humanitarian open spaces in Gorkha Municipality

Serial number	Name of open space	Address (ward number)	Coordinates	Total area (m^2)	Total usable area (m^2.)	Approximate capacity (3.5 m^2 per person)
1	Rangasala	6	27.993022° 84.627683°	6,894.539	4,740	1,354
2	Aamchaur	8	27.957528° 84.638872°	4,864.955	4,360	1,245
3	Shikhar Ground	9	27.960527° 84.622659°	9,163.558	6,850	1,957
4	Mahadevtari Picnic Spot	10	27.986495° 84.571068°	8,387.42	7,205	2,058
5	Gorakhkali Khelkud Maidan	13	27.911136° 84.541337°	9,666.3	9,665	2,761

The remaining locations in the preliminary list were rejected as these locations did not meet the standard criteria. For example, Jogidanda Chaur has a flat land surface and a proper road access but was rejected due to insufficient flat surface area for humanitarian purposes. Some locations were also rejected due to their vulnerability to risk and hazards like landslides, floods and high-tension lines. For example, Simalgiri picnic spot was rejected due to the presence of high-tension line and Oshan Club ground was rejected due to the risk of soil erosion in the area. Likewise, some identified open spaces had greater area but were rejected due to the vegetation and infrastructure within the periphery which caused the actual open space to be lower than the required area to use it for humanitarian purposes during a disaster. For example, Gothetaari Deurali ground was rejected as this location was entirely covered with trees and vegetation.

The technical team visited Gorkha in December 2019 and shared the draft outputs of the survey and mapping with the Municipality. As per the request of the municipal authorities, the technical team revisited all the locations. The resurvey showed that several locations which were previously rejected from the list of open spaces for humanitarian assistance have now been expanded and widened under the initiation of ward and municipal offices. The Municipality has initiated its development plan of constructing a public playground in each ward of the Municipality with a slogan "Ek Ward Ek Khel Maidan" (One Ward One Playground). During the field visit by the technical team, several playgrounds were under construction. The technical team also identified some new locations during the revisit with a significantly large area (>3,000 m^2) and easy road access. These locations can be categorized under open spaces for humanitarian assistance. Following are the new locations identified during the resurvey in Gorkha Municipality:

Table 3: List of identified humanitarian open spaces during the resurvey in December 2019

Serial number	Name of open space	Address (ward number)	Coordinates	Total area (m^2)	Total usable area (m^2)	Approximate capacity (3.5 m^2 per person)
1	Taple Khel Maidan	1	28.019855° 84.676568°	6,950	3,190	911
2	Rajetar Khel Maidan	3	28.040638° 84.637502°	4,140	3,240	925
3	Gorkha Multiple Campus	5	28.000664° 84.605782°	15,000	4,450	1,271
4	Chhebetar Barbare Chaur	10	27.999007° 84.570861°	6,505	3,970	1,134
4	Tara Secondary School	10	27.996628° 84.573375°	7,680	3,180	908
6	Mahendra Secondary School	12	27.960852° 84.559915°	9,228	6,735	1,924

3.4 Critical facilities

The technical team collected location data and names of critical facilities within the vicinity of each finalized open space. Following is a summary of collected datasets:

- Health facilities (12)
- Educational institutions (44)
- Security forces (7)

Table 4: Critical facilities near humanitarian open spaces in Gorkha Municipality

Serial number	Name of open space	List of critical facilities					
		WASH facilities	Health facilities	Educational institutions	Market	Security	Helipad
1	Taple Khel Maidan	Available	Taple Health Post (50 m), Kokhe Aahale Health Post (1.2 km), Sahari Swasthya Kendra (1.3 km)	Shree Jana Jyoti Secondary School, Kalika Devi Lower Secondary School, Mahalaxmi Secondary School,	Some local shops in the nearby settlements	Kokhe Aahale Police Station	The site itself could be utilized as a helipad
2	Rajetar Khel Maidan	Not available	No health facility available near the site	Jana Devi Higher Secondary School, Shree Jyoti Lower Secondary School, Shree Daya Jyoti Lower Secondary School	Some local shops in the nearby settlements	No security forces available near the site	No helipad available near the site
3	Gorkha Multiple Campus	Available	Paslang Sahari Swasthya Chauki	Prithvi Ismarak Secondary School, Nawajyoti Secondary School	Some local shops in the nearby settlements	No security forces available near the site	No helipad available near the site
4	Rangasala	Not available	District Hospital	Shakti Secondary School	Haramtari Bazar	Nepal Police	Army Helipad (1 km north)

5	Aamchaur	Not available	Raniswara Health Post	Suryodaya Primary School	Raniswara	Laxmibazar Police Station	Rangasala (4.5 km north)
6	Shikhar Ground	Not available	Laxmibazar Sahari Swasthya Kendra	Laxmi Samudayik Shikshya Sadan	Laxmi Bazar	Laxmibazar Police Station (900 m)	The site itself can be used as helipad
7	Mahadevtari Picnic Spot	Available	Chebetar Sahari Swasthya Kendra	Suryodaya Bal Bikas	Gorkha Bazar	Barha Kilo Police Station	Laxmibazar, Army Barrack (7.5 km)
8	Chhebetar Barbare Chaur	Available	Chebetar Sahari Swasthya Kendra	Shree Tara Higher Secondary School, Suryodaya Bal Bikas	Chebetar market	No security forces available near the site	The site itself could be used as helipad
9	Tara Secondary School	Available	Chebetar Sahari Swasthya Kendra	Shree Tara Higher Secondary School, Suryodaya Bal Bikas	Some local shops in the nearby settlements	No security forces near the site	No helipad available near the site
10	Mahendra Secondary School	Available	Aama-Baa Hospital and Research Centre, District Hospital, Sansthagat Clinic	Mahendra Jyoti Secondary School, Shree Baal Mandir Secondary School, Nawajyoti Secondary School	Pokharithok Bazar	Tallo Durbar Police Station, Traffic Police, District Police Office	No helipad available near the site
11	Gorakhkali Football Ground	Not available	Abukhaireni Health Post	Ram Shah Pre-Primary School	Laxmi Bazar	Majuwa Police Station	The site itself can be used as helipad

A list of emergency contacts in Gorkha Municipality is found in Annex 6 of this document.

3.5 Other locations

In the immediate aftermath of the earthquakes in 2015, local people in Gorkha Municipality used private and public lands and other open areas near their houses and communities as temporary shelters. Some of the open areas were also used by relief distribution agencies. The technical team visited 74 locations identified by the Municipality and measured the total available flat area, collected GPS coordinates, attribute details and photographs for each location during the project period. These locations do not fulfill all the

criteria required to consider for humanitarian open spaces, however, they can be used during an emergency. These 74 locations observed during the field survey were broadly grouped into four major categories based on the current land use practice by the local community:

- Category 1: Playgrounds
- Category 2: Picnic spots and parks
- Category 3: Community gathering spots (Chautara, temple, garden, open public land)
- Category 4: Periphery of hospitals, schools, public institutions and other public places

As the finalized major open spaces may not be easily accessible for all scattered communities in the rural wards of the Municipality during a disaster, the school compounds, the periphery of the ward offices, health institutions and various other community buildings' premises near the settlement areas have also been considered for its utilization during an emergency.

The identified locations based on the current land use are listed in Annex 7 of this document.

3.6 Open space platform for humanitarian assistance

Upon finalization, all open-space datasets will be handed over by IOM to the Government of Nepal and also be published in a public GIS based data platform where the datasets will be stored and updated. This includes the datasets from Gorkha. The platform mainly consists of the following features:

(a) Provides information through text as well as audiovisuals regarding the identified open spaces, camp sites, logistics, distribution areas, medical assistance areas and other details.

(b) Contains an interactive mapping feature where users can select the respective municipalities and find details of each open space like attribute tables, nearest critical facilities and photographs.

(c) Allows the system admins to view reports regarding open-space encroachment submitted by the public and forward it to the concerned authority for necessary action. The report function contains GPS location, photographs and report messages.

(d) Allows users to download and view publications regarding camp management, open spaces and its importance, open-space mapping reports and other useful reports and publications related to the open spaces and their role in disaster preparedness and management.

(e) A humanitarian assistance tab in the web platform and in the mobile app which is enabled only in the event of a disaster. This tab is mainly for various humanitarian agencies to upload details of emergency supplies or relief distribution in a location and notify the public about their humanitarian efforts during and after a disaster.

3.7 Open space mobile application

The open space mobile application was developed to provide the general public with information regarding open spaces and critical facilities so that they can promptly use it during an emergency. The app contains location data of all open spaces in Gorkha Municipality and users can navigate to each of these open spaces from their locations at the push of a button in the app. The app works both online and offline and can provide multiple routes from users' locations to the nearest open space during an emergency.

CHAPTER 4 CONCLUSION

4.1 Conclusion

This report identifies the open spaces suitable for humanitarian purposes in an event of a disaster in Gorkha Municipality. The surveys and related activities have been implemented as per the plan of action along with necessary consultations and interactions with the ward and municipal officials, local communities, humanitarian actors and relevant stakeholders of the project. IOM supported Gorkha Municipality to conduct a detailed study on the 11 suitable open spaces – Taple Khel Maidan, Rajetar Khel Maidan, Gorkha Multiple Campus, Rangasala, Aamchaur, Shikhar Ground, Mahadevtari Picnic Spot, Chebetar Barbare Chaur, Tara Secondary School, Mahendra Secondary School and Gorakhkali Khelkud Maidan. The 11 identified open spaces in Gorkha Municipality could be used for accommodating an estimate of 16,452 disaster displaced individuals with basic WASH facilities, easy access to all 11 open spaces, health and educational facilities and proximity to market and nearby security forces. The national disaster response framework includes specific provisions for security forces and local governments that include evacuation of local populations to safer locations. This report includes open spaces which are at least 3,000 m^2 in area and are nearby major settlements that could be used for humanitarian purposes.

Based on the past experience of the 2015 earthquakes and landslides, it was found that displaced people took shelters in these open spaces irrespective of public or private ownership. Therefore, in an event of a disaster, these spaces can be usable for IDPs provided that they are well preserved by the concerned authority. Therefore, identification and preservation of open spaces is important as most of the existing infrastructures could be destroyed and human settlements could be damaged in a catastrophic event such as earthquake or landslide. Moreover, the humanitarian efforts to accommodate and support displaced populations post-disaster is likely to be difficult. Besides humanitarian services, open spaces can also be used for a variety of purposes such as cultural events, community activities and sports. Thus, pre-identifying and locating nearby open spaces can strengthen disaster preparedness and management.

The Constitution of Nepal was promulgated in 2015 which led the country to initiate its federalization process, dividing the Government into three tiers: federal, provincial and local. As a result, 753 local governments were formed, allowing for more resources to be allocated to the local level, and the formulation of local disaster management plans and strategies is now among the prioritized local government plans. Disaster preparedness at a local level is crucial to inform and raise public awareness about disaster vulnerability and emergency response. Activities and initiatives for disaster preparedness include the identification, mapping, promotion and protection of open spaces, all of which are crucial initiatives in disaster prone areas of Gorkha Municipality, Gorkha.

CHAPTER 5 ANNEXES

Annex I. Open-space selection criteria

(a) Accessibility

(i) Accessibility is a critical factor for open-space identification. Some open spaces have restricted road access which impacts the establishment of camps, movement of IDPs to the camps, ensuring food supplies and other camp necessities. Therefore, it is critical in the selection phase that the accessibility of the open spaces in all seasons is considered.

(ii) The mobility of displaced populations, supply of goods and services, access to critical services (such as hospitals, markets, schools) in the surroundings are ensured while selecting an open space.

(iii) Access to livelihoods is also considered for open-spaces identification.

(b) Security

(i) Security is likely to be a key issue in high density camp. Existing security features are explained as these will assist with open-space identification and camp management.

(ii) Natural and human induced hazards. Example: Existence of industrial areas in the proximities of the open spaces are avoided.

(iii) Extreme climatic conditions. Example: Open spaces at risk of flooding, strong winds or landslides are avoided. Similarly, open spaces with high intensity electric wires are also avoided.

(iv) Environmental and health conditions. Example: Health risks typical for the open spaces are assessed. Malaria zones and cholera high risk areas are avoided.

(v) Evacuation routes are considered while identifying open spaces.

(c) Access to resources and water

(i) Availability of and accessibility to water is considered.

(ii) Water needs to be available in sufficient quantity in all seasons, taking into consideration the level of water during the dry season, as well as the basic needs of the displaced population (calculated as 7.5-15 liters per person per day).

(d) Land availability and topography

(i) Selection of open spaces considers the Sphere standard, which defines the minimum surface area is 35-45 m^2 per person.

(ii) The possibility of site expansion is considered.

(iii) A gentle terrain slope of 1-5° is considered.

(iv) Open spaces that could become marshy and waterlogged during rainy seasons should be avoided.

(v) Open spaces that are excessively rocky should be avoided as they hamper toilet or camp construction.

(e) Environmental concerns

(i) Open space with sufficient ground cover is suitable for setting up camps as the vegetation provides shade, protects soil erosion and reduces dust.

(ii) The negative impact of turning an open space into a camp is also considered while selecting an open space.

(iii) A general environment checklist is filled during the open-space selection process.

(f) Size

The size of the open space and area per capita are important factors in planning for camps. The Sphere Project outlined the Humanitarian Charter and set minimum standards in disaster response. The standards include spaces that should be made available for camp functions such as accommodation, cooking, hygiene, agriculture and schools. The total area required for all camp functions is 45 m^2 per person. While this should remain the objective for camp density, it is important that the humanitarian community be prepared for a higher influx of displaced population immediately following the disaster. The covered living area is 3.5 m^2 per person.

Annex II. Preliminary list of identified open spaces with scored weights in Gorkha Municipality by the local and municipal officials:

Serial Number	Name of open space	Ward number	Area	Access	Security	Source availability	Social cultural values	Environmental perspective	Total
1	Taple Swasthya Chauki	1	1	3	3	1	3	3	14
2	Thulo Chaur	1	1	3	3	1	3	3	14
3	Kalika School	1	1	3	1	1	1	3	10
4	Padherapaari (Ghumaune)	2	2	1	1	3	1	3	11
5	Mahalaxmi Khelkud Maidan	2	1	2	3	2	3	1	12
6	Bhag Bhairav Maidan	2	1	2	2	2	3	2	12
7	Rajetaar Khelkud Maidan	3	3	3	2	3	3	3	17
8	Tallo Ahale Picnic Spot	3	2	3	3	3	2	2	15
9	Ghumaune Chaur Khelud Maidan	3	2	2	1	2	3	3	13
10	Darim Danda Khulla Maidan	4	1	3	3	3	2	3	15
11	Putali Bagaicha Parishar	4	1	3	1	1	1	3	10
12	Bhimsen Thapa Park	4	1	3	3	1	3	2	13
13	Padel Thok Khel Maidan	5	`1	3	2	2	2	3	12
14	Paschimkali Children Park	5	3	3	1	3	2	3	15
15	Ranipokhari Army Maidan Parishar	6	3	3	3	3	3	3	18
16	Tallo Durbar Maidan Parishar	6	3	3	3	3	3	3	18
17	Rangasala Khelkud Maidan	6	1	3	3	3	3	3	16
18	Bishwo Nagaki Guitar Dada	6	1	3	3	3	3	3	16
19	Naya Buspark Parishar	7	2	3	3	3	2	3	16

20	Army Maidan Parishar	7	2	3	3	3	2	3	16
21	Aase Aahal Khelkud Maidan	8	1	2	2	2	3	3	13
22	Aamdanda Bagaicha	8	1	2	2	2	2	2	11
23	Ludidam Gaun Ban Chhetra	8	1	2	2	2	3	3	13
24	Aapaara Khel Maidan	8	1	2	3	2	3	3	14
25	Raniban Khel Maidan	8	1	2	3	2	2	2	12
26	Chapedada kaprachautara Parishar	8	1	3	3	2	2	2	13
27	Crown Hotel Parishar Khula Maidan	3	1	3	3	3	3	3	16
28	Sirbar Khelkud Maidan	9	1	2	3	3	2	2	13
29	Army Barrack Khel Maidaan	9	1	3	3	3	2	3	15
30	Belpata Thulo Chaur	9	1	2	2	3	3	3	14
31	Ramailo Danda Khel Maidan	9	1	2	3	3	2	3	14
32	Chabise Bagaicha Parishar	10	1	3	2	3	2	2	13
33	Sajha Bhawan Khulla Maidan	10	1	3	2	3	2	1	12
34	Barbare Khel Maidan	10	2	1	1	2	1	2	9
35	Mahadevtar Picnic Spot	10	1	3	2	2	3	2	13
36	Biredanda	10	1	2	1	1	3	2	10
37	Birenchok Khel Maidan	10	1	3	1	1	1	2	9
38	Aletar	10	1	1	2	1	1	2	8
39	Kalchaur Khel Maidan	11	2	3	3	3	1	1	13
40	Majhigaura Samudayik Bhawan Parishar	11	1	2	2	2	1	1	9
41	Barthok Khel Maidan	11	1	1	1	1	1	1	6
42	Chambote Bagaicha	11	1	2	1	2	1	1	8

43	Nayagaun Samudayik Ban Bhawan Chhetra	11	1	1	1	1	1	1	6
44	Ranitaar Park Parishar	12	2	3	3	3	2	3	16
45	Nauli Chautara Park Area	12	1	2	1	1	2	2	9
46	Adhai Gaun Sisau Ghari Picnic Spot	12	3	1	1	2	2	1	10
47	Sahid Batika Deurali Gaun	12	3	2	2	2	2	2	13
48	Gorkha Kali Khelkud Maidan	13	2	3	3	3	3	2	16
49	Simal Gairi	13	2	1	2	2	2	1	10
50	Ramshah Ma Bi Khelkud Maidan	13	1	1	2	2	2	1	9
51	Simletar Khelkud Maidan	13	3	2	2	2	1	2	12
52	Golpin Bagaicha Parishar	14	1	3	3	2	1	2	12
53	Golpin School Chaur	14	3	3	3	3	1	2	15
54	Golpin Tudetar	14	1	3	3	1	1	1	10
55	Sallangiri School Parishar	14	1	2	1	2	2	2	10
56	Sallangiri Siwalaya Mandir Parishar	14	1	1	1	2	2	1	8
57	Yangkot Khelkud Maidan	14	3	2	2	3	1	2	13
58	Thulokhola Pinko Parishar	14	1	2	2	3	2	2	12
59	Bhatbesi Khel Maidan	14	3	3	2	2	2	1	13

Annex III. Attribute checklist for open space in Gorkha Municipality

General site assessment		
Site name		
District	Municipality	Ward
GPS coordinates		Area
Gradient (1 – 5%)		Proximity to Helipad
Proximity to Nepal Army	Proximity to Nepal Police	Proximity to Armed Police Force
Special feature of site		
Significant feature near site (within 500 metres)		
Ownership		
Security		
Access to site		
Access to market		
Trees and vegetation		
WASH facilities		
Health facilities		
Educational infrastructures		
Implementation issues		

Annex IV. Environmental checklist

Environmental checklist	
Is it a protected area?	
Is it a buffer zone of a protected area?	
Is it a cultural heritage site?	
Densely populated area?	
Special area for protection of biodiversity?	
Will the project require temporary or permanent support facilities?	
Are project related ecosystems fragile or degraded?	
Will the project cause an increase in peak and flood flows (including from temporary or permanent waste waters)?	
Will the project cause air, soil or water pollution?	
Will the project cause soil erosion and siltation?	
Will the project cause an increase in waste accumulation?	
Will the project cause hazardous waste accumulation?	
Will the project cause a threat to local ecosystems due to invasive species?	
Will the project cause greenhouse gas emissions?	
Will the project cause use of pesticides?	
Does the project encourage the use of environmentally friendly technologies?	
Other environmental issues, e.g. noise and traffic?	

Annex V. Map projection and coordinate system used for the detailed topographical mapping

Serial number	Projection and coordinate system	Parameters
1	Coordinate system	WGS_1984_UTM_Zone_45N
2	Projection	Transverse Mercator
3	False easting	500000 metres
4	False northing	0.0 metre
5	Central meridian	84° East
6	Scale factor	0.9996
7	Latitude of origin	0.0
8	Linear unit	Metre
9	Angular unit	Degree (°)
10	Prime meridian	Greenwich (0.0)
11	Datum	D_WGS_1984
12	Spheroid	WGS_1984
13	Semi major axis	6378137.0
14	Semi minor axis	6356752.314245179
15	Inverse flattening	298.257223563

Annex VI. Emergency contacts

Serial number	Emergency service	Name of organization	Phone number
1	Ambulance	District Hospital	064-420208
2	Ambulance	Aama Baa Hospital and Research Centre	064-420250
3	Fire Brigade	Gorkha Municipality	064-420269

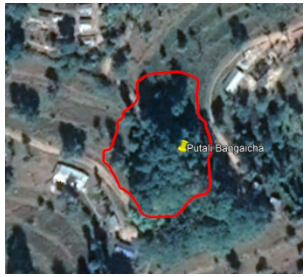
Annex VII. Details of other locations in Gorkha Municipality:

Serial number	Name	Image	Ward No.	Category	Coordinates	Approximate flat area (m^2)	Elevation (m)	Remarks
1	Akala Mandir Parisar		1	Community gathering spot	28.022226° 84.681669°	1,000	1,210	Small sized open area within the premises of Akala Devi temple
2	Janashakti Pra. Vi.		1	Periphery of school	28.031869° 84.701772°	670	1,150	An open area within the school premises, has a well-managed WASH facility, used by community people during the 2015 earthquake
3	Shree Kalika Devi Jhalak Pra. Vi.		1	Periphery of school	28.024967° 84.686133°	300	1,279	Small school ground, surrounded by earthquake resistant and disabled-friendly school buildings
4	Argauta Pauwa Khel Maidan		2	Playground	28.039175° 84.655691°	2,810	761	A playground under construction, needs preventive measures to prevent soil erosion, close to Argauta Pauwa school and settlements

5	Baaghbhairav Pra. Vi.		2	Periphery of school	28.038615° 84.659289°	1,270	782	Small school ground, can be used as storage and distribution hub during an emergency
6	Gaurishankar Mahadev Parisar		2	Community gathering spot	28.032287° 84.668001°	No remarkable flat area	965	No remarkable flat area within the temple premises, located in the middle of a settlement, a community space: Mohi community centre is located nearby
7	Mahalaxmi Madhyamik School		2	Periphery of school	28.027532° 84.669634°	800	1,005	A small sized ground within the school premises, located near to settlement
8	Mahalaxmi Madhyamik School Ground		2	Periphery of school	28.027892° 84.671472°	1,730	1,020	A recently donated private land located in between the settlements, presence of high-tension and an electric pole with a transformer is at the edge of the ground

9	Shree Rastriya Ma. Vi.		3	Periphery of school	28.030089° 84.609928°	2,250	742	Open area within the school premises, located next to a seasonal earthen road
10	Aanpchaur Khelkud Maidan		3	Playground	28.031481° 84.625929°	2,645	795	A playground under construction, a public toilet is located nearby
11	Ghumaune Chaur Open Space		3	Playground	28.021095° 84.646980°	1,580	1,245	A recently constructed small sized playground located near to a settlement, water tank in the vicinity
12	Tallo Aahale Ward Office		3	Periphery of ward office	28.024913° 84.628570°	1,150	990	An unused barren land in the ward office premises

13	Jogidanda Khel Maidan		4	Playground	28.017136° 84.663872°	2,100	922	A recently expanded playground at a close distance from a scattered settlement
14	Darim Danda Khel Maidan		4	Playground	28.010719° 84.654941°	2,610	1,052	A playground under construction, located next to Ward number 4 office, can be a suitable open space for nearby communities after the construction is completed
15	Ram Laxman Khel Maidan		4	Playground	27.986305° 84.649949°	2,215	890	A public land which is sometimes used as a playground, surrounded by forest on all sides
16	Baniya Gaun Pandhera Chaur		4	Community gathering spot	28.005299° 84.651479°	320	952	A small sized public land located nearby a settlement; a water tap is available in the area

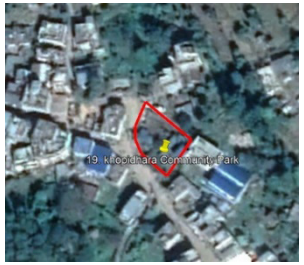
17	Bhimsen Thapa Park		4	Picnic spot and park	28.016157° 84.645413°	1,160	1,310	A popular park that has a statue of the former prime minister of Nepal- Bhimsen Thapa
18	Garhapani		4	Community gathering spot	27.999889° 84.646624°	No remarkable flat area	1,053	Sloped land covered with trees and vegetation; the Municipality has allocated budget to expand the area as an open space
19	Narshal Chaur		4	Community gathering spot	28.003516° 84.653572°	160	880	An open public land located near to a settlement, also has a community building in the periphery
20	Putali Bagaincha		4	Picnic spot and park	28.007636° 84.656764°	No remarkable flat area	982	Sloped area with a resting place, few settlements located nearby

21	Paschimkali Area		5	Picnic spot and park	28.000927° 84.600959°	6,000	1,007	Large area covered with trees and vegetation, a picnic spot, a mini zoo, a community building, a toilet, a playground and several other objects, also a potential helipad is located towards the southern corner of the site
22	Bandeli Dhara Chaur		5	Playground	28.008262° 84.601571°	2,500	871	This area is currently being developed as a playground
23	Paschimkali Children Park Area		5	Picnic spot and park	28.004274° 84.610341°	No remarkable flat area	1,095	Children park with constructions setup well suited for a park, no significant flat area available
24	Amalpani Bastiko Chaur		5	Community gathering spot	28.000542° 84.586588°	300	623	A small sized community space with a sloped landscape and is surrounded by trees and vegetation

25	Boharabesi 10 Mure Bagaincha		5	Picnic spot and park	28.010593° 84.587350°	250	470	A small sized garden with a few residential buildings nearby
26	Drabya Shaha Park Area		5	Picnic spot and park	28.004483° 84.606122°	1,500	1,063	A park with a historical significance, consists a statue of King Drabya Shah, also consists of a small ground in the periphery
27	Gairikuwa Chaur		5	Community gathering spot	28.008032° 84.628650°	1,050	1,205	A public land which is currently being used as a playground, a resting place and a funeral space
28	Gorkha Durbar Parking Area		5	Periphery of Gorkha Durbar	28.005377° 84.630279°	1,750	1,340	A public land which is currently used as a parking space for Gorkha Durbar

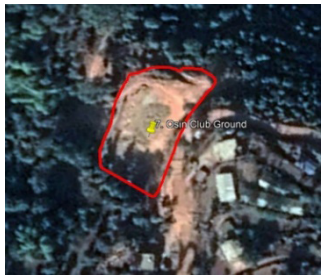
29	Nibuwa Chaur		5	Playground	28.002839° 84.593710°	1,350	761	A small sized playground, few settlements located nearby
30	Padhelthok Khel Maidan		5	Playground	28.007238° 84.633380°	1,500	1,335	A playground near Padelthok settlement, consists of a tap, a community building and a public toilet in the vicinity
31	Pauwadhara Chaur		5	Community gathering spot	28.009783° 84.607128°	300	883	A small sized open area located next to the road on the way to Ward number 10 health post, rarely used by locals
32	Raatamate Chaur		5	Community gathering spot	28.015438° 84.590424°	No remarkable flat area	485	A large sized public land currently covered with trees and vegetation, no significant usable flat area

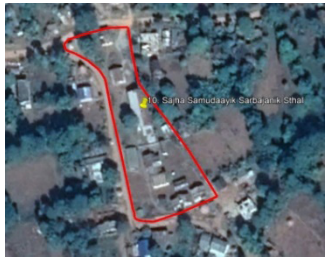
33	Simpaani Chaur		5	Playground	28.013736° 84.595900°	1,630	631	A community playground which is now rarely used by locals, covered by thick grassland
34	Army Ground		6	Periphery of army barrack	27.999445° 84.622439°	3,650	1,105	A flat open ground being used and maintained by Nepal Army; this area is also used as a helipad
35	Bosepani Dhara and Community Centre		6	Community gathering spot	27.996062° 84.628390°	800	1,082	A public land with a small sized playground, also used for cultural programs and as a community gathering place, a community building is within the area, WASH facility is also available in the area
36	Gorkha Museum		6	Periphery of museum	27.998698° 84.624328°	1,250	1,109	Museum, popular as Tallo Durbar, contains a large park within the premises, the park also has some flat areas available

37	Khopidhara Community Park		6	Picnic spot and park	27.998590° 84.625803°	No remarkable flat area	1,115	A small sized park used by locals as a recreational area, a community tap lies next to the park
38	Mahendra Jyoti Madhyamik Bidhyalaya		6	Periphery of school	28.001003° 84.625027°	1,250	1,154	Playground within the premises of Mahendra Jyoti School, located near to settlements
39	Ranipokhari Gorkha		6	Picnic spot and park	27.999761° 84.623111°	1,300	1,109	A public land with a park and a pond near the army barrack, the site was used for temporary settlements during the 2015 earthquake as there were no other places around
40	Beldanda Khelkud Maidan		7	Playground	27.982973° 84.607355°	4,000	670	A large sized playground surrounded by trees, close to a scattered settlement, few buildings are located nearby, the ground is rarely used by the community

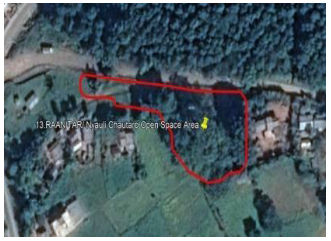
41	Gorkha Covered Hall Construction Site		7	Periphery of covered hall	28.000574° 84.618440°	2,200	1,071	This area is under construction, close to settlement, currently being used as a parking area
42	Construction Site (New bus park)		7	Periphery of public place	27.999441° 84.610652°	2,000	977	Bus park area under construction
43	Tharpu Khel Maidan		7	Playground	27.993291° 84.609569°	1,000	783	A small sized playground surrounded by trees and vegetation, located nearby a small settlement
44	Old Capital School		8	Periphery of school	27.993459° 84.630927°	3,800	1,085	A large playground within the school premises

45	Sahid Park Chaur		8	Community gathering spot	27.992863° 84.633791°	2,500	1,185	A public park consisting of a playground and a park, surrounded by vegetation, the park also consists of a community building
46	Saraswati Madhyamik School		8	Periphery of school	27.980663° 84.636762°	1,820	1,070	Open space within the school premises and can be used during an emergency
47	Laxmi Community Academy		9	Periphery of school	27.966652° 84.621207°	2,750	800	Two school grounds in the school periphery, connected to an earthen road, currently being used as a playground by the school students, can be used during an emergency by nearby communities
48	Marchi Gaun Chautara		9	Community gathering spot	27.963047° 84.612754°	500	790	A small sized open area located next to a village road, currently being used as a community gathering spot

49	The Oshan Club Ground Area		9	Playground	27.974029° 84.624641°	1,850	792	Playground connected to an earthen road and close to settlement, the playground is at a high risk of soil erosion in the southern side, access road is in damaged condition
50	Amalapani Devithaan		10	Community gathering spot	27.998903° 84.582308°	No remarkable flat area	536	A small area in the temple premises, located next to the earthen village road
51	Baula Bagaincha		10	Picnic spot and park	28.001099° 84.580062°	No remarkable flat area	480	A small sized park, few settlements located nearby
52	Bhutte Bagaincha		10	Picnic spot and park	28.001694° 84.577457°	350	434	A small sized park occupied by trees in most of its area

53	Chha Bishe Bagaincha		10	Picnic spot and park	27.989150° 84.573170°	1,275	407	A public land area with a ground, few buildings and varied landscape, an earthen village road passes through this park
54	Sajha Samudaayik Sarbajanik Jagga		10	Community gathering spot	27.991594° 84.573599°	1,710	434	A multi-purpose area located at Chebetar, contains old government buildings, an evacuation centre being constructed by IOM is within the area
55	St Mary's School		11	Periphery of school	27.977601° 84.575157°	2,500	560	A playground within St. Mary's school premises, contains several buildings, the school is located right next to Abukhaireni-Gorkha highway, contains several buildings, other structures, and vegetation, a private land area and permission may be required from the school if needed to be used during an emergency
56	St Joseph's School		11	Periphery of school	27.973753° 84.566175°	6,500	410	A large sized properly maintained playground within St. Joseph's school, a private land area and permission may be required from the school if needed to be used during an emergency

57	12 Kilo Veterinary Area		11	Periphery of veterinary	27.979295° 84.573637°	1,250	497	Open area within the veterinary office premises, located near to Abukhaireni-Gorkha Highway
58	Barthok Bal Baatika		11	Picnic spot and park	27.973757° 84.583082°	No remarkable flat area	743	A public land with no remarkable usable flat area
59	Chandrajyoti Pra. Vi. 13 Kilo		11	Periphery of school	27.981463° 84.578060°	650	561	Small open area located within the school premises
60	Kolchaur		11	Community gathering spot	27.981566° 84.573131°	1,950	454	A small sized public land area located on the north eastern side of the highway, can be used as a gathering point

61	Majigara Community Space		11	Community gathering spot	27.979772° 84.581964°	No remarkable flat area	584	A small area located near to the Majigara community
62	Adaigaun Khelkud Maidan		12	Playground	27.958557° 84.551767°	No remarkable flat area	372	Large area but covered with thick vegetation and trees, hence no significant flat area
63	Gothetaari Deurali Ground		12	Community gathering spot	27.964097° 84.555043°	No remarkable flat area	378	A public land which could be a potential ground, currently occupied with thick vegetation and trees
64	Nyauli Chautaro Open Space		12	Picnic spot and park	27.954236° 84.558174°	1,250	453	A public land close to the main highway road, sloped area, a resting place is available in the area

65	Raanitar Udhyaan		12	Community gathering spot	27.966638° 84.562732°	1,750	427	A community space consisting of a public toilet, a resting place, a small sized community gathering spot and a playground, can be used as a multi-purpose centre during an emergency
66	Ram Shah Ma. Vi. Parisar		13	Periphery of school	27.939727° 84.531965°	5,400	687	A government school with few settlements nearby, consists of a playground and an open space just in front of the school buildings
67	Ajingare Open Space Area		13	Community gathering spot	27.914563° 84.533513°	5,000	295	A large sized public land located near to the river, high risk of flood during monsoon, connected to the nearby settlements via a link road
68	Simalgiri Picnic Spot		13	Picnic spot and park	27.916603° 84.546237°	5,500	495	A picnic spot at the bank of Daraudi River, a high-tension line passes directly above the site

69	Bhattabesi Khelkud Maidan		14	Playground	27.958031° 84.535634°	3,350	443	A playground under construction, surrounded by agricultural land, a road connects the playground to a nearby village main road
70	Gopling Phaant Bagaincha		14	Picnic spot and park	27.931571° 84.486889°	600	378	A small sized community park, surrounded by cultivation area, also has a community building in the periphery
71	Gorbung Gaun Chaur		14	Community gathering spot	27.944666° 84.506080°	755	737	A small area on the side of the road and near to Gorbung settlement
72	Kanyadevi Pra. Vi. Parisar		14	Periphery of school	27.929523° 84.493784°	1,500	361	A small sized land located near Kanya Devi school; it is a planned site for the construction of a park

73	Salangiri Pra. Vi.		14	Periphery of school	27.945160° 84.495986°	410	692	A small sized open space within the school premises, the site has an easy road access as it is located next to the village main road
74	Upallo Yangkot Maidan		14	Playground	27.922063° 84.512211°	1,750	416	A playground under construction, located in the western side of Upallo Yangkot village

Note: The aerial images used in the table above are extracted from Google Earth. The details of other locations in this municipality is based on the data from the 2019 survey.

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