Fundamental Data (Datum: WGS84, Projection: UTM zone45N)						
SN	Category	Contents	Type	Source	Field Name-Field Description (Attribute)	File Name (Shape)
00_	**Evaluation Grid**	**Mesh Grid of 250m * 250m in the study area** Note: Total number of grids: 11933 ,Grid size: 250m*250m	Polygon	JICA ERAKV, 2017	GridCode - Unique ID of Grid; PageNumber - Unique number of Grid; Shape_Leng - Perimeter of Grid in meter; Shape_Area - Area of Grid in square meter; Longitude - Longitude coordinate of the centroid of Grid in degree; Lattitude - Lattitude coordinate of the centroid of Grid in degree; UTMX - Easting Coordinate on UTM 45N in meter; UTMY - Northing Coordinate on UTM 45N in meter;	GRID250_KTM_WGS84_UTM45N
01_	**Administrative Boundary**	**Study Area**	Polygon	DoS, 2015 MoFALD, 2017 JICA ERAKV, 2017	Province - Province name; Provi_num - Province number; Area - Area of the study area in square kilometer calculated on a shape of the data using GIS software;	Study Area_ERAKV
		Municipality Boundary Note: Administrative boundary is based on reconstruction of municipality in 2017.	Polygon		Muni_Name - Name of municipality based on reconstruction of municipality in 2017; District - District name; Area - Area of municipality calculated on a shape of the data using GIS software;	Municipality_Boundary_2017
		Ward Boundary Note: Administrative boundary is based on reconstruction of municipality in 2017.	Polygon		Muni_Name - Name of municipality based on reconstruction of municipality in 2017; Ward_num - Ward number based on reconstruction of municipality in 2017; Muni_ward - Municipality name with Ward number; Area - Area of Ward calculated on a shape of the data using GIS software;	Ward_Boundary_2017
		Mask Layer of Study Area Note: Mask layer to hide surrounding area outside KV for Mapping	Polygon		-	Mask Layer_Outside_Study Area
		Municipality & Ward Boundaries Adjusted Based on Evaluation Grid	Polygon		Attribute data is same as Municipality and Ward boundaries.	Municipality_Boundary_2017_adjusted_on_Grid Ward_Boundary_2017_adjusted_on_Grid
02_	**Population**	**Ward-wise Population in 2011 Reorganized Based on Ward Boundary in 2017** Note: Old ward-wise population of Census 2011 was reorganized based on reconstruction of municipality in 2017.	Polygon	CBS, 2011 JICA ERAKV, 2017	Muni_Name - Name of municipality based on reconstruction of municipality in 2017; Ward_num - Ward number based on reconstruction of municipality in 2017; Muni_ward - Municipality name with Ward number; District - District name; Household - Household number of Census 2011 based on reconstruction of municipality in 2017; Total_Pop - Total population of Census 2011 based on reconstruction of municipality in 2017; Male_Pop - Male population of Census 2011 based on reconstruction of municipality in 2017; Female_Pop - Female population of Census 2011 based on reconstruction of municipality in 2017; Area - Area of Ward calculated on a shape of the data using GIS software; Pop_Den - Population density based on reconstruction of municipality in 2017;	Population_Census2011_Reorganized_on_Ward2017
		Estimated Ward-wise Population in 2016 and in 2030 for Daytime and Nighttime	Polygon	JICA ERAKV, 2017	Muni_Name - Name of municipality based on reconstruction of municipality in 2017; Ward_num - Ward number based on reconstruction of municipality in 2017; Muni_ward - Municipality name with Ward number; DT_P_2016 - Estimated day time population in 2016; NT_P_2016 - Estimated night time Population in 2016; DT_P_2030 - Estimated day time Population in 2030; NT_P_2030 - Estimated night time population in 2030; Area - Area of Ward calculated on a shape of the data using GIS software; NT_16_DENS - Population density in 2016 for night time; NT_30_DENS - Population density in 2030 for Night time;	Estimated_Population_2016&2030_for_Day&Night

Fundamental Data

(Datum: WGS84, Projection: UTM zone45N)

SN	Category	Contents	Type	Source	Field Name-Field Description (Attribute)	File Name (Shape)
03_	General Building	**Building Footprints in Kathmandu Valley by Photographic Interpretation**	Polygon	UNDP/CDRMP, 2013 JICA ERAKV, 2017	-	KV_Building_Footprint
		Ward-wise Building Data in 2011 Reorganized Based on Ward Boundary in 2017 Note: Old ward-wise buildingdata of Census 2011 was reorganized based on reconstruction of municipality in 2017.	Polygon	CBS, 2011 JICA ERAKV, 2017	Muni_Name - Name of municipality based on reconstruction of municipality in 2017; Ward_num - Ward number based on reconstruction of municipality in 2017; Muni_ward - Municipality name with Ward number; MBBS - Building number of mud bonded bricks/stone; CBBS - Building number of cement bonded bricks/stone; RCCpill - Building number of RCC with pillar; WPiller - Building number of wooden pillar; Others - Building number of other structured;	Buildings_Census2011_Reorganized_on_Ward2017
		Grid-wise Estimated Building Distribution in 2015 **Grid-wise Estimated Building Distribution in 2016** **Grid-wise Estimated Building Distribution in 2030 without BSPS** **Grid-wise Estimated Building Distribution in 2030 with BSPS Case 01 to 05** BSPS: Building Seismic Performance Strengthening	Polygon	JICA ERAKV, 2017	GridCode - Unique ID of Grid; Bdg_Num (or BdgNo2030) - Estimated building number in object grid; Adobe_R - Estimated Building component ratio for **Adobe** in object grid; SMM_R - Estimated Building component ratio for **Stone with mud mortar joint** in object grid; BMM_1_R - Estimated Building component ratio for **Brick masonry with mud mortar joint, flex roof & over 20 years after construction** in object grid; BMM_2_R - Estimated Building component ratio for **Brick masonry with mud mortar joint, flex roof & 20 years and under after construction** in object grid; BMM_3_R - Estimated Building component ratio for **Brick masonry with mud mortar joint & rigid roof** in object grid; SCM_R - Estimated Building component ratio for **Stone with cement mortar joint** in object grid; BCM_R - Estimated Building component ratio for **Brick masonry with cement mortar joint** in object grid; RC_N_Eng_R - Estimated Building component ratio for **Non-engineered RC** in object grid; RC_Eng_R - Estimated Building component ratio for **Engineered RC** with low to mid-rise in object grid; Others_R - Estimated Building component ratio for Other structures in object grid; **Index of estimated building component ratio:** ***_R2 --> without BSPS // ***_C1 --> with BSPS Case01 // ***_C3 --> with BSPS Case02 // ***_C6 --> with BSPS Case03 // ***_C02 --> with BSPS Case04 // ***_C03 --> with BSPS Case05	Gridwise_Building_Distribution_2015 Gridwise_Building_Distribution_2016 Gridwise_Building_Distribution_2030_without_BSPS Gridwise_Building_Distribution_2030_with_BSPS_C01 Gridwise_Building_Distribution_2030_with_BSPS_C02 Gridwise_Building_Distribution_2030_with_BSPS_C03 Gridwise_Building_Distribution_2030_with_BSPS_C04 Gridwise_Building_Distribution_2030_with_BSPS_C05
		Ward-wise Estimated Building Distribution in 2016 **Ward-wise Estimated Building Distribution in 2030 without BSPS** **Ward-wise Estimated Building Distribution in 2030 with BSPS Case 01 to 05** BSPS: Building Seismic Performance Strengthening	Polygon	JICA ERAKV, 2017	Muni_Name - Name of municipality based on reconstruction of municipality in 2017; Ward_num - Ward number based on reconstruction of municipality in 2017; Muni_ward - Municipality name with Ward number; Bdg_Num - Estimated building number in object Ward; Adobe - Estimated Building number for **Adobe** in object Ward; B_SMM - Estimated Building number for **Brick masonry & stone with mud mortar joint** in object Ward; B_SCM - Estimated Building number for **Brick masonry & stone with cement mortar joint** in object Ward; RCNE - Estimated Building number for **Non-Engineered RC** in object Ward; RCE - Estimated Building number for **Engineered RC** with low to mid-rise in object Ward; Others - Estimated Building number for **Other structures** in object Ward; Adobe_R - Estimated Building component ratio for **Adobe** in object Ward; B_SMM_R - Estimated Building component ratio for **Brick masonry & stone with mud mortar joint** in object Ward; B_SCM_R - Estimated Building component ratio for **Brick masonry & stone with cement mortar joint** in object Ward; RCNE_R - Estimated Building component ratio for **Non-Engineered RC** in object Ward; RCE_R - Estimated Building component ratio for **Engineered RC** with low to mid-rise in object Ward; Others_R - Estimated Building component ratio for **Other structures** in object Ward; B_SMM = BMM_1 + BMM_2 + BMM_3 + SMM B_SCM = BCM + SCM	Wardwise_Building_Distribution_2016 Wardwise_Building_Distribution_2030_without_BSPS Wardwise_Building_Distribution_2030_with_BSPS_C01 Wardwise_Building_Distribution_2030_with_BSPS_C02 Wardwise_Building_Distribution_2030_with_BSPS_C03 Wardwise_Building_Distribution_2030_with_BSPS_C04 Wardwise_Building_Distribution_2030_with_BSPS_C05

Fundamental Data						
(Datum: WGS84, Projection: UTM zone45N)						
SN	Category	Contents	Type	Source	Field Name-Field Description (Attribute)	File Name (Shape)
04_	Facility Building	Distribution of School Buildings	Point	DoE, 2015 Flagship 1 of NRRC, 2014 JICA ERAKV, 2017	BUIL_CODE - Unigue building code, M: Main building, A: Associated building; SQ_BUILDIN - Category which Main or Associate Building; Name - Name of school; Latitude & Longitude - Coordinate of building location based on WGS-1984; Classifica - Classification of school (Primary, Lower Secondary, Secondary, Higher Secondary, College etc); Operator_t - Ownership (Private or Government); Building_s - Building structure type; Damage_Fun - Category of damage function for building sesmic risk assessment; (1: Adobe // 2: BMM_1, SMM // 3: BMM_2, BMM_3 // 4: BCM, SCM // 5: RC_N_Eng // 6: RC_Eng) **Attributes sourced from Flagship 1 of NRRC, there are partly some branks in following attributes** Personnel_ - Number of employee; Student_co - Number of student; Occupant_d - Number of occupant in daytime; Occupant_n - Number of occupant in nighttime; Building_o - Building occupancy type, (Self or Rent); Building_l - Number of story; Column_siz - Size of column; Floor_mate - Material of floor; Roof_shape - Shape of roof; Roof_mater - Material of roof; Start_date - Period of operation;	School_Buildings
		Distribution of Health Facilities	Point	DoH, 2015 Flagship 1 of NRRC, 2014 JICA ERAKV, 2017	SQ_BUILDIN - Category which Main or Associate Building; Name - Name of health facility; Latitude & Longitude - Coordinate of building location based on WGS-1984; Classifica - Classification of facilities (Hospital, Healthpost, Clicnic etc); Operator_t - Ownership (Private or Government); Structure - Building structure type; Damage_Fun - Category of damage function for building sesmic risk assessment; (1: Adobe // 2: BMM_1, SMM // 3: BMM_2, BMM_3 // 4: BCM, SCM // 5: RC_N_Eng // 6: RC_Eng) **Attributes sourced from Flagship 1 of NRRC, there are partly some branks in following attributes** Personnel_ - Number of employee; Capacity_b - Bed capacity; Occupant_d - Number of occupant in daytime; Occupant_n - Number of occupant in nighttime; Building_o - Building occupancy type, (Self or Rent); Building_l - Number of story ; Column siz - Size of column; Floor_mate - Material of floor; Roof_shape - Shape of roof; Roof_mater - Material of roof; Start_date - Period of operation;	Health_Facility_Buildings

Fundamental Data						
(Datum: WGS84, Projection: UTM zone45N)						
SN	Category	Contents	Type	Source	Field Name-Field Description (Attribute)	File Name (Shape)
		Distribution of Government Buildings	Point	DUDBC, 2015 JICA ERAKV, 2017	BUIL_CODE - Unigue building code, M: Main building, A: Associated building; SQ_BUILDIN - Category which Main or Associate Building; NAME - Name of building; LATITUDE & LONGITUDE - Coordinate of building location based on WGS-1984; PRIMARY_OC - Primary occupancy (Office, Residential, Museum etc) CATEGORY - Category of building (Ministers Quater, Department, District office, Municipality office etc); TYPE_CONST - Building structure type; DAMAGE_FUN - Category of damage function for building sesmic risk assessment; (1: Adobe // 2: BMM_1, SMM // 3: BMM_2, BMM_3 // 4: BCM, SCM // 5: RC_N_Eng // 6: RC_Eng) NO_STOREY - Number of story; COLUMN_SIZ - Size of column; TYPE_ROOF - Type of roof; TYPE_FLOOR - Type of floor;	Government_buildings
05_	**Road Network**	**General Road Network**	Line	DoR, 2015 DoLIDAR, 2015 JICA ERAKV, 2017 UNDP/CDRMP, 2013	Object_id - UNIQUE ID of each road segment used for risk assessment; SUR_TYPE - Road surface type; ROAD_WIDTH - Width of road; PAVE_TYPE - pave condition; Start_End - Place name at start and end of road; STATUS - Existig status of road; Remarks - Note if any; LINKNAME - Link Name of Road; ROADCLASS - Class of Road; ROADNAME - Road name; RW_Cat - Category of road width; Length - Length of road segment in meter;	Road_Network
		Emergency Transportation Road Network Proposed by JICA RRNE	Line	JICA RRNE, 2017	name - Road name; Category - Class of Road; Length - Length of road segment in kilo meter;	ETRN
06_	**Bridge**	**Distribution of Bridges**	Point	DoR, 2015 JICA ERAKV, 2017	SQ_No - Unique ID of Bridge; DoR_Bridge - Code of Bridge provided by DOR; Bridge_nam - Bridge name; Latitude & Longitude - Coordinate of bridge location based on WGS-1984; Bridge_Type - Type of Bridge; Substructu - Sub structure type of Bridge; Total_Leng - Length of Bridge in meter; No_of_Spa - Number of span; Span_Type - Type of Span; Remarks - Note if any;	Bridge

Fundamental Data						
(Datum: WGS84, Projection: UTM zone45N)						
SN	Category	Contents	Type	Source	Field Name-Field Description (Attribute)	File Name (Shape)
07_	Water Supply Network	Distribution of Water supply Network (Existing)	Line	KUKL, 2005	NP_ID - Uniqe code of object; TYPE - Type of pipe material; DIA - Diameter of pipe in millimeter; YEAR - Construction year; AGE - Approx operational period; RNAME- Site of the pipe line; PIPE_ID- Uniqe code of pipeline segment;	KV_WaterSupply_Line
		Distribution of Water Supply Network (Planned)	Line	KUKL, 2016	Layer - Information for construction of pipe distribution; Diameter - Diamter of pipe in millimeter; TYP_Materi - Type of pipe material;	Proposed_Pipeline_Final
08_	Sewage Network	Distribution of Sewage newtwork (Existing)	Line	KUKL, 2015	id - Unique id of sewer line segment; mea_length - Length of pipeline segment in meter; sew_sec - Cross section shape of pipeline; sew_mat - Type of pipe material; sw_dia_dep - Diameter of pipe; pave_type - Type of road pavement along sewer pipeline; road_width - Road width along sewer pipeline; cons_year - Construction year;	sewer
09_	Telecom Network	Distribution of BTS Towers	Point	NTA,NTC,Ncell, 2015 JICA ERAKV, 2017	SN - Unique ID Of BTS tower; Buil_Code - Unique code provided based on SN; Tower_owne - Ownership of tower; Site_Name - Name of tower site; Latitude & Longitude - Coordinate of tower location based on WGS-1984; Tower_Type - Tower type (Rooftop, GBT:Ground Based Tower); Tower_Ht_m - Tower height in meter; Bldg_Type - Building structure type if tower is located on a building; Bdg_Class - Engineered RC or Non-engineered RC; No_Stry - Number of Story; Bldg_Usage - Usage of Building;	BTS_Tower
10_	Electricity Network	Area of Power Distribution & Consumer Service	Polygon	NEA, 2016	Distributi - Area name of power distribution and Consumer service;	Electricity Base Area
		Estimated Power Pole distribution	Polygon	JICA ERAKV, 2017	GridCode - Unique ID of Grid; Pole_No - Estimated power pole number in object grid; Bdg_Num - Estimated building number in 2016 in object grid;	Estimated_Power_pole_Number_in_Grid
11_	Landuse	Land Use in 2012	Polygon	UNDP/CDRMP, 2013	OBJECTID - Unique ID of polygon; Class2012 - Landuse category; Shape_Area - Area of polygon in square kilometer calculated on a shape of the data using GIS software;	UNDP_LANDUSE2012
12_	Open Space	Distribution of Open space in Lalitpur Metropolitan City, Bhaktapur and Budhanilkantha Municipalities	Polygon	KVDA, 2014 JICA ERAKV, 2017	Muni_Name - Municipality name where object open space is located; Area - Area of open space in square meter calculated on a shape of the data using GIS software; Unique_ID - Unique ID of open space; Area_KVDA_ - Area of open space in square meter based on KVDA map document; Remarks - Note if any;	Open_Space
13_	Major Rivers and Streams	Major River	Line	2002 JICA Project, UN OCHA, 2014 JICA ERAKV, 2017	LENGTH - Length of river calculated on a shape of the data using GIS software;	Major_River_UTM45N_WGS84
		Minor River(Stream)			LENGTH - Length of river calculated on a shape of the data using GIS software;	kv_riverl_sdn_wgs84

Fundamental Data						
(Datum: WGS84, Projection: UTM zone45N)						
SN	Category	Contents	Type	Source	Field Name-Field Description (Attribute)	File Name (Shape)
14_	**Building Inventory Survey Result**	**Result of All Building Inventory and Damage Survey in Lalitpur Sub Metropolitan City** **Result of All Building Inventory and Damage Survey in Bhaktapur Municipality** **Result of Sample Building Inventory and Damage Survey in Kathmandu Valley**	Line	JICA ERAKV, 2016	BLD_ID (or Main ID) - Building ID; LATITUDE & LONGITUDE (or Lat_Co & Long_Co) - Coordinate of building location based on WGS-1984; STRU_TYP (or Structure) - Building structure type; IRREGULAR - Irregular Structure (Soft story, overhang etc.); ROOF_TYPE (or Roof) - Type of Roof (Rigid, Flexible); CONST_YEAR (or Construted) - Approx. years passed since construction; USAGE - Usage of building; BREADTH & LENGTH - Breadth and length of building area in meter; STOREY - Number of story; ADJ_BLD (or AdjacentBu) - Adjacent building; DAMGE_DGR - Damage degree due to Gorkha EQ based on EMS-98 Damage definition; CRR_BLD_CN (or BuildingCo) - Current building condition after Gorkha EQ; GND_FLR (or Groundfail) - Ground failure due to Gorkha EQ; LAND_SLOPE - Land slope; MUN -Municipality name WARD_NO – Ward number; TOLE – Tole name; BLD_ADD (or Remark) – Additional explanation, if any;	Lalitpur_Sub_Metro_Survey_Result Bhaktapur_Minicipality_Survey_Rresult KV_Smaple_Survey_Result
15_	**Zoning**	**Zoning of Kathmandu Valley 2007**	Polygon	KVDA 2007	Sub_Class - Sub Zone Main_Class - Main Zone Area - Area of Zone in Hectare	Zoning
16_	**Landcover (1:10,000 Topographic Map)**	**Vegetation** **Waterbody** **Parks**	Polygon	JICA RRNE	FCODE - Unique ID of each Landcover Layer - Classification of Landcover Text - Name of Parks and River Shape _Area - Area of Landcover	Vegetation Park Hydro
17_	**Emergency Service Office**	**Location of Emergency Service Office, Police and Fire Station**	Point	JICA RRNE	Name - Name of office Category - Category of office	Emergency Service office

Seismic Hazard Assessment Relevant Data						
(Datum: WGS84, Projection: UTM zone45N)						
SN	Category	Contents	Type	Source	Field Name - Field Description (Attribute)	File Name (Shape)
01_	Geomorphology	**Geomorphological Map in Kathmandu Valley**	Polygon	JICA ERAKV, 2016	OBJECTID - Unique ID of polygon; GEOM - Unique code of surface; Main_Surfa - Type of geomorphological class (Fluvial surfaces, Deltaic-lacustrine surfaces, Other surfaces); Sub_Class - Sub class under geomorphological classes; ABBR - Relationship between class of Deltatic-lacustrine surfaces and name of terraces; Shape_Area - Area of Polygon calculated on a shape of the data using GIS software;	Geom_Map_KV3_UTM45N_WGS84
		Active Fault in Kathmandu Valley	Line	JICA ERAKV, 2016	-	Active_Fault_UTM45N_WGS84
		Landslides in Kathmandu Valley	Line	JICA ERAKV, 2016	-	Landslide_UTM45N_WGS84
02_	Altitude Distribution	**Digital Elevation Model in Kathmandu Valley**	Raster	UNDP/CDR MP, 2013	Resolution: 10m	DEM_KTM_Valley.tif
		Hill Shade in Kathmandu Valley	Raster	UNDP/CDR MP, 2013	Analyzed based on digital elevation model	Hillshade_KTM_Valley.tif
03_	AVS30	**Grid-wise AVS30 Distribution Estimated from Ground Model**	Polygon	JICA ERAKV, 2016	GridCode - Unique ID of Grid; Surface - Sub class of geomorphology in object grid; Altitude- Altitude value in object grid; AVS30- AVS30 value in object grid;	AVS30_0322
		Estimated AVS30 base on Geomorphological Unit	Raster	JICA ERAKV, 2016	Develped based on geomorphological map and a variety of survey results. The data show the softness of ground.	GRID50_AVS30_Raster4
04_	Predominant Period	**Grid-wise Predominant Period of Ground**	Polygon	JICA ERAKV, 2016	GridCode - Unique ID of Grid; Predom_Prd: Predominant Period calculated by SHAKE91 (sec) in object grid; 2nd_Peak: Secondary Peak Period calculated by SHAKE91 (sec) in object grid;	Predom_Period
05_	Scenario Earthquake	**Fault Model of Scenario Earthquake** - Western Nepal Scenario Earthquake Model - Central Nepal South Scenarion Earthquake Model	Polygon	JICA ERAKV, 2016	Shape_Leng - Perimeter of scenario model calculated on a shape of the data using GIS software; Shape_Area - Area of scenario model calculated on a shape of the data using GIS software;	File1- West File2- South
06_	Seismic Intensity	**Grid-wise Peak Ground Acceleration (PGA) Distribution** -Western Nepal Scenario Earthquake (WN) -Cental Nepal South Scenario Earthquake-1/3 (CNS-1) -Cental Nepal South Scenario Earthquake-1/2 (CNS-2) -Cental Nepal South Scenario Earthquake-2/3 (CNS-3)	Polygon	JICA ERAKV, 2016	GridCode - Unique ID of Grid; PGA - Value of Peak Ground Acceleration in gal in object grid; Shape_Leng - Perimeter of Grid in meter; Shape_Area - Area of Grid in square meter;	File1- PGA_WN File2- PGA_CNS1 File3- PGA_CNS2 File4- PGA_CNS3

Seismic Hazard Assessment Relevant Data						
(Datum: WGS84, Projection: UTM zone45N)						
SN	Category	Contents	Type	Source	Field Name - Field Description (Attribute)	File Name (Shape)
07_	Seismic Intensity	**Grid-wise Peak Ground Velocity (PGV) Distribution** -Western Nepal Scenario Earthquake (WN) -Cental Nepal South Scenario Earthquake-1/3 (CNS-1) -Cental Nepal South Scenario Earthquake-1/2 (CNS-2) -Cental Nepal South Scenario Earthquake-2/3 (CNS-3)	Polygon	JICA ERAKV, 2016	GridCode - Unique ID of Grid; PGV - value of Peak Ground Velocity in kine in object grid; Shape_Leng - Perimeter of Grid in meter; Shape_Area - Area of Grid in square meter;	File1- PGV_WN File2- PGV_CNS1 File3- PGV_CNS2 File4- PGV_CNS3
08_	Seismic Intensity	**Grid-wise Modified Mercalli Intensity (MMI) Distribution** -Western Nepal Scenario Earthquake (WN) -Cental Nepal South Scenario Earthquake-1/3 (CNS-1) -Cental Nepal South Scenario Earthquake-1/2 (CNS-2) -Cental Nepal South Scenario Earthquake-2/3 (CNS-3)	Polygon	JICA ERAKV, 2016	GridCode - Unique ID of Grid; MMI - Value of Modified Mercalli Intensity in object grid; Shape_Leng - Perimeter of Grid in meter; Shape_Area - Area of Grid in square meter;	File1- MMI_WN File2- MMI_CNS1 File3- MMI_CNS2 File4- MMI_CNS3
09_	Seismic Intensity	**Grid-wise Acceleration Response Spectrum Distribution** -Western Nepal Scenario Earthquake (WN) -Cental Nepal South Scenario Earthquake-1/3 (CNS-1) -Cental Nepal South Scenario Earthquake-1/2 (CNS-2) -Cental Nepal South Scenario Earthquake-2/3 (CNS-3)	CSV file	JICA ERAKV, 2016	GridCode - Unique ID of Grid; PGA - Value of Peak Ground Acceleration in object grid; Sa (0.05 ot 10.0 sec) - Value of acceleration response spectrum in gal;	File1- ARS_WN File2- ARS_CNS1 File3- ARS_CNS2 File4- ARS_CNS3
10_	Liquefaction	**Grid-wise Liquefaction Possibility in Dry and Rainy Seasons** -Western Nepal Scenario Earthquake (WN) -Cental Nepal South Scenario Earthquake-1/3 (CNS-1) -Cental Nepal South Scenario Earthquake-1/2 (CNS-2) -Cental Nepal South Scenario Earthquake-2/3 (CNS-3)	Polygon	JICA ERAKV, 2016	GridCode - Unique ID of Grid; WN_Dry - Liquefaction possibility in dry season based on WN in object grid; WN_Wet - Liquefaction possibility in rainy season based on WN in object grid; CNS1_Dry - Liquefaction possibility in dry season based on CNS-1 in object grid; CNS1_Wet - Liquefaction possibility in rainy season based on CNS-1 in object grid; CNS2_Dry - Liquefaction possibility in dry season based on CNS-2 in object grid; CNS2_Wet - Liquefaction possibility in rainy season based on CNS-2 in object grid; CNS3_Dry - Liquefaction possibility in dry season based on CNS-3 in object grid; CNS3_Wet - Liquefaction possibility in rainy season based on CNS-3 in object grid; H: High possibility // M: Moderate possibility // L: Low possibility // O: No possibility	Liquefaction_Possibility_Class
11_	Slope Failure	**Grid-wise Earthquake induced Slope Failure Possibility** -Western Nepal Scenario Earthquake (WN) -Cental Nepal South Scenario Earthquake-1/3 (CNS-1) -Cental Nepal South Scenario Earthquake-1/2 (CNS-2) -Cental Nepal South Scenario Earthquake-2/3 (CNS-3)	Polygon	JICA ERAKV, 2016	GridCode - Unique ID of Grid; SF_WN- Value of Slope failure possibility based on WN in object grid; SF_CNS1- Value of Slope failure possibility based on CNS-1 in object grid; SF_CNS2- Value of Slope failure possibility based on CNS-2 in object grid; SF_CNS3- Value of Slope failure possibility based on CNS-3 in object grid; 50 < Value <= 100: High // 25 < Value <= 50: Moderate // 0< Value <=25: Low // 0: No possibility	SlopeFailure_Possibility

Seismic Hazard Assessment Relevant Data						
(Datum: WGS84, Projection: UTM zone45N)						
SN	Category	Contents	Type	Source	Field Name - Field Description (Attribute)	File Name (Shape)
12_	Liquefaction Susceptibility base on Geomorphological Unit	Geomorphological Map in Kathmandu Valley	Polygon	JICA ERAKV, 2016	OBJECTID - Unique ID of polygon; GEOM - Unique code of surface; Main_Surfa - Type of geomorphological class (Fluvial surfaces, Deltaic-lacustrine surfaces, Other surfaces); Sub_Class - Sub class under geomorphological classes; ABBR - Relationship between class of Deltatic-lacustrine surfaces and name of terraces; Shape_Area - Area of Polygon calculated on a shape of the data using GIS software; Susceptible with high ground water level: al (Alluvial plain), vp (Valley plain formed by tributary stream), fr (Former river course), bm (Back marsh), nl (Natural levee and slightly hilliy area formed by dry river bed), at (Artificially transformed land except terraces)	Geom_Map_KV3_UTM45N_WGS84
		Mask Layer	Polygon	JICA ERAKV, 2016	This layer file is used to exclude a part of Artificially transformed land (at) from susceptible area	Mask layer.shp
		Liquefaction History - 2015 Gorkha Earthquake - 1934 Bihar Earthquake	Point	JICA ERAKV, 2016	Name (or Locations) - Name of location for liquefaction history Detail_des - Detail description	Liquefaction_2015GorkhaEq_UTM45N_WGS84 Liquefaction_1934BiharEq_UTM45N_WGS84
13_	Slope Failure Susceptibility base on Geomorphological Unit	Geomorphological Map in Kathmandu Valley	Polygon	JICA ERAKV, 2016	OBJECTID - Unique ID of polygon; GEOM - Unique code of surface; Main_Surfa - Type of geomorphological class (Fluvial surfaces, Deltaic-lacustrine surfaces, Other surfaces); Sub_Class - Sub class under geomorphological classes; ABBR - Relationship between class of Deltatic-lacustrine surfaces and name of terraces; Shape_Area - Area of Polygon calculated on a shape of the data using GIS software; Susceptible Geomorphological Unit: Ls (Land slide and Land collapse), es (Eroded slope and cliff), fa (Fan), ta (Talus), Bs (Geomorphological Basement)	Geom_Map_KV3_UTM45N_WGS84
		Geological Units	Polygon	UNDP/CDR MP, 2013	GEOLOGY_ - Unique ID of polygon; GEOLOGY_ID - Type of geology ABBR- Short abbreibation for different formation of soil; FORMATION- Formation of soil; AREA - Area of Polygon calculated on a shape of the data using GIS software; PERIMETER - Perimeter of Polygon calculated on a shape of the data using GIS software;	KV_Geology_UTM45N_WGS84
		20m Interval Contour	Line	UNDP/CDR MP, 2013	OBJECTID- Unique ID of each contour; Contour- Elevation values of each contour in meter;	Contour_Dem10_20m
		Slope Failure History - 2015 Gorkha Earthquake - Rainfall after Earthquake - Landslide (DMG)	Point	DMG, JICA ERAKV, 2016	x & y - coordinate of point in degree; Addree - Name of location for slope failure history	SlopeFailure_Earthquake_UTM45N_WGS84 SlopeFailure_SeasonalRainfall_UTM45N_WGS84 Landslide_DMG_UTM45N_WGS84

Seismic Risk Assessment Relevant Data						
(Datum: WGS84, Projection: UTM zone45N)						
SN	Category	Contents	Type	Source	Field Name - Field Description (Attribute)	File Name (Shape)
01_	Damage of General Buildings	**Grid-wise Estimated Damaged Building Distribution in 2016 based on 4 Scenario EQ** **Grid-wise Estimated Damaged Building Distribution in 2030 without BSPS based on 4 Scenario EQ** **Grid-wise Estimated Damaged Building Distribution in 2030 with BSPS Case 01 to 05 based on 4 Scenario EQ** BSPS: Building Seismic Performance Strengthening -Western Nepal Scenario Earthquake (WN) -Cental Nepal South Scenario Earthquake-1/3 (CNS-1) -Cental Nepal South Scenario Earthquake-1/2 (CNS-2) -Cental Nepal South Scenario Earthquake-2/3 (CNS-3)	Polygon	JICA ERAKV, 2017	GridCode - Unique ID of Grid; Prdmnt_Prd - Predominant Period in object grid; PGA - Value of Peak Ground Acceleration in gal in object grid; Bldg_N2016 (or BdgNo2030) - Estimated building number in 2016 (or 2030) in object grid; Bldg_IncrR - Increase rate of building number from in 2016 to in 2030; *****_R - Estimated Building component ratio for ***** in object grid; *****_D45 - Number of damaged buildings for ***** with Damage Level 4+5 in object grid; N_TDB_D45 - Total number of damaged buildings with Damage Level 4+5 in object grid; *****_D345 - Number of damaged buildings for ***** with Damage Level 3+4+5 in object grid; N_TDB_D345 - Total number of damaged buildings with Damage Level 3+4+5 in object grid; *****_D2345 - Number of damaged buildings for ***** with Damage Level 2+3+4+5 in object grid; N_TDB_D45 - Total number of damaged buildings with Damage Level 2+3+4+5 in object grid; N_MSRY_HD - Number of heavily (DL4+5) damaged masonry buildings in object grid; N_RC_HD - Number of heavily (DL4+5) damaged RC buildings in object grid; N_TDB_HD - Total number of heavily (DL4+5) damaged buildings in object grid; R_TDB_HD - Ratio of heavily (DL4+5) damaged buildings in object grid; N_MSRY_MD - Number of moderately (DL3) damaged masonry buildings in object grid; N_RC_MD - Number of moderately (DL3) damaged RC buildings in object grid; N_TDB_MD - Total number of moderately (DL3) damaged buildings in object grid; R_TDB_MD - Ratio of moderately (DL3) damaged buildings in object grid; N_MSRY_SD - Number of slightly (DL2) damaged masonry buildings in object grid; N_RC_SD - Number of slightly (DL2) damaged RC buildings in object grid; Note: Adobe (or Adb): Adobe; SMM: Stone with mud mortar joint; BMM_1 (or BM1): Brick masonry with mud mortar joint, flex roof & over 20 years after construction; BMM_2 (or BM2): Brick masonry with mud mortar joint, flex roof & 20 years and under after construction; BMM_3 (or BM3): Brick masonry with mud mortar joint & rigid roof; SCM: Stone with cement mortar joint; BCM: Brick masonry with cement mortar joint; RC_N_Eng (or RCN): Non-engineered RC; RC_Eng (or RCE): Engineered RC with low to mid-rise; Others (or Ohr): Other structures;	GRID250_Damaged_Building_2016_WN GRID250_Damaged_Building_2016_CNS-1 GRID250_Damaged_Building_2016_CNS-2 GRID250_Damaged_Building_2016_CNS-3 GRID250_Damaged_Building_2030_withoutBSPS_WN GRID250_Damaged_Building_2030_withoutBSPS_CNS-1 GRID250_Damaged_Building_2030_withoutBSPS_CNS-2 GRID250_Damaged_Building_2030_withoutBSPS_CNS-3 GRID250_Damaged_Building_2030_withtBSPS01_WN GRID250_Damaged_Building_2030_withtBSPS01_CNS-1 GRID250_Damaged_Building_2030_withtBSPS01_CNS-2 GRID250_Damaged_Building_2030_withtBSPS01_CNS-3 GRID250_Damaged_Building_2030_withtBSPS02_WN GRID250_Damaged_Building_2030_withtBSPS02_CNS-1 GRID250_Damaged_Building_2030_withtBSPS02_CNS-2 GRID250_Damaged_Building_2030_withtBSPS02_CNS-3 GRID250_Damaged_Building_2030_withtBSPS03_WN GRID250_Damaged_Building_2030_withtBSPS03_CNS-1 GRID250_Damaged_Building_2030_withtBSPS03_CNS-2 GRID250_Damaged_Building_2030_withtBSPS03_CNS-3 GRID250_Damaged_Building_2030_withtBSPS04_WN GRID250_Damaged_Building_2030_withtBSPS04_CNS-1 GRID250_Damaged_Building_2030_withtBSPS04_CNS-2 GRID250_Damaged_Building_2030_withtBSPS04_CNS-3 GRID250_Damaged_Building_2030_withtBSPS05_WN GRID250_Damaged_Building_2030_withtBSPS05_CNS-1 GRID250_Damaged_Building_2030_withtBSPS05_CNS-2 GRID250_Damaged_Building_2030_withtBSPS05_CNS-3

Seismic Risk Assessment Relevant Data						
(Datum: WGS84, Projection: UTM zone45N)						
SN	Category	Contents	Type	Source	Field Name - Field Description (Attribute)	File Name (Shape)
02_	**Damage of School Buildings**	**Estimated Damage Probability of School Buildings based on 4 Scenario EQ** Western Nepal Scenario Earthquake (WN) -Cental Nepal South Scenario Earthquake-1/3 (CNS-1) -Cental Nepal South Scenario Earthquake-1/2 (CNS-2) -Cental Nepal South Scenario Earthquake-2/3 (CNS-3)	Point	JICA ERAKV, 2017	BUIL_CODE - Unigue building code, M: Main building, A: Associated building; SQ_BUILDIN - Category which Main or Associate Building; Name - Name of school; Latitude & Longitude - Coordinate of building location based on WGS-1984; Classifica - Classification of school (Primary, Lower Secondary, Secondary, Higher Secondary, College etc); Operator_t - Ownership (Private or Government); Building_s - Building structure type; Damage_Fun - Category of damage function for building sesmic risk assessment; (1: Adobe // 2: BMM_1, SMM // 3: BMM_2, BMM_3 // 4: BCM, SCM // 5: RC_N_Eng // 6: RC_Eng) PGA_CNS1 (CNS2, CNS3 or WN) - Value of Peak Ground Acceleration of CNS-1 in gal at object facility; Predo_time - Predominant Period at object facility; CNS1_D45 (CNS2, CNS3 or WN) - Building damage probability (Damage Level 4+5) based on scenario earthquake; CNS1_D345 (CNS2, CNS3 or WN) - Building damage probability (Damage Level 3+4+5) based on scenario earthquake; CNS1_D2345 (CNS2, CNS3 or WN) - Building damage probability (Damage Level 2+3+4+5) based on scenario earthquake; Occupancy- Number of occupant in object building;	Damage of School Buildings
03_	**Damage of Health facility Buildings**	**Estimated Damage Probability of Health Facilitiy Buildings based on 4 Scenario EQ** -Western Nepal Scenario Earthquake (WN) -Cental Nepal South Scenario Earthquake-1/3 (CNS-1) -Cental Nepal South Scenario Earthquake-1/2 (CNS-2) -Cental Nepal South Scenario Earthquake-2/3 (CNS-3)	Point	JICA ERAKV, 2017	BUIL_CODE - Unigue building code, M: Main building, A: Associated building; SQ_BUILDIN - Category which Main or Associate Building; Name - Name of health facility; Latitude & Longitude - Coordinate of building location based on WGS-1984; Classifica - Classification of facilities (Hospital, Healthpost, Clicnic etc); Operator_t - Ownership (Private or Government); Structure - Building structure type; Damage_Fun - Category of damage function for building sesmic risk assessment; (1: Adobe // 2: BMM_1, SMM // 3: BMM_2, BMM_3 // 4: BCM, SCM // 5: RC_N_Eng // 6: RC_Eng) PGA_CNS1 (CNS2, CNS3 or WN) - Value of Peak Ground Acceleration of CNS-1 in gal at object facility; Predo_time - Predominant Period at object facility; CNS1_D45 (CNS2, CNS3 or WN) - Building damage probability (Damage Level 4+5) based on scenario earthquake; CNS1_D345 (CNS2, CNS3 or WN) - Building damage probability (Damage Level 3+4+5) based on scenario earthquake; CNS1_D2345 (CNS2, CNS3 or WN) - Building damage probability (Damage Level 2+3+4+5) based on scenario earthquake;	Damage_of_Health_buildings
04_	**Damage of Government Buildings**	**Estimated Damage Probability of Government Buildings based on 4 Scenario EQ** -Western Nepal Scenario Earthquake (WN) -Cental Nepal South Scenario Earthquake-1/3 (CNS-1) -Cental Nepal South Scenario Earthquake-1/2 (CNS-2) -Cental Nepal South Scenario Earthquake-2/3 (CNS-3)	Point	JICA ERAKV, 2017	BUIL_CODE - Unigue building code, M: Main building, A: Associated building; SQ_BUILDIN - Category which Main or Associate Building; NAME - Name of building; LATITUDE & LONGITUDE - Coordinate of building location based on WGS-1984; PRIMARY_OC - Primary occupancy (Office, Residential, Museum etc) CATEGORY - Category of building (Ministers Quater, Department, District office, Municipality office etc); TYPE_CONST - Building structure type; DAMAGE_FUN - Category of damage function for building sesmic risk assessment; (1: Adobe // 2: BMM_1, SMM // 3: BMM_2, BMM_3 // 4: BCM, SCM // 5: RC_N_Eng // 6: RC_Eng) PGA_CNS1 (CNS2, CNS3 or WN) - Value of Peak Ground Acceleration of CNS-1 in gal at object facility; Predo_time - Predominant Period at object facility; CNS1_D45 (CNS2, CNS3 or WN) - Building damage probability (Damage Level 4+5) based on scenario earthquake; CNS1_D345 (CNS2, CNS3 or WN) - Building damage probability (Damage Level 3+4+5) based on scenario earthquake; CNS1_D2345 (CNS2, CNS3 or WN) - Building damage probability (Damage Level 2+3+4+5) based on scenario earthquake;	Damage_of_Government_buildings

Seismic Risk Assessment Relevant Data						
(Datum: WGS84, Projection: UTM zone45N)						
SN	Category	Contents	Type	Source	Field Name - Field Description (Attribute)	File Name (Shape)
05_	**Damage Possibility of Road due to Liquefaction & Slope Failure**	**Possible Damage of Road by Liquefaction based on 4 Scenario EQ** **Possible Damage of Road by Slope Failure based on 4 Scenario EQ** -Western Nepal Scenario Earthquake (WN) -Cental Nepal South Scenario Earthquake-1/3 (CNS-1) -Cental Nepal South Scenario Earthquake-1/2 (CNS-2) -Cental Nepal South Scenario Earthquake-2/3 (CNS-3) Note: These files were input data for calculation of total length of possible damage road in Kathmandu valley due to lequefaction and slope failure based on scenario earthquake using spread sheet-based calculation form.	Line	JICA ERAKV, 2017	OBJECT_ID - UNIQUE ID of each road segment used for risk assessment; SUR_TYPE - Road surface type; ROAD_WIDTH - Width of road; PAVE_TYPE - pave condition; RW_Cat - Category of road width; Length - Length of road segment in meter; ROADCLASS - Class of Road; GridCode - Unique ID of Grid; SF_WN- Value of Slope failure possibility based on WN in object grid; SF_CNS1- Value of Slope failure possibility based on CNS-1 in object grid; SF_CNS2- Value of Slope failure possibility based on CNS-2 in object grid; SF_CNS3- Value of Slope failure possibility based on CNS-3 in object grid; LAP_WN - Slope failure possibility based on WN in object grid; LAP_CNS1 - Slope failure possibility based on CNS-1 in object grid; LAP_CNS2 - Slope failure possibility based on CNS-2 in object grid; LAP_CNS3 - Slope failure possibility based on CNS-3 in object grid; (50 < Value <= 100: High // 25 < Value <= 50: Moderate // 0< Value <=25: Low // 0: No possibility) LIP_WN - Liquefaction possibility in rainy season based on WN in object grid (Same as WN_Wet); LIP_CNS1 - Liquefaction possibility in rainy season based on CNS-1 in object grid (Same as CNS1_Wet); LIP_CNS2 - Liquefaction possibility in rainy season based on CNS-2 in object grid (Same as CNS2_Wet); LIP_CNS3 - Liquefaction possibility in rainy season based on CNS-3 in object grid (Same as CNS3_Wet); (H: High possibility // M: Moderate possibility // L: Low possibility // O: No possibility)	Road_Network_with_Possibility_of_Liquefaction_and_Slope_failure
		Grid-wise Liquefaction Possibility in Rainy Season Located on Road Networkbased on 4 Scenario EQ	Polygon	JICA ERAKV, 2017	GridCode - Unique ID of Grid; LIP_WN - Liquefaction possibility in rainy season based on WN in object grid (Same as WN_Wet); LIP_CNS1 - Liquefaction possibility in rainy season based on CNS-1 in object grid (Same as CNS1_Wet); LIP_CNS2 - Liquefaction possibility in rainy season based on CNS-2 in object grid (Same as CNS2_Wet); LIP_CNS3 - Liquefaction possibility in rainy season based on CNS-3 in object grid (Same as CNS3_Wet);	Liquefaction Possibility Located on Road Network
		Grid-wise Slope Failure Possibility Located on Road Networkbased on 4 Scenario EQ	Polygon	JICA ERAKV, 2017	GridCode - Unique ID of Grid; SF_WN- Value of Slope failure possibility based on WN in object grid; SF_CNS1- Value of Slope failure possibility based on CNS-1 in object grid; SF_CNS2- Value of Slope failure possibility based on CNS-2 in object grid; SF_CNS3- Value of Slope failure possibility based on CNS-3 in object grid;	Slope Failure Possibility Located on Road Network

Seismic Risk Assessment Relevant Data						
(Datum: WGS84, Projection: UTM zone45N)						
SN	Category	Contents	Type	Source	Field Name - Field Description (Attribute)	File Name (Shape)
06_	Link Blockage of Road due to Debris_of_Collapsed_Buildings	**Road_Network with_Damage_Building_Number** - General Road Network in Kathmandu Valley - Emergency Transportation Road Network (ETRN) Proposed by JICA RRNE -Western Nepal Scenario Earthquake (WN) -Cental Nepal South Scenario Earthquake-1/3 (CNS-1) -Cental Nepal South Scenario Earthquake-1/2 (CNS-2) -Cental Nepal South Scenario Earthquake-2/3 (CNS-3) Note: This file was input data for calculation of gridwise link blockage of road network due to debris of collapsed buildings using spread sheet-based calculation form.	Line	JICA ERAKV, 2017	OBJECT_ID - UNIQUE ID of each road segment used for risk assessment; SUR_TYPE - Road surface type; ROAD_WIDTH - Width of road; PAVE_TYPE - pave condition; RW_Cat - Category of road width; Length - Length of road segment in meter; ROADCLASS - Class of Road; GridCode - Unique ID of Grid; Bldg_N2016 - Estimated building number in 2016 in object grid; WN_DL45 - Total number of damaged buildings with Damage Level 4+5 based on WN in object grid; WN_DL345 - Total number of damaged buildings with Damage Level #+4+5 based on WN in object grid; CS1_DL45 - Total number of damaged buildings with Damage Level 4+5 based on CNS-1 in object grid; CS1_DL345 - Total number of damaged buildings with Damage Level 3+4+5 based on CNS-1 in object grid; CS2_DL45 - Total number of damaged buildings with Damage Level 4+5 based on CNS-2 in object grid; CS2_DL345 - Total number of damaged buildings with Damage Level 3+4+5 based on CNS-2 in object grid; CS3_DL45 - Total number of damaged buildings with Damage Level 4+5 based on CNS-3 in object grid;	Road_Network with_Damage_Building_Number ETRN_with_Damage_Building_Number.shp
		Grid-wise Rate of Road Link Blockage due to Debris of Collapsed_Buildings based on 4 Scenario Earthquake - General Road Network in Kathmandu Valley - Emergency Transportation Road Network (ETRN) Proposed by JICA RRNE	Polygon	JICA ERAKV, 2017	GridCode - Unique ID of Grid; R_Length_m - Total length of road in object grid in meter; WN_RRLB- Average rate or road link blockage based on WN; CNS1_RRLB- Average rate or road link blockage based on CNS-1; CNS2_RRLB- Average rate or road link blockage based on CNS-2; CNS3_RRLB- Average rate or road link blockage based on CNS-3;	Link Blockage of Road due to Debris_of_Collapsed_Buildings ETRN_with_Damage_Building_Number
		Masked Area set up to eliminate grids of low building density from evaluation targets	Polygon	JICA ERAKV, 2017	GridCode - Unique ID of Grid; Mask - Evaluation target grid or not (0: Target grid, 1: Out of range for evaluation);	Mask_for_Low_Building_Density_Area
07_	Damage of Bridge	**Estimated Bridge Damage based on 4 Scenario EQ** -Western Nepal Scenario Earthquake (WN) -Cental Nepal South Scenario Earthquake-1/3 (CNS-1) -Cental Nepal South Scenario Earthquake-1/2 (CNS-2) -Cental Nepal South Scenario Earthquake-2/3 (CNS-3)	Point	JICA ERAKV, 2017	SQ_No - Unique ID of Bridge; DoR_Bridge - Code of Bridge provided by DOR; Bridge_nam - Bridge name; Latitude & Longitude - Coordinate of bridge location based on WGS-1984; Bridge_Type - Type of Bridge; Substructu - Sub structure type of Bridge; Total_Leng - Length of Bridge in meter; No_of_Spa - Number of span; Span_Type - Type of Span; Dam_WN - Damage level of Bridge based on WN; Dam_CNS-1 - Damage level of Bridge based on CNS1; Dam_CNS-2 - Damage level of Bridge based on CNS2; Dam_CNS-3 - Damage level of Bridge based on CNS3; (Heavy // Moderate // Slight // No visible)	Damage_of_Bridge
		Prioritization for Bridge Seismic Strengthening based on CNS-2	Point	JICA ERAKV, 2017	SQ_No - Unique ID of Bridge; DoR_Bridge - Code of Bridge provided by DOR; Bridge_nam - Bridge name; Latitude & Longitude - Coordinate of bridge location based on WGS-1984; Bridge_Type - Type of Bridge; Substructu - Sub structure type of Bridge; Total_Leng - Length of Bridge in meter; No_of_Spa - Number of span; Span_Type - Type of Span; Prio_CNS2- Result of prioritization for Bridge Seismic Strengthening based on CNS-2 (5 ranks);	Priority_of_Bridge_for_Seismic_Strengthening

Seismic Risk Assessment Relevant Data						
(Datum: WGS84, Projection: UTM zone45N)						
SN	Category	Contents	Type	Source	Field Name - Field Description (Attribute)	File Name (Shape)
08_	Distribution of Water supply Network(Existing)	**Water Supply Network with PGV Value and Ground Condition on Geomorphological Map** -Western Nepal Scenario Earthquake (WN) -Cental Nepal South Scenario Earthquake-1/3 (CNS-1) -Cental Nepal South Scenario Earthquake-1/2 (CNS-2) -Cental Nepal South Scenario Earthquake-2/3 (CNS-3) Note: This file was input data for calculation of gridwise damage rate of pipeline (Number of damage spot / kilometer) using spread sheet-based calculation form.	Line	JICA ERAKV, 2017	NP_ID - Uniqe code of object; TYPE - Type of pipe material; DIA - Diameter of pipe in millimeter; YEAR - Construction year; AGE - Approx operational period; RNAME- Site of the pipe line; PIPE_ID- Uniqe code of pipeline segment; OBJECTID - Unique ID of polygon; GEOM - Unique code of surface; Main_Surfa - Type of geomorphological class (Fluvial surfaces, Deltaic-lacustrine surfaces, Other surfaces); Sub_Class - Sub class under geomorphological classes; ABBR - Relationship between class of Deltatic-lacustrine surfaces and name of terraces; GridCode - Unique ID of Grid; PGV_WN - Value of Peak Ground Velocity in kine based on WN; PGV_CNS1 - Value of Peak Ground Velocity in kine based on CNS1; PGV_CNS2 - Value of Peak Ground Velocity in kine based on CNS2; PGV_CNS3 - Value of Peak Ground Velocity in kine based on CNS3;	Water_Supply_Network_with_Ground_Condition & PGV
		Grid-wise Estimated Damage Rate of Existing Water Supply Network based on 4 Scenarion EQ	Polygon	JICA ERAKV, 2017	GridCode - Unique ID of Grid; Length_m - Total length of pipeline in object grid in meter; Dmg_WN - Damage rate of Pipeline (Spot/km) based on WN; Dmg_CNS1 - Damage rate of Pipeline (Spot/km) based on CNS-1; Dmg_CNS2 - Damage rate of Pipeline (Spot/km) based on CNS-2; Dmg_CNS3 - Damage rate of Pipeline (Spot/km) based on CNS-3;	Damage of Existing watersupply pipeline
09_	Distribution of Water supply Network(Planned)	**Proposed Water Supply Network with PGV Value and Ground Condition on Geomorphological Map** -Western Nepal Scenario Earthquake (WN) -Cental Nepal South Scenario Earthquake-1/3 (CNS-1) -Cental Nepal South Scenario Earthquake-1/2 (CNS-2) -Cental Nepal South Scenario Earthquake-2/3 (CNS-3) Note: This file was input data for calculation of gridwise damage rate of pipeline (Number of damage spot / kilometer) using spread sheet-based calculation form.	Line	JICA ERAKV, 2017	Layer - Information for construction of pipe distribution; Diameter - Diamter of pipe in millimeter; TYP_Materi - Type of pipe material; OBJECTID - Unique ID of polygon; GEOM - Unique code of surface; Main_Surfa - Type of geomorphological class (Fluvial surfaces, Deltaic-lacustrine surfaces, Other surfaces); Sub_Class - Sub class under geomorphological classes; ABBR - Relationship between class of Deltatic-lacustrine surfaces and name of terraces; GridCode - Unique ID of Grid; PGV_WN - Value of Peak Ground Velocity in kine based on WN; PGV_CNS1 - Value of Peak Ground Velocity in kine based on CNS1; PGV_CNS2 - Value of Peak Ground Velocity in kine based on CNS2; PGV_CNS3 - Value of Peak Ground Velocity in kine based on CNS3; Length - Length of pipeline segment in meter;	Proposed_Water_Supply_Network_with_Ground_Condition & PGV
		Grid-wise Estimated Damage Rate of Proposed Water Supply Network based on 4 Scenarion EQ	Polygon	JICA ERAKV, 2017	GridCode - Unique ID of Grid; Length_m - Total length of pipeline in object grid in meter; Dmg_WN - Damage rate of Pipeline (Spot/km) based on WN; Dmg_CNS1 - Damage rate of Pipeline (Spot/km) based on CNS-1; Dmg_CNS2 - Damage rate of Pipeline (Spot/km) based on CNS-2; Dmg_CNS3 - Damage rate of Pipeline (Spot/km) based on CNS-3;	Damage of proposed watersupply pipeline

Seismic Risk Assessment Relevant Data						
(Datum: WGS84, Projection: UTM zone45N)						
SN	Category	Contents	Type	Source	Field Name - Field Description (Attribute)	File Name (Shape)
10_	Distribution of Sewage Network Damage	**Sewer Network with PGA Value** -Western Nepal Scenario Earthquake (WN) -Cental Nepal South Scenario Earthquake-1/3 (CNS-1) -Cental Nepal South Scenario Earthquake-1/2 (CNS-2) -Cental Nepal South Scenario Earthquake-2/3 (CNS-3) Note: This file was input data for calculation of gridwise damage length of wewage network (kilometer) using spread sheet-based calculation form.	Line	JICA ERAKV, 2017	id - Unique id of sewer line segment; mea_length - Length of pipeline segment in meter; sew_sec - Cross section shape of pipeline; sew_mat - Type of pipe material; sw_dia_dep - Diameter of pipe; pave_type - Type of road pavement along sewer pipeline; road_width - Road width along sewer pipeline; cons_year - Construction year; GridCode - Unique ID of Grid; PGA_WN - Value of Peak Ground Acceleration in gal based on WN; PGA_CNS1 - Value of Peak Ground Acceleration in gal based on CNS1; PGA_CNS2 - Value of Peak Ground Acceleration in gal based on CNS2; PGA_CNS3 - Value of Peak Ground Acceleration in gal based on CNS3; Length - Length of pipeline segment in meter;	Sewer_Network_with_PGA
		Grid-wise Estimated Damage Length of Existing Sewage Network based on 4 Scenarion EQ	Polygon	JICA ERAKV, 2017	GridCode - Unique ID of Grid; Length_km - Total length of pipeline in object grid in kilometer; DR_WN - Length of Damage (km) based on WN; DR_CNS1 -Length of Damage (km) based on CNS-1; DR_CNS2 - Length of Damage (km) based on CNS-2; DR_CNS3 - Length of Damage (km) based on CNS-3;	Damage of Sewer line
11_	Distribution of Power pole Damage	**Grid-wise Power Pole Distribution PGA Value and Damage Building Number** -Western Nepal Scenario Earthquake (WN) -Cental Nepal South Scenario Earthquake-1/3 (CNS-1) -Cental Nepal South Scenario Earthquake-1/2 (CNS-2) -Cental Nepal South Scenario Earthquake-2/3 (CNS-3) Note: This file was input data for calculation of gridwise failure pole number using spread sheet-based calculation form.	Polygon	JICA ERAKV, 2017	GridCode - Unique ID of Grid; Pole_No - Estimated power pole number in object grid; Bdg_Num - Estimated building number in 2016 in object grid; PGA_WN - Value of Peak Ground Acceleration in gal based on WN; PGA_CNS1 - Value of Peak Ground Acceleration in gal based on CNS1; PGA_CNS2 - Value of Peak Ground Acceleration in gal based on CNS2; PGA_CNS3 - Value of Peak Ground Acceleration in gal based on CNS3; WN_DL45 - Total number of damaged buildings with Damage Level 4+5 based on WN in object grid; CNS1_DL45 - Total number of damaged buildings with Damage Level 4+5 based on CNS-1 in object grid; CNS2_DL45 - Total number of damaged buildings with Damage Level 4+5 based on CNS-2 in object grid; CNS3_DL45 - Total number of damaged buildings with Damage Level 4+5 based on CNS-3 in object grid;	Power_pole_Distribution_with_PGA & Damaged_Building_Number
		Grid-wise Estimated Number of Failure Pole based on 4 Scenarion EQ	Polygon	JICA ERAKV, 2017	GridCode - Unique ID of Grid; Pole_No - Estimated power pole number in object grid; Nfp_WN - Number of Failure Poles based on WN; Nfp_CNS1 - Number of Failure Poles based on CNS-1; Nfp_CNS2 - Number of Failure Poles based on CNS-2; Nfp_CNS3 - Number of Failure Poles based on CNS-3;	Damage_of_power_pole

Seismic Risk Assessment Relevant Data						
(Datum: WGS84, Projection: UTM zone45N)						
SN	Category	Contents	Type	Source	Field Name - Field Description (Attribute)	File Name (Shape)
12_	**Distribution of Mobile BTS Tower Damage**	**Estimated Damage Probability of BTS Towers based on 4 Scenario EQ** -Western Nepal Scenario Earthquake (WN) -Cental Nepal South Scenario Earthquake-1/3 (CNS-1) -Cental Nepal South Scenario Earthquake-1/2 (CNS-2) -Cental Nepal South Scenario Earthquake-2/3 (CNS-3)	Point	JICA ERAKV, 2017	Buil_Code - Unique code of BTS tower; Tower_owne - Ownership of tower; Site_Name - Name of tower site; Latitude & Longitude - Coordinate of tower location based on WGS-1984; Tower_Type - Tower type (Rooftop, GBT:Ground Based Tower); Bldg_Type - Building structure type if tower is located on a building; Bdg_Class - Engineered RC or Non-engineered RC; PGA_WN - Value of Peak Ground Acceleration of WN in gal at object facility; PGA_CNS1 - Value of Peak Ground Acceleration of CNS-1 in gal at object facility; PGA_CNS2 - Value of Peak Ground Acceleration of CNS-2 in gal at object facility; PGA_CNS3 - Value of Peak Ground Acceleration of CNS-3 in gal at object facility; Predo_time - Predominant Period at object facility; DG_WN - Building damage probability (Damage Level 4+5) based on WN; DG_CNS1 - Building damage probability (Damage Level 4+5) based on CNS-1; DG_CNS2 - Building damage probability (Damage Level 4+5) based on CNS-2; DG_CNS3 - Building damage probability (Damage Level 4+5) based on CNS-3;	Damage_of_BTS_Tower
13_	**Distribution of Death and Death Ratio**	**Municipality-wise Human Casualty based on 4 Scenario EQ** -Night at 2:00am -weekday Noon at 12:00pm -weekend Afternoon at 18:00pm -Western Nepal Scenario Earthquake (WN) -Cental Nepal South Scenario Earthquake-1/3 (CNS-1) -Cental Nepal South Scenario Earthquake-1/2 (CNS-2) -Cental Nepal South Scenario Earthquake-2/3 (CNS-3)	Polygon	JICA ERAKV, 2017	Muni_Name - Name of municipality based on reconstruction of municipality in 2017; Pop_Night - Total Population of object municipality in nighttime; P_Wkdynoon - Total Population of object municipality in weekday noon; P_Wkndaftn - Total Population of object municipality in weekend afternoon; CNS1_DN (CNS2, CNS3 or WN) - Estimated number of death based on scenario earthquake; CNS1_DR (CNS2, CNS3 or WN) - Estimated rate of death based on scenario earthquake; CNS1_IN (CNS2, CNS3 or WN) - Estimated number of injured based on scenario earthquake; CNS1_IR (CNS2, CNS3 or WN) - Estimated rate of injured based on scenario earthquake; CNS1_EN (CNS2, CNS3 or WN) - Estimated number of evacuee based on scenario earthquake; CNS1_ER (CNS2, CNS3 or WN) - Estimated rate of evacuee based on scenario earthquake;	Human_Casualty_Night Human_Casualty__WKDY_noon_ Human_Casualty__WKND_afternoon_

Contents of Data List

1 Summary of Risk Assessment Results of KATHMANDU VALLEY

Category		Physical Damage				Economic Loss (mil. NPR)*1				Human Casualty (Population:2016: 2786929; 2030:3805926)				
		Scenario Earthquake Ground Motion				Scenario Earthquake Ground Motion					Scenario Earthquake Ground Motion			
		WN	CNS-1	CNS-2	CNS-3	WN	CNS-1	CNS-2	CNS-3		WN	CNS-1	CNS-2	CNS-3
Building (2016) (Total building 444554)	Heavy damage (EMS DL4&5)	**24,961**	**65,314**	**136,060**	**199,643**	**132,999.0**	**371,003.0**	**761,534.0**	**1,098,353.0**	Night (Weekday and weekend)				
		5.6%	14.7%	30.6%	44.9%					Death	**3,034**	**9,133**	**22,179**	**35,726**
											0.11%	0.33%	0.80%	1.28%
										Injured	**11,880**	**35,766**	**86,861**	**139,914**
											0.43%	1.28%	3.12%	5.02%
										Evacuee	**279,031**	**642,743**	**1,196,080**	**1,613,314**
											10.01%	23.06%	42.92%	57.89%
	Moderate damage (EMS DL3)	**21,967**	**42,940**	**62,691**	**67,418**					Weekday (noon, 12:00)				
		4.9%	9.7%	14.1%	15.2%					Death	**2,784**	**8,282**	**19,959**	**31,956**
											0.10%	0.30%	0.72%	1.15%
										Injured	**10,905**	**32,435**	**78,168**	**125,152**
											0.39%	1.16%	2.80%	4.49%
										Evacuee	**285,850**	**652,798**	**1,206,530**	**1,619,792**
											10.26%	23.42%	43.29%	58.12%
	Slight damage (EMS DL2)	**43,564**	**67,770**	**77,713**	**70,462**					Weekend (afternoon, 18:00)				
		9.8%	15.2%	17.5%	15.9%					Death	**2123**	**6393**	**15526**	**25008**
											0.08%	0.23%	0.56%	0.90%
										Injured	**8,316**	**25,036**	**60,803**	**97,940**
											0.30%	0.90%	2.18%	3.51%
										Evacuee	**279,942**	**645,483**	**1,202,734**	**1,624,032**
											10.04%	23.16%	43.16%	58.27%
Building (2030), (Total building 606506)*2	Case-0, heavy damage	**33,763**	**88,681**	**185,796**	**273,269**					Death	**4,121**	**12,508**	**30,583**	**49,381**
		5.6%	14.6%	30.6%	45.1%						0.11%	0.33%	0.80%	1.30%
	Case-1, heavy damage	**28,377**	**79,075**	**171,977**	**258,044**					Death	**3,434**	**11,017**	**27,930**	**46,017**
		4.7%	13.0%	28.4%	42.5%						0.09%	11.9%	8.7%	6.8%
	Case-2, heavy damage	**13,627**	**56,452**	**146,361**	**234,477**					Death	**1,721**	**8,135**	**24,356**	**42,526**
		2.2%	9.3%	24.1%	38.7%						58.2%	35.0%	20.4%	13.9%
	Case-3, heavy damage	**12,162**	**49,970**	**131,095**	**213,481**					Death	**1,438**	**6,733**	**20,526**	**36,715**
		2.0%	8.2%	21.6%	35.2%						65.1%	46.2%	32.9%	25.6%
	Case-4, heavy damage	**16,147**	**52,413**	**129,904**	**210,181**					Death	**2,052**	**7,887**	**23,086**	**41,146**
		2.7%	8.6%	21.4%	34.7%						50.2%	36.9%	24.5%	16.7%
	Case-5, heavy damage	**11,138**	**41,230**	**111,854**	**189,357**					Death	**1,476**	**6,524**	**20,842**	**38,733**
		1.8%	6.8%	18.4%	31.2%						64.2%	47.8%	31.9%	21.6%
School (Total building 5731)	Heavy damage	**237**	**737**	**1,654**	**2,486**	**20,462.0**	**51,231.0**	**98,171.0**	**134,932.0**	Death	**444**	**1,545**	**4,002**	**6,555**
		4.1%	12.9%	28.9%	43.4%						0.05%	0.18%	0.47%	0.77%
	Moderate damage	**253**	**539**	**810**	**875**					Injured	**1,739**	**6,051**	**15,673**	**25,671**
		4.4%	9.4%	14.1%	15.3%						0.20%	0.71%	1.84%	3.02%
	Slight damage	**568**	**916**	**1,057**	**960**									
		9.9%	16.0%	18.4%	16.8%									
Health facility (Total building 584)	Heavy damage	**20**	**64**	**153**	**235**	**27,534.0**	**68,588.0**	**165,683.0**	**232,782.0**					
		3.4%	11.0%	26.2%	40.2%									
	Moderate damage	**24**	**55**	**83**	**94**									
		4.1%	9.4%	14.2%	16.1%									
	Slight damage	**51**	**85**	**105**	**97**									
		8.7%	14.6%	18.0%	16.6%									
Government building (Total building 478)	Heavy damage	**20**	**59**	**126**	**186**	**2,444.0**	**8,669.0**	**16,514.0**	**22,708.0**					
		4.2%	12.3%	26.4%	38.9%									
	Moderate damage	**20**	**44**	**66**	**73**									
		4.2%	9.2%	13.8%	15.3%									
	Slight damage	**44**	**71**	**85**	**80**									
		9.2%	14.9%	17.8%	16.7%									
Road*3 (Total length 5811 km)	Length in landslide area (km)	**0.0**	**6.6**	**98.5**	**390.6**	**0.0**	**471.0**	**1,620.0**	**2,878.0**					
		0.0%	0.1%	1.7%	6.7%									
	Length in liquefaction area (km)	**0.0**	**76.1**	**274.9**	**455.3**									
		0.0%	1.3%	4.7%	7.8%									
Bridge (Total bridge 145)*4	Heavy damage	**0**	**1**	**12**	**32**	**377.0**	**898.0**	**1,359.0**	**1,914.0**					
		0.0%	0.7%	8.3%	22.1%									
	Moderate damage	**2**	**21**	**27**	**11**									
		1.4%	14.5%	18.6%	7.6%									
	Slight damage	**18**	**17**	**6**	**2**									
		12.4%	11.7%	4.1%	1.4%									
Water supply (Existing) (Total length 1167 km)	Damage points	**982**	**1921**	**3496**	**5161**	**36.3**	**71.1**	**129.3**	**190.9**					
		0.84	1.65	3.00	4.42									
Water supply (Planned) (Total length 699 km)	Damage points	**124**	**255**	**460**	**676**	**4.6**	**9.4**	**17.0**	**25.0**					
		0.2	0.4	0.7	1.0									
Sewage (Total length 1192 km)	Damage length (km)	**4.8**	**8.2**	**11.9**	**18.2**	**76.5**	**135.3**	**199.8**	**289.6**					
		0.4%	0.7%	1.0%	1.5%									
Power distribution (Total pole 190851)	Pole damage	**1,327**	**3,991**	**9,156**	**13,992**	**18.7**	**56.2**	**128.9**	**197.0**					
		0.7%	2.1%	4.8%	7.3%									
Mobile BTS tower (Total tower 1043)	Tower damage	**43**	**143**	**372**	**601**	**81.7**	**271.7**	**706.8**	**1,141.9**					
		4.1%	13.7%	35.7%	57.6%									

Caution:

1. Scenario earthquake is not the prediction of future earthquake
2. Hazard and risk assessment were carried out based on the research results of past earthquakes and the available data of Nepal for the purpose of policy and planning development and the activities related to disaster risk reduction and management in Kathmandu Valley.

Note:

*1 Economic loss is the direct loss due to the damage of building, infrastructure and lifeline, calculated by reconstruction or repair cost.

*2 The building damage of 2030 accounts for heavy damage only.

Case-0: The composition of the structure type of 2030 is assumed as same as that of 2016.

Case-1: Buildings increased from 2016 to 2030 are assumed masonry with cement mortar and RC engineered only. The ratio of masonry and RC is assumed as same as that at the time of 2016.

Case-2: 1) Same as Case-1, 2) All of the existing masonry building are assumed to change to masonry with cement mortar.

Case-3: 1) Same as Case-2, 2) All of the existing RC non-engineered building are assumed to change to RC engineered.

Case-4: 1) 50% of increased new masonry buildings are changed to RC engineered, 2) 50% of existing masonry buildings at 2016 are assumed be reconstructed to RC Engineered, 3) 30% of existing non-engineered RC buildings are assumed be reconstructed to RC engineered.

Case-5: 1) 70% of increased new masonry buildings are changed to RC engineered, 2) 70% of existing masonry buildings at 2016 are assumed be reconstructed to RC Engineered,

*3 The damage length of road means the road length which located in the high liquefaction and landslide potential area, not the damage length which will happen in the scenario earthquakes.

*4 There are a total of 145 bridges. 45 RC multi span bridges were quantitatively assessed. The remaining single span (RC and masonry) and multi span (masonry) bridges were qualitatively assessed.

2 Summary of Risk Assessment Results of BAGMATI Municipality

Category		Physical Damage				Economic Loss (mil. NPR)*1				Human Casualty (Population: 2016:1605; 2030: 1858)				
		Scenario Earthquake Ground Motion				Scenario Earthquake Ground Motion					Scenario Earthquake Ground Motion			
		WN	CNS-1	CNS-2	CNS-3	WN	CNS-1	CNS-2	CNS-3		WN	CNS-1	CNS-2	CNS-3
Building (2016) (Total building 551)	Heavy damage (EMS DL4&5)	**45**	**135**	**238**	**326**	**67.0**	**272.0**	**574.0**	**860.0**	Night (Weekday and weekend)				
										Death	**3**	**9**	**16**	**24**
		8.2%	24.5%	43.2%	59.2%						0.19%	0.56%	1.00%	1.50%
										Injured	**10**	**34**	**64**	**94**
											0.62%	2.12%	3.99%	5.86%
										Evacuee	**222**	**563**	**895**	**1,138**
											13.83%	35.08%	55.76%	70.90%
	Moderate damage (EMS DL3)	**32**	**60**	**75**	**73**					Weekday (noon, 12:00)				
										Death	**2**	**6**	**12**	**17**
		5.8%	10.9%	13.6%	13.2%						0.15%	0.46%	0.92%	1.31%
										Injured	**7**	**25**	**47**	**69**
											0.54%	1.93%	3.62%	5.32%
										Evacuee	**180**	**456**	**725**	**922**
											13.87%	35.13%	55.86%	71.03%
	Slight damage (EMS DL2)	**53**	**87**	**88**	**71**					Weekend (afternoon, 18:00)				
										Death	**2**	**6**	**12**	**17**
		9.6%	15.8%	16.0%	12.9%						0.12%	0.37%	0.75%	1.06%
										Injured	**7**	**24**	**45**	**66**
											0.44%	1.50%	2.80%	4.11%
										Evacuee	**223**	**566**	**900**	**1,145**
											13.89%	35.26%	56.07%	71.34%
Building (2030), (Total building 638)*2	Case-0, heavy damage	**52**	**156**	**275**	**377**					Death	**3**	**10**	**19**	**28**
		8.2%	24.5%	43.1%	59.1%						0.16%	0.54%	1.02%	1.51%
	Case-1, heavy damage	**45**	**141**	**257**	**360**					Death	**3**	**9**	**18**	**26**
		7.1%	22.1%	40.3%	56.4%						0.16%	10.0%	5.3%	7.1%
	Case-2, heavy damage	**3**	**45**	**147**	**265**					Death	**-**	**3**	**9**	**19**
		0.5%	7.1%	23.0%	41.5%						100.0%	70.0%	52.6%	32.1%
	Case-3, heavy damage	**3**	**43**	**140**	**253**					Death	**-**	**2**	**9**	**17**
		0.5%	6.7%	21.9%	39.7%						100.0%	80.0%	52.6%	39.3%
	Case-4, heavy damage	**23**	**76**	**157**	**251**					Death	**1**	**5**	**11**	**20**
		3.6%	11.9%	24.6%	39.3%						66.7%	50.0%	42.1%	28.6%
	Case-5, heavy damage	**14**	**49**	**117**	**206**					Death	**1**	**3**	**9**	**18**
		2.2%	7.7%	18.3%	32.3%						66.7%	70.0%	52.6%	35.7%
School (Total building 21)	Heavy damage	**1**	**4**	**9**	**13**	**73.0**	**250.0**	**426.0**	**582.0**	Death	**-**	**2**	**3**	**5**
		4.8%	19.0%	42.9%	61.9%						0.00%	0.40%	0.60%	1.00%
	Moderate damage	**1**	**3**	**3**	**3**					Injured	**-**	**8**	**12**	**20**
		4.8%	14.3%	14.3%	14.3%						0.00%	1.60%	2.40%	4.00%
	Slight damage	**2**	**4**	**4**	**3**									
		9.5%	19.0%	19.0%	14.3%									
Health facility (Total building 1)	Heavy damage	**0**	**0**	**0**	**0**	**0.0**	**0.0**	**0.0**	**0.0**					
		0.0%	0.0%	0.0%	0.0%									
	Moderate damage	**0**	**0**	**0**	**0**									
		0.0%	0.0%	0.0%	0.0%									
	Slight damage	**0**	**0**	**0**	**0**									
		0.0%	0.0%	0.0%	0.0%									
Government building (Total building 1)	Heavy damage	**0**	**0**	**0**	**0**	**0.0**	**0.0**	**0.0**	**0.0**					
		0.0%	0.0%	0.0%	0.0%									
	Moderate damage	**0**	**0**	**0**	**0**									
		0.0%	0.0%	0.0%	0.0%									
	Slight damage	**0**	**0**	**0**	**0**									
		0.0%	0.0%	0.0%	0.0%									
Road*3 (Total length 27 km)	Length in landslide area (km)	**0.0**	**0.0**	**1.0**	**3.9**	**0.0**	**0.0**	**4.4**	**13.4**					
		0.0%	0.0%	3.8%	14.7%									
	Length in liquefaction area (km)	**0.0**	**0.0**	**0.0**	**0.0**									
		0.0%	0.0%	0.0%	0.0%									
Bridge (Total bridge 0)*4	Heavy damage	**0**	**0**	**0**	**0**	**0.0**	**0.0**	**0.0**	**0.0**					
		0.0%	0.0%	0.0%	0.0%									
	Moderate damage	**0**	**0**	**0**	**0**									
		0.0%	0.0%	0.0%	0.0%									
	Slight damage	**0**	**0**	**0**	**0**									
		0.0%	0.0%	0.0%	0.0%									
Water supply (Existing) (Total length 0 km)	Damage points	**0**	**0**	**0**	**0**	**0.0**	**0.0**	**0.0**	**0.0**					
		0.00	0.00	0.00	0.00									
Water supply (Planned) (Total length 0 km)	Damage points	**0**	**0**	**0**	**0**	**0.0**	**0.0**	**0.0**	**0.0**					
		0.0	0.0	0.0	0.0									
Sewage (Total length 0 km)	Damage length (km)	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**					
		0.0%	0.0%	0.0%	0.0%									
Power distribution (Total pole 0)	Pole damage	**0**	**0**	**0**	**0**	**0.0**	**0.0**	**0.0**	**0.0**					
		0.0%	0.0%	0.0%	0.0%									
Mobile BTS tower (Total tower 1)	Tower damage	**0**	**0**	**0**	**1**	**0.0**	**0.0**	**0.0**	**1.9**					
		0.0%	0.0%	0.0%	100.0%									

Caution:

1. Scenario earthquake is not the prediction of future earthquake
2. Hazard and risk assessment were carried out based on the research results of past earthquakes and the available data of Nepal for the purpose of policy and planning development and the activities related to disaster risk reduction and management in Kathmandu Valley.

Note:

*1 Economic loss is the direct loss due to the damage of building, infrastructure and lifeline, calculated by reconstruction or repair cost.

*2 The building damage of 2030 accounts for heavy damage only.

Case-0: The composition of the structure type of 2030 is assumed as same as that of 2016.

Case-1: Buildings increased from 2016 to 2030 are assumed masonry with cement mortar and RC engineered only. The ratio of masonry and RC is assumed as same as that at the time of 2016.

Case-2: 1) Same as Case-1, 2) All of the existing masonry building are assumed to change to masonry with cement mortar.

Case-3: 1) Same as Case-2, 2) All of the existing RC non-engineered building are assumed to change to RC engineered.

Case-4: 1) 50% of increased new masonry buildings are changed to RC engineered, 2) 50% of existing masonry buildings at 2016 are assumed be reconstructed to RC Engineered, 3) 30% of existing non-engineered RC buildings are assumed be reconstructed to RC engineered.

Case-5: 1) 70% of increased new masonry buildings are changed to RC engineered, 2) 70% of existing masonry buildings at 2016 are assumed be reconstructed to RC Engineered,

*3 The damage length of road means the road length which located in the high liquefaction and landslide potential area, not the damage length which will happen in the scenario earthquakes.

*4 There are a total of 145 bridges. 45 RC multi span bridges were quantitatively assessed. The remaining single span (RC and masonry) and multi span (masonry) bridges were qualitatively assessed.

3 Summary of Risk Assessment Results of BHAKTAPUR Municipality

Category		Physical Damage				Economic Loss (mil. NPR)*1				Human Casualty (Population: 2016:93350; 2030: 120460)				
		Scenario Earthquake Ground Motion				Scenario Earthquake Ground Motion					Scenario Earthquake Ground Motion			
		WN	CNS-1	CNS-2	CNS-3	WN	CNS-1	CNS-2	CNS-3		WN	CNS-1	CNS-2	CNS-3
Building (2016) (Total building 13811)	Heavy damage (EMS DL4&5)	**1,200**	**2,980**	**5,559**	**7,708**	**4,536.0**	**11,570.0**	**22,392.0**	**31,529.0**	Night (Weekday and weekend)				
		8.7%	21.6%	40.3%	55.8%					Death	**152**	**429**	**913**	**1,388**
											0.16%	0.46%	0.98%	1.49%
										Injured	**594**	**1,681**	**3,577**	**5,435**
											0.64%	1.80%	3.83%	5.82%
										Evacuee	**13,817**	**29,710**	**49,615**	**63,665**
											14.80%	31.83%	53.15%	68.20%
	Moderate damage (EMS DL3)	**955**	**1,608**	**2,034**	**2,001**					Weekday (noon, 12:00)				
		6.9%	11.6%	14.7%	14.5%					Death	**150**	**430**	**923**	**1,408**
											0.14%	0.41%	0.88%	1.35%
										Injured	**588**	**1,685**	**3,616**	**5,513**
											0.56%	1.61%	3.46%	5.28%
										Evacuee	**15,257**	**33,153**	**55,666**	**71,530**
											14.61%	31.75%	53.31%	68.50%
	Slight damage (EMS DL2)	**1,732**	**2,340**	**2,334**	**1,902**					Weekend (afternoon, 18:00)				
		12.5%	16.9%	16.9%	13.8%					Death	**106**	**300**	**640**	**971**
											0.11%	0.32%	0.69%	1.04%
										Injured	**416**	**1,177**	**2,504**	**3,805**
											0.45%	1.26%	2.68%	4.08%
										Evacuee	**13,862**	**29,838**	**49,889**	**64,082**
											14.85%	31.96%	53.44%	68.65%
Building (2030), (Total building 17527)*2	Case-0, heavy damage	**1,495**	**3,730**	**7,000**	**9,738**					Death	**191**	**546**	**1,171**	**1,789**
		8.5%	21.3%	39.9%	55.6%						0.16%	0.45%	0.97%	1.49%
	Case-1, heavy damage	**1,270**	**3,325**	**6,511**	**9,274**					Death	**160**	**480**	**1,076**	**1,685**
		7.2%	19.0%	37.1%	52.9%						0.13%	12.1%	8.1%	5.8%
	Case-2, heavy damage	**360**	**1,785**	**4,844**	**7,845**					Death	**43**	**253**	**799**	**1,429**
		2.1%	10.2%	27.6%	44.8%						77.5%	53.7%	31.8%	20.1%
	Case-3, heavy damage	**344**	**1,683**	**4,569**	**7,459**					Death	**40**	**229**	**724**	**1,309**
		2.0%	9.6%	26.1%	42.6%						79.1%	58.1%	38.2%	26.8%
	Case-4, heavy damage	**666**	**1,956**	**4,479**	**7,106**					Death	**86**	**297**	**811**	**1,444**
		3.8%	11.2%	25.6%	40.5%						55.0%	45.6%	30.7%	19.3%
	Case-5, heavy damage	**423**	**1,401**	**3,644**	**6,208**					Death	**55**	**223**	**699**	**1,338**
		2.4%	8.0%	20.8%	35.4%						71.2%	59.2%	40.3%	25.2%
School (Total building 215)	Heavy damage	**10**	**30**	**68**	**104**	**780.0**	**2,110.0**	**4,207.0**	**5,945.0**	Death	**14**	**62**	**186**	**332**
		4.7%	14.0%	31.6%	48.4%						0.04%	0.17%	0.50%	0.89%
	Moderate damage	**9**	**21**	**33**	**35**					Injured	**55**	**243**	**728**	**1,300**
		4.2%	9.8%	15.3%	16.3%						0.15%	0.65%	1.95%	3.47%
	Slight damage	**19**	**34**	**39**	**33**									
		8.8%	15.8%	18.1%	15.3%									
Health facility (Total building 25)	Heavy damage	**0**	**2**	**5**	**9**	**0.0**	**2,143.4**	**5,414.5**	**8,915.1**					
		0.0%	8.0%	20.0%	36.0%									
	Moderate damage	**1**	**2**	**4**	**5**									
		4.0%	8.0%	16.0%	20.0%									
	Slight damage	**1**	**3**	**5**	**4**									
		4.0%	12.0%	20.0%	16.0%									
Government building (Total building 33)	Heavy damage	**1**	**4**	**10**	**15**	**122.2**	**587.7**	**1,310.6**	**1,831.3**					
		3.0%	12.1%	30.3%	45.5%									
	Moderate damage	**1**	**3**	**5**	**6**									
		3.0%	9.1%	15.2%	18.2%									
	Slight damage	**3**	**5**	**6**	**6**									
		9.1%	15.2%	18.2%	18.2%									
Road*3 (Total length 91 km)	Length in landslide area (km)	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**28.9**	**97.7**					
		0.0%	0.0%	0.0%	0.0%									
	Length in liquefaction area (km)	**0.0**	**0.0**	**6.7**	**28.7**									
		0.0%	0.0%	7.3%	31.5%									
Bridge (Total bridge 9)*4	Heavy damage	**0**	**0**	**0**	**0**	**0.0**	**0.0**	**0.0**	**0.0**					
		0.0%	0.0%	0.0%	0.0%									
	Moderate damage	**0**	**0**	**0**	**0**									
		0.0%	0.0%	0.0%	0.0%									
	Slight damage	**0**	**0**	**0**	**0**									
		0.0%	0.0%	0.0%	0.0%									
Water supply (Existing) (Total length 45 km)	Damage points	**18**	**40**	**74**	**110**	**0.7**	**1.5**	**2.7**	**4.1**					
		0.40	0.90	1.65	2.45									
Water supply (Planned) (Total length 0 km)	Damage points	**0**	**0**	**0**	**0**	**0.0**	**0.0**	**0.0**	**0.0**					
		0.0	0.0	0.0	0.0									
Sewage (Total length 47 km)	Damage length (km)	**0.2**	**0.4**	**0.5**	**0.9**	**3.0**	**6.3**	**7.8**	**14.0**					
		0.4%	0.8%	1.0%	1.9%									
Power distribution (Total pole 4953)	Pole damage	**51**	**141**	**294**	**434**	**0.7**	**2.0**	**4.1**	**6.1**					
		1.0%	2.8%	5.9%	8.8%									
Mobile BTS tower (Total tower 23)	Tower damage	**1**	**3**	**9**	**15**	**1.9**	**5.7**	**17.1**	**28.5**					
		4.3%	13.0%	39.1%	65.2%									

Caution:

1. Scenario earthquake is not the prediction of future earthquake
2. Hazard and risk assessment were carried out based on the research results of past earthquakes and the available data of Nepal for the purpose of policy and planning development and the activities related to disaster risk reduction and management in Kathmandu Valley.

Note:

*1 Economic loss is the direct loss due to the damage of building, infrastructure and lifeline, calculated by reconstruction or repair cost.

*2 The building damage of 2030 accounts for heavy damage only.

Case-0: The composition of the structure type of 2030 is assumed as same as that of 2016.

Case-1: Buildings increased from 2016 to 2030 are assumed masonry with cement mortar and RC engineered only. The ratio of masonry and RC is assumed as same as that at the time of 2016.

Case-2: 1) Same as Case-1, 2) All of the existing masonry building are assumed to change to masonry with cement mortar.

Case-3: 1) Same as Case-2, 2) All of the existing RC non-engineered building are assumed to change to RC engineered.

Case-4: 1) 50% of increased new masonry buildings are changed to RC engineered, 2) 50% of existing masonry buildings at 2016 are assumed be reconstructed to RC Engineered, 3) 30% of existing non-engineered RC buildings are assumed be reconstructed to RC engineered.

Case-5: 1) 70% of increased new masonry buildings are changed to RC engineered, 2) 70% of existing masonry buildings at 2016 are assumed be reconstructed to RC Engineered,

*3 The damage length of road means the road length which located in the high liquefaction and landslide potential area, not the damage length which will happen in the scenario earthquakes.

*4 There are a total of 145 bridges. 45 RC multi span bridges were quantitatively assessed. The remaining single span (RC and masonry) and multi span (masonry) bridges were qualitatively assessed.

4 Summary of Risk Assessment Results of BUDHANILKANTHA Municipality

Category		Physical Damage				Economic Loss (mil. NPR)*1				Human Casualty (Population: 2016:129708; 2030: 193486)				
		Scenario Earthquake Ground Motion				Scenario Earthquake Ground Motion					Scenario Earthquake Ground Motion			
		WN	CNS-1	CNS-2	CNS-3	WN	CNS-1	CNS-2	CNS-3		WN	CNS-1	CNS-2	CNS-3
Building (2016) (Total building 17066)	Heavy damage (EMS DL4&5)	**550**	**881**	**2,640**	**4,883**	**4,279.0**	**7,490.0**	**21,198.0**	**36,607.0**	Night (Weekday and weekend)				
		3.2%	5.2%	15.5%	28.6%					Death	**92**	**158**	**545**	**1,109**
											0.07%	0.12%	0.42%	0.85%
										Injured	**362**	**619**	**2,133**	**4,344**
											0.28%	0.48%	1.64%	3.35%
										Evacuee	**8,867**	**14,000**	**35,688**	**57,622**
											6.84%	10.79%	27.51%	44.42%
	Moderate damage (EMS DL3)	**587**	**904**	**1,984**	**2,670**					Weekday (noon, 12:00)				
		3.4%	5.3%	11.6%	15.6%					Death	**65**	**111**	**384**	**782**
											0.06%	0.11%	0.38%	0.77%
										Injured	**253**	**435**	**1,502**	**3,062**
											0.25%	0.43%	1.48%	3.02%
										Evacuee	**6,914**	**10,953**	**27,962**	**45,176**
											6.82%	10.80%	27.57%	44.54%
	Slight damage (EMS DL2)	**1,313**	**1,823**	**2,974**	**3,208**					Weekend (afternoon, 18:00)				
		7.7%	10.7%	17.4%	18.8%					Death	**65**	**111**	**381**	**776**
											0.05%	0.09%	0.29%	0.60%
										Injured	**253**	**433**	**1,493**	**3,041**
											0.20%	0.33%	1.15%	2.34%
										Evacuee	**8,895**	**14,048**	**35,852**	**57,955**
											6.86%	10.83%	27.64%	44.68%
Building (2030), (Total building 26894)*2	Case-0, heavy damage	**872**	**1,380**	**4,135**	**7,657**					Death	**140**	**235**	**806**	**1,642**
		3.2%	5.1%	15.4%	28.5%						0.07%	0.12%	0.42%	0.85%
	Case-1, heavy damage	**691**	**1,137**	**3,634**	**6,941**					Death	**110**	**193**	**702**	**1,472**
		2.6%	4.2%	13.5%	25.8%						0.06%	17.9%	12.9%	10.4%
	Case-2, heavy damage	**440**	**841**	**3,218**	**6,506**					Death	**68**	**142**	**624**	**1,385**
		1.6%	3.1%	12.0%	24.2%						51.4%	39.6%	22.6%	15.7%
	Case-3, heavy damage	**381**	**712**	**2,744**	**5,668**					Death	**55**	**112**	**498**	**1,140**
		1.4%	2.6%	10.2%	21.1%						60.7%	52.3%	38.2%	30.6%
	Case-4, heavy damage	**416**	**736**	**2,714**	**5,629**					Death	**69**	**132**	**559**	**1,276**
		1.5%	2.7%	10.1%	20.9%						50.7%	43.8%	30.6%	22.3%
	Case-5, heavy damage	**301**	**566**	**2,308**	**5,037**					Death	**51**	**105**	**492**	**1,177**
		1.1%	2.1%	8.6%	18.7%						63.6%	55.3%	39.0%	28.3%
School (Total building 267)	Heavy damage	**10**	**15**	**48**	**88**	**898.0**	**1,331.0**	**3,292.0**	**5,222.0**	Death	**11**	**20**	**80**	**168**
		3.7%	5.6%	18.0%	33.0%						0.03%	0.06%	0.25%	0.52%
	Moderate damage	**11**	**16**	**33**	**41**					Injured	**43**	**78**	**313**	**658**
		4.1%	6.0%	12.4%	15.4%						0.13%	0.24%	0.96%	2.02%
	Slight damage	**26**	**34**	**50**	**51**									
		9.7%	12.7%	18.7%	19.1%									
Health facility (Total building 13)	Heavy damage	**0**	**1**	**2**	**4**	**0.0**	**1,071.7**	**2,165.8**	**3,962.2**					
		0.0%	7.7%	15.4%	30.8%									
	Moderate damage	**1**	**1**	**2**	**2**									
		7.7%	7.7%	15.4%	15.4%									
	Slight damage	**1**	**2**	**3**	**3**									
		7.7%	15.4%	23.1%	23.1%									
Government building (Total building 1)	Heavy damage	**0**	**0**	**0**	**0**	**0.0**	**0.0**	**0.0**	**0.0**					
		0.0%	0.0%	0.0%	0.0%									
	Moderate damage	**0**	**0**	**0**	**0**									
		0.0%	0.0%	0.0%	0.0%									
	Slight damage	**0**	**0**	**0**	**0**									
		0.0%	0.0%	0.0%	0.0%									
Road*3 (Total length 309 km)	Length in landslide area (km)	**0.0**	**0.0**	**0.2**	**1.8**	**0.0**	**0.0**	**2.7**	**7.5**					
		0.0%	0.0%	0.1%	0.6%									
	Length in liquefaction area (km)	**0.0**	**0.0**	**0.4**	**0.4**									
		0.0%	0.0%	0.1%	0.1%									
Bridge (Total bridge 12)*4	Heavy damage	**0**	**0**	**0**	**0**	**0.0**	**0.0**	**30.2**	**42.5**					
		0.0%	0.0%	0.0%	0.0%									
	Moderate damage	**0**	**0**	**0**	**1**									
		0.0%	0.0%	0.0%	8.3%									
	Slight damage	**0**	**0**	**1**	**0**									
		0.0%	0.0%	8.3%	0.0%									
Water supply (Existing) (Total length 37 km)	Damage points	**33**	**46**	**87**	**130**	**1.2**	**1.7**	**3.2**	**4.8**					
		0.89	1.22	2.32	3.48									
Water supply (Planned) (Total length 1 km)	Damage points	**0**	**0**	**0**	**0**	**0.0**	**0.0**	**0.0**	**0.0**					
		0.0	0.0	0.0	0.0									
Sewage (Total length 44 km)	Damage length (km)	**0.2**	**0.2**	**0.4**	**0.5**	**2.9**	**2.9**	**6.4**	**7.2**					
		0.4%	0.4%	0.9%	1.0%									
Power distribution (Total pole 14024)	Pole damage	**66**	**108**	**344**	**655**	**0.9**	**1.5**	**4.8**	**9.2**					
		0.5%	0.8%	2.5%	4.7%									
Mobile BTS tower (Total tower 48)	Tower damage	**2**	**2**	**8**	**18**	**3.8**	**3.8**	**15.2**	**34.2**					
		4.2%	4.2%	16.7%	37.5%									

Caution:

1. Scenario earthquake is not the prediction of future earthquake
2. Hazard and risk assessment were carried out based on the research results of past earthquakes and the available data of Nepal for the purpose of policy and planning development and the activities related to disaster risk reduction and management in Kathmandu Valley.

Note:

*1 Economic loss is the direct loss due to the damage of building, infrastructure and lifeline, calculated by reconstruction or repair cost.

*2 The building damage of 2030 accounts for heavy damage only.

Case-0: The composition of the structure type of 2030 is assumed as same as that of 2016.

Case-1: Buildings increased from 2016 to 2030 are assumed masonry with cement mortar and RC engineered only. The ratio of masonry and RC is assumed as same as that at the time of 2016.

Case-2: 1) Same as Case-1, 2) All of the existing masonry building are assumed to change to masonry with cement mortar.

Case-3: 1) Same as Case-2, 2) All of the existing RC non-engineered building are assumed to change to RC engineered.

Case-4: 1) 50% of increased new masonry buildings are changed to RC engineered, 2) 50% of existing masonry buildings at 2016 are assumed be reconstructed to RC Engineered, 3) 30% of existing non-engineered RC buildings are assumed be reconstructed to RC engineered.

Case-5: 1) 70% of increased new masonry buildings are changed to RC engineered, 2) 70% of existing masonry buildings at 2016 are assumed be reconstructed to RC Engineered,

*3 The damage length of road means the road length which located in the high liquefaction and landslide potential area, not the damage length which will happen in the scenario earthquakes.

*4 There are a total of 145 bridges. 45 RC multi span bridges were quantitatively assessed. The remaining single span (RC and masonry) and multi span (masonry) bridges were qualitatively assessed.

5 Summary of Risk Assessment Results of CHANDRAGIRI Municipality

Category		Physical Damage				Economic Loss (mil. NPR)*1				Human Casualty (Population: 2016:99843; 2030: 163511)				
		Scenario Earthquake Ground Motion				Scenario Earthquake Ground Motion					Scenario Earthquake Ground Motion			
		WN	CNS-1	CNS-2	CNS-3	WN	CNS-1	CNS-2	CNS-3		WN	CNS-1	CNS-2	CNS-3
Building (2016) (Total building 18214)	Heavy damage (EMS DL4&5)	**1,409**	**4,253**	**8,543**	**11,874**	**8,275.0**	**25,664.0**	**48,190.0**	**64,429.0**	Night (Weekday and weekend)				
		7.7%	23.4%	46.9%	65.2%					Death	**165**	**607**	**1,421**	**2,151**
											0.17%	0.61%	1.42%	2.15%
										Injured	**645**	**2,376**	**5,563**	**8,423**
											0.65%	2.38%	5.57%	8.44%
										Evacuee	**13,697**	**35,909**	**61,385**	**76,747**
											13.72%	35.97%	61.48%	76.87%
	Moderate damage (EMS DL3)	**1,159**	**2,380**	**2,825**	**2,423**					Weekday (noon, 12:00)				
		6.4%	13.1%	15.5%	13.3%					Death	**123**	**451**	**1,056**	**1,598**
											0.15%	0.55%	1.28%	1.94%
										Injured	**480**	**1,767**	**4,135**	**6,257**
											0.58%	2.15%	5.02%	7.60%
										Evacuee	**11,346**	**29,736**	**50,827**	**63,547**
											13.78%	36.11%	61.73%	77.17%
	Slight damage (EMS DL2)	**2,150**	**3,201**	**2,812**	**1,958**					Weekend (afternoon, 18:00)				
		11.8%	17.6%	15.4%	10.7%					Death	**115**	**425**	**994**	**1505**
											0.12%	0.43%	1.00%	1.51%
										Injured	**451**	**1,663**	**3,894**	**5,896**
											0.45%	1.67%	3.90%	5.91%
										Evacuee	**13,747**	**36,090**	**61,812**	**77,392**
											13.77%	36.15%	61.91%	77.51%
Building (2030), (Total building 29707)*2	Case-0, heavy damage	**2,256**	**6,897**	**13,918**	**19,375**					Death	**266**	**992**	**2,331**	**3,535**
		7.6%	23.2%	46.9%	65.2%						0.16%	0.61%	1.43%	2.16%
	Case-1, heavy damage	**1,814**	**6,054**	**12,847**	**18,371**					Death	**211**	**856**	**2,116**	**3,304**
		6.1%	20.4%	43.2%	61.8%						0.13%	13.7%	9.2%	6.5%
	Case-2, heavy damage	**1,177**	**5,163**	**12,009**	**17,719**					Death	**139**	**745**	**2,005**	**3,213**
		4.0%	17.4%	40.4%	59.6%						47.7%	24.9%	14.0%	9.1%
	Case-3, heavy damage	**1,056**	**4,645**	**11,080**	**16,722**					Death	**118**	**636**	**1,775**	**2,940**
		3.6%	15.6%	37.3%	56.3%						55.6%	35.9%	23.9%	16.8%
	Case-4, heavy damage	**1,116**	**4,472**	**10,751**	**16,400**					Death	**138**	**689**	**1,943**	**3,244**
		3.8%	15.1%	36.2%	55.2%						48.1%	30.5%	16.6%	8.2%
	Case-5, heavy damage	**828**	**3,798**	**9,838**	**15,532**					Death	**107**	**613**	**1,855**	**3,198**
		2.8%	12.8%	33.1%	52.3%						59.8%	38.2%	20.4%	9.5%
School (Total building 202)	Heavy damage	**14**	**49**	**100**	**137**	**1,101.0**	**2,910.0**	**4,972.0**	**6,308.0**	Death	**22**	**92**	**208**	**303**
		6.9%	24.3%	49.5%	67.8%						0.09%	0.38%	0.87%	1.26%
	Moderate damage	**13**	**27**	**31**	**25**					Injured	**86**	**360**	**815**	**1,187**
		6.4%	13.4%	15.3%	12.4%						0.36%	1.50%	3.40%	4.95%
	Slight damage	**28**	**39**	**32**	**21**									
		13.9%	19.3%	15.8%	10.4%									
Health facility (Total building 18)	Heavy damage	**1**	**3**	**8**	**12**	**1,376.7**	**3,215.1**	**8,663.2**	**11,886.7**					
		5.6%	16.7%	44.4%	66.7%									
	Moderate damage	**1**	**3**	**3**	**3**									
		5.6%	16.7%	16.7%	16.7%									
	Slight damage	**2**	**3**	**3**	**2**									
		11.1%	16.7%	16.7%	11.1%									
Government building (Total building 1)	Heavy damage	**0**	**0**	**0**	**1**	**0.0**	**0.0**	**0.0**	**122.1**					
		0.0%	0.0%	0.0%	100.0%									
	Moderate damage	**0**	**0**	**0**	**0**									
		0.0%	0.0%	0.0%	0.0%									
	Slight damage	**0**	**0**	**0**	**0**									
		0.0%	0.0%	0.0%	0.0%									
Road*3 (Total length 372 km)	Length in landslide area (km)	**0.0**	**0.0**	**12.5**	**41.5**	**0.0**	**0.0**	**64.6**	**155.7**					
		0.0%	0.0%	3.4%	11.2%									
	Length in liquefaction area (km)	**0.0**	**0.0**	**2.3**	**4.2**									
		0.0%	0.0%	0.6%	1.1%									
Bridge (Total bridge 13)*4	Heavy damage	**0**	**0**	**0**	**0**	**0.0**	**0.0**	**0.0**	**0.0**					
		0.0%	0.0%	0.0%	0.0%									
	Moderate damage	**0**	**0**	**0**	**0**									
		0.0%	0.0%	0.0%	0.0%									
	Slight damage	**0**	**0**	**0**	**0**									
		0.0%	0.0%	0.0%	0.0%									
Water supply (Existing) (Total length 8 km)	Damage points	**3**	**7**	**13**	**19**	**0.1**	**0.3**	**0.5**	**0.7**					
		0.39	0.94	1.72	2.56									
Water supply (Planned) (Total length 0 km)	Damage points	**0**	**0**	**0**	**0**	**0.0**	**0.0**	**0.0**	**0.0**					
		0.0	0.0	0.0	0.0									
Sewage (Total length 3 km)	Damage length (km)	**0.0**	**0.0**	**0.1**	**0.1**	**0.2**	**0.4**	**0.8**	**0.9**					
		0.4%	0.9%	1.8%	1.9%									
Power distribution (Total pole 8735)	Pole damage	**82**	**307**	**679**	**970**	**1.1**	**4.3**	**9.6**	**13.7**					
		0.9%	3.5%	7.8%	11.1%									
Mobile BTS tower (Total tower 34)	Tower damage	**3**	**10**	**21**	**27**	**5.7**	**19.0**	**39.9**	**51.3**					
		8.8%	29.4%	61.8%	79.4%									

Caution:

1. Scenario earthquake is not the prediction of future earthquake
2. Hazard and risk assessment were carried out based on the research results of past earthquakes and the available data of Nepal for the purpose of policy and planning development and the activities related to disaster risk reduction and management in Kathmandu Valley.

Note:

*1 Economic loss is the direct loss due to the damage of building, infrastructure and lifeline, calculated by reconstruction or repair cost.

*2 The building damage of 2030 accounts for heavy damage only.

Case-0: The composition of the structure type of 2030 is assumed as same as that of 2016.

Case-1: Buildings increased from 2016 to 2030 are assumed masonry with cement mortar and RC engineered only. The ratio of masonry and RC is assumed as same as that at the time of 2016.

Case-2: 1) Same as Case-1, 2) All of the existing masonry building are assumed to change to masonry with cement mortar.

Case-3: 1) Same as Case-2, 2) All of the existing RC non-engineered building are assumed to change to RC engineered.

Case-4: 1) 50% of increased new masonry buildings are changed to RC engineered, 2) 50% of existing masonry buildings at 2016 are assumed be reconstructed to RC Engineered, 3) 30% of existing non-engineered RC buildings are assumed be reconstructed to RC engineered.

Case-5: 1) 70% of increased new masonry buildings are changed to RC engineered, 2) 70% of existing masonry buildings at 2016 are assumed be reconstructed to RC Engineered,

*3 The damage length of road means the road length which located in the high liquefaction and landslide potential area, not the damage length which will happen in the scenario earthquakes.

*4 There are a total of 145 bridges. 45 RC multi span bridges were quantitatively assessed. The remaining single span (RC and masonry) and multi span (masonry) bridges were qualitatively assessed.

6 Summary of Risk Assessment Results of CHANGUNARAYAN Municipality

Category		Physical Damage				Economic Loss (mil. NPR)*1				Human Casualty (Population: 2016:57282; 2030: 66112)				
		Scenario Earthquake Ground Motion				Scenario Earthquake Ground Motion					Scenario Earthquake Ground Motion			
		WN	CNS-1	CNS-2	CNS-3	WN	CNS-1	CNS-2	CNS-3		WN	CNS-1	CNS-2	CNS-3
Building (2016) (Total building 16655)	Heavy damage (EMS DL4&5)	**975**	**2,094**	**4,512**	**6,958**	**3,726.0**	**11,128.0**	**24,543.0**	**37,062.0**	Night (Weekday and weekend)				
		5.9%	12.6%	27.1%	41.8%					Death	**70**	**163**	**392**	**653**
											0.12%	0.28%	0.68%	1.14%
										Injured	**276**	**639**	**1,534**	**2,558**
											0.48%	1.12%	2.68%	4.47%
										Evacuee	**6,121**	**12,052**	**23,015**	**32,265**
											10.69%	21.04%	40.18%	56.33%
	Moderate damage (EMS DL3)	**760**	**1,327**	**2,071**	**2,360**					Weekday (noon, 12:00)				
		4.6%	8.0%	12.4%	14.2%					Death	**49**	**113**	**271**	**452**
											0.11%	0.26%	0.61%	1.02%
										Injured	**191**	**443**	**1,063**	**1,773**
											0.43%	1.00%	2.41%	4.02%
										Evacuee	**4,717**	**9,295**	**17,753**	**24,894**
											10.69%	21.07%	40.25%	56.44%
	Slight damage (EMS DL2)	**1,448**	**2,218**	**2,793**	**2,673**					Weekend (afternoon, 18:00)				
		8.7%	13.3%	16.8%	16.0%					Death	**49**	**114**	**274**	**457**
											0.09%	0.20%	0.48%	0.80%
										Injured	**193**	**447**	**1,073**	**1,791**
											0.34%	0.78%	1.87%	3.13%
										Evacuee	**6,142**	**12,101**	**23,133**	**32,461**
											10.72%	21.13%	40.38%	56.67%
Building (2030), (Total building 19161)*2	Case-0, heavy damage	**1,114**	**2,405**	**5,199**	**8,028**					Death	**81**	**188**	**454**	**759**
		5.8%	12.6%	27.1%	41.9%						0.12%	0.28%	0.69%	1.15%
	Case-1, heavy damage	**1,010**	**2,229**	**4,941**	**7,743**					Death	**73**	**173**	**429**	**727**
		5.3%	11.6%	25.8%	40.4%						0.11%	8.0%	5.5%	4.2%
	Case-2, heavy damage	**290**	**1,075**	**3,412**	**6,203**					Death	**21**	**85**	**303**	**595**
		1.5%	5.6%	17.8%	32.4%						74.1%	54.8%	33.3%	21.6%
	Case-3, heavy damage	**270**	**986**	**3,125**	**5,730**					Death	**19**	**74**	**265**	**525**
		1.4%	5.1%	16.3%	29.9%						76.5%	60.6%	41.6%	30.8%
	Case-4, heavy damage	**535**	**1,285**	**3,279**	**5,696**					Death	**39**	**105**	**312**	**600**
		2.8%	6.7%	17.1%	29.7%						51.9%	44.1%	31.3%	20.9%
	Case-5, heavy damage	**343**	**900**	**2,592**	**4,839**					Death	**26**	**77**	**263**	**543**
		1.8%	4.7%	13.5%	25.3%						67.9%	59.0%	42.1%	28.5%
School (Total building 187)	Heavy damage	**8**	**19**	**43**	**69**	**580.0**	**1,201.0**	**2,419.0**	**3,582.0**	Death	**5**	**14**	**40**	**74**
		4.3%	10.2%	23.0%	36.9%						0.04%	0.12%	0.34%	0.62%
	Moderate damage	**7**	**13**	**22**	**26**					Injured	**20**	**55**	**157**	**290**
		3.7%	7.0%	11.8%	13.9%						0.17%	0.46%	1.33%	2.45%
	Slight damage	**15**	**23**	**31**	**32**									
		8.0%	12.3%	16.6%	17.1%									
Health facility (Total building 14)	Heavy damage	**1**	**1**	**3**	**5**	**1,376.7**	**1,071.7**	**3,248.7**	**4,952.8**					
		7.1%	7.1%	21.4%	35.7%									
	Moderate damage	**1**	**1**	**1**	**2**									
		7.1%	7.1%	7.1%	14.3%									
	Slight damage	**1**	**2**	**2**	**2**									
		7.1%	14.3%	14.3%	14.3%									
Government building (Total building 2)	Heavy damage	**0**	**0**	**0**	**1**	**0.0**	**0.0**	**0.0**	**122.1**					
		0.0%	0.0%	0.0%	50.0%									
	Moderate damage	**0**	**0**	**0**	**0**									
		0.0%	0.0%	0.0%	0.0%									
	Slight damage	**0**	**0**	**0**	**0**									
		0.0%	0.0%	0.0%	0.0%									
Road*3 (Total length 374 km)	Length in landslide area (km)	**0.0**	**0.0**	**0.6**	**4.7**	**0.0**	**0.0**	**5.0**	**27.2**					
		0.0%	0.0%	0.2%	1.3%									
	Length in liquefaction area (km)	**0.0**	**0.0**	**0.5**	**3.3**									
		0.0%	0.0%	0.1%	0.9%									
Bridge (Total bridge 3)*4	Heavy damage	**0**	**0**	**0**	**0**	**0.0**	**0.0**	**0.0**	**0.0**					
		0.0%	0.0%	0.0%	0.0%									
	Moderate damage	**0**	**0**	**0**	**0**									
		0.0%	0.0%	0.0%	0.0%									
	Slight damage	**0**	**0**	**0**	**0**									
		0.0%	0.0%	0.0%	0.0%									
Water supply (Existing) (Total length 8 km)	Damage points	**1**	**3**	**5**	**8**	**0.0**	**0.1**	**0.2**	**0.3**					
		0.17	0.34	0.65	0.98									
Water supply (Planned) (Total length 0 km)	Damage points	**0**	**0**	**0**	**0**	**0.0**	**0.0**	**0.0**	**0.0**					
		0.0	0.0	0.0	0.0									
Sewage (Total length 0 km)	Damage length (km)	**0.0**	**0.0**	**0.0**	**0.0**	**0.1**	**0.1**	**0.1**	**0.3**					
		0.9%	1.1%	2.1%	3.6%									
Power distribution (Total pole 1912)	Pole damage	**9**	**27**	**73**	**124**	**0.1**	**0.4**	**1.0**	**1.8**					
		0.5%	1.4%	3.8%	6.5%									
Mobile BTS tower (Total tower 30)	Tower damage	**1**	**2**	**6**	**12**	**1.9**	**3.8**	**11.4**	**22.8**					
		3.3%	6.7%	20.0%	40.0%									

Caution:

1. Scenario earthquake is not the prediction of future earthquake
2. Hazard and risk assessment were carried out based on the research results of past earthquakes and the available data of Nepal for the purpose of policy and planning development and the activities related to disaster risk reduction and management in Kathmandu Valley.

Note:

*1 Economic loss is the direct loss due to the damage of building, infrastructure and lifeline, calculated by reconstruction or repair cost.

*2 The building damage of 2030 accounts for heavy damage only.

Case-0: The composition of the structure type of 2030 is assumed as same as that of 2016.

Case-1: Buildings increased from 2016 to 2030 are assumed masonry with cement mortar and RC engineered only. The ratio of masonry and RC is assumed as same as that at the time of 2016.

Case-2: 1) Same as Case-1, 2) All of the existing masonry building are assumed to change to masonry with cement mortar.

Case-3: 1) Same as Case-2, 2) All of the existing RC non-engineered building are assumed to change to RC engineered.

Case-4: 1) 50% of increased new masonry buildings are changed to RC engineered, 2) 50% of existing masonry buildings at 2016 are assumed be reconstructed to RC Engineered, 3) 30% of existing non-engineered RC buildings are assumed be reconstructed to RC engineered.

Case-5: 1) 70% of increased new masonry buildings are changed to RC engineered, 2) 70% of existing masonry buildings at 2016 are assumed be reconstructed to RC Engineered,

*3 The damage length of road means the road length which located in the high liquefaction and landslide potential area, not the damage length which will happen in the scenario earthquakes.

*4 There are a total of 145 bridges. 45 RC multi span bridges were quantitatively assessed. The remaining single span (RC and masonry) and multi span (masonry) bridges were qualitatively assessed.

7 Summary of Risk Assessment Results of DAKSHINKALI Municipality

Category		Physical Damage				Economic Loss (mil. NPR)*1				Human Casualty (Population: 2016:25915; 2030: 34976)				
		Scenario Earthquake Ground Motion				Scenario Earthquake Ground Motion					Scenario Earthquake Ground Motion			
		WN	CNS-1	CNS-2	CNS-3	WN	CNS-1	CNS-2	CNS-3		WN	CNS-1	CNS-2	CNS-3
Building (2016) (Total building 6961)	Heavy damage (EMS DL4&5)	**537**	**1,623**	**3,014**	**4,180**	**1,583.0**	**6,016.0**	**11,976.0**	**16,947.0**	Night (Weekday and weekend)				
		7.7%	23.3%	43.3%	60.0%					Death	**41**	**142**	**295**	**442**
											0.16%	0.55%	1.14%	1.71%
										Injured	**162**	**557**	**1,155**	**1,729**
											0.63%	2.15%	4.46%	6.67%
										Evacuee	**3,397**	**8,846**	**14,625**	**18,629**
											13.11%	34.13%	56.43%	71.89%
	Moderate damage (EMS DL3)	**382**	**785**	**988**	**939**					Weekday (noon, 12:00)				
		5.5%	11.3%	14.2%	13.5%					Death	**28**	**95**	**197**	**295**
											0.15%	0.49%	1.02%	1.53%
										Injured	**108**	**372**	**771**	**1,155**
											0.56%	1.93%	4.01%	6.00%
										Evacuee	**2,524**	**6,577**	**10,877**	**13,860**
											13.12%	34.19%	56.55%	72.05%
	Slight damage (EMS DL2)	**677**	**1,122**	**1,112**	**868**					Weekend (afternoon, 18:00)				
		9.7%	16.1%	16.0%	12.5%					Death	**29**	**100**	**206**	**309**
											0.11%	0.39%	0.79%	1.19%
										Injured	**113**	**390**	**808**	**1,210**
											0.44%	1.50%	3.12%	4.67%
										Evacuee	**3,409**	**8,889**	**14,713**	**18,762**
											13.15%	34.30%	56.77%	72.40%
Building (2030), (Total building 9307)*2	Case-0, heavy damage	**715**	**2,168**	**4,033**	**5,593**					Death	**55**	**191**	**398**	**597**
		7.7%	23.3%	43.3%	60.1%						0.16%	0.55%	1.14%	1.71%
	Case-1, heavy damage	**580**	**1,897**	**3,712**	**5,296**					Death	**45**	**166**	**363**	**560**
		6.2%	20.4%	39.9%	56.9%						0.13%	13.1%	8.8%	6.2%
	Case-2, heavy damage	**182**	**1,152**	**2,930**	**4,647**					Death	**13**	**99**	**286**	**492**
		2.0%	12.4%	31.5%	49.9%						76.4%	48.2%	28.1%	17.6%
	Case-3, heavy damage	**169**	**1,065**	**2,731**	**4,388**					Death	**12**	**88**	**256**	**448**
		1.8%	11.4%	29.3%	47.1%						78.2%	53.9%	35.7%	25.0%
	Case-4, heavy damage	**314**	**1,197**	**2,709**	**4,252**					Death	**25**	**112**	**293**	**505**
		3.4%	12.9%	29.1%	45.7%						54.5%	41.4%	26.4%	15.4%
	Case-5, heavy damage	**207**	**911**	**2,292**	**3,814**					Death	**17**	**90**	**262**	**480**
		2.2%	9.8%	24.6%	41.0%						69.1%	52.9%	34.2%	19.6%
School (Total building 90)	Heavy damage	**5**	**19**	**38**	**54**	**320.0**	**1,020.0**	**1,825.0**	**2,432.0**	Death	**5**	**21**	**48**	**73**
		5.6%	21.1%	42.2%	60.0%						0.07%	0.30%	0.68%	1.03%
	Moderate damage	**4**	**10**	**13**	**12**					Injured	**20**	**82**	**188**	**286**
		4.4%	11.1%	14.4%	13.3%						0.28%	1.15%	2.65%	4.03%
	Slight damage	**8**	**16**	**15**	**12**									
		8.9%	17.8%	16.7%	13.3%									
Health facility (Total building 6)	Heavy damage	**0**	**1**	**2**	**3**	**0.0**	**1,071.7**	**2,165.8**	**2,971.7**					
		0.0%	16.7%	33.3%	50.0%									
	Moderate damage	**0**	**1**	**1**	**1**									
		0.0%	16.7%	16.7%	16.7%									
	Slight damage	**1**	**1**	**1**	**1**									
		16.7%	16.7%	16.7%	16.7%									
Government building (Total building 1)	Heavy damage	**0**	**0**	**0**	**1**	**0.0**	**0.0**	**0.0**	**122.1**					
		0.0%	0.0%	0.0%	100.0%									
	Moderate damage	**0**	**0**	**0**	**0**									
		0.0%	0.0%	0.0%	0.0%									
	Slight damage	**0**	**0**	**0**	**0**									
		0.0%	0.0%	0.0%	0.0%									
Road*3 (Total length 245 km)	Length in landslide area (km)	**0.0**	**3.3**	**21.4**	**79.9**	**0.0**	**18.7**	**94.2**	**273.3**					
		0.0%	1.3%	8.7%	32.6%									
	Length in liquefaction area (km)	**0.0**	**0.0**	**0.4**	**0.4**									
		0.0%	0.0%	0.1%	0.1%									
Bridge (Total bridge 0)*4	Heavy damage	**0**	**0**	**0**	**0**	**0.0**	**0.0**	**0.0**	**0.0**					
		0.0%	0.0%	0.0%	0.0%									
	Moderate damage	**0**	**0**	**0**	**0**									
		0.0%	0.0%	0.0%	0.0%									
	Slight damage	**0**	**0**	**0**	**0**									
		0.0%	0.0%	0.0%	0.0%									
Water supply (Existing) (Total length 0 km)	Damage points	**0**	**0**	**0**	**0**	**0.0**	**0.0**	**0.0**	**0.0**					
		0.16	0.44	0.82	1.22									
Water supply (Planned) (Total length 0 km)	Damage points	**0**	**0**	**0**	**0**	**0.0**	**0.0**	**0.0**	**0.0**					
		0.0	0.0	0.0	0.0									
Sewage (Total length 0 km)	Damage length (km)	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**					
		0.0%	0.0%	0.0%	0.0%									
Power distribution (Total pole 707)	Pole damage	**3**	**17**	**42**	**66**	**0.0**	**0.2**	**0.6**	**0.9**					
		0.4%	2.4%	5.9%	9.3%									
Mobile BTS tower (Total tower 6)	Tower damage	**1**	**1**	**2**	**4**	**1.9**	**1.9**	**3.8**	**7.6**					
		16.7%	16.7%	33.3%	66.7%									

Caution:

1. Scenario earthquake is not the prediction of future earthquake
2. Hazard and risk assessment were carried out based on the research results of past earthquakes and the available data of Nepal for the purpose of policy and planning development and the activities related to disaster risk reduction and management in Kathmandu Valley.

Note:

*1 Economic loss is the direct loss due to the damage of building, infrastructure and lifeline, calculated by reconstruction or repair cost.

*2 The building damage of 2030 accounts for heavy damage only.

Case-0: The composition of the structure type of 2030 is assumed as same as that of 2016.

Case-1: Buildings increased from 2016 to 2030 are assumed masonry with cement mortar and RC engineered only. The ratio of masonry and RC is assumed as same as that at the time of 2016.

Case-2: 1) Same as Case-1, 2) All of the existing masonry building are assumed to change to masonry with cement mortar.

Case-3: 1) Same as Case-2, 2) All of the existing RC non-engineered building are assumed to change to RC engineered.

Case-4: 1) 50% of increased new masonry buildings are changed to RC engineered, 2) 50% of existing masonry buildings at 2016 are assumed be reconstructed to RC Engineered, 3) 30% of existing non-engineered RC buildings are assumed be reconstructed to RC engineered.

Case-5: 1) 70% of increased new masonry buildings are changed to RC engineered, 2) 70% of existing masonry buildings at 2016 are assumed be reconstructed to RC Engineered,

*3 The damage length of road means the road length which located in the high liquefaction and landslide potential area, not the damage length which will happen in the scenario earthquakes.

*4 There are a total of 145 bridges. 45 RC multi span bridges were quantitatively assessed. The remaining single span (RC and masonry) and multi span (masonry) bridges were qualitatively assessed.

8 Summary of Risk Assessment Results of GODAWARI Municipality

Category		Physical Damage				Economic Loss (mil. NPR)*1				Human Casualty (Population: 2016:84959; 2030: 108338)				
		Scenario Earthquake Ground Motion				Scenario Earthquake Ground Motion					Scenario Earthquake Ground Motion			
		WN	CNS-1	CNS-2	CNS-3	WN	CNS-1	CNS-2	CNS-3		WN	CNS-1	CNS-2	CNS-3
Building (2016) (Total building 21203)	Heavy damage (EMS DL4&5)	**1,481**	**5,386**	**10,034**	**13,708**	**6,227.0**	**27,257.0**	**51,396.0**	**69,725.0**	Night (Weekday and weekend)				
		7.0%	25.4%	47.3%	64.7%					Death	**124**	**537**	**1,137**	**1,679**
											0.15%	0.63%	1.34%	1.98%
										Injured	**485**	**2,102**	**4,453**	**6,575**
											0.57%	2.47%	5.24%	7.74%
										Evacuee	**10,396**	**32,060**	**52,270**	**64,964**
											12.24%	37.74%	61.52%	76.47%
	Moderate damage (EMS DL3)	**1,115**	**2,626**	**3,114**	**2,759**					Weekday (noon, 12:00)				
		5.3%	12.4%	14.7%	13.0%					Death	**92**	**397**	**839**	**1,238**
											0.13%	0.57%	1.21%	1.78%
										Injured	**360**	**1,553**	**3,286**	**4,848**
											0.52%	2.23%	4.72%	6.96%
										Evacuee	**8,562**	**26,357**	**42,956**	**53,389**
											12.30%	37.86%	61.71%	76.70%
	Slight damage (EMS DL2)	**2,056**	**3,587**	**3,254**	**2,353**					Weekend (afternoon, 18:00)				
		9.7%	16.9%	15.3%	11.1%					Death	**87**	**376**	**796**	**1175**
											0.10%	0.44%	0.94%	1.38%
										Injured	**340**	**1,472**	**3,117**	**4,602**
											0.40%	1.73%	3.67%	5.42%
										Evacuee	**10,433**	**32,221**	**52,611**	**65,468**
											12.28%	37.93%	61.93%	77.06%
Building (2030), (Total building 27151)*2	Case-0, heavy damage	**1,851**	**6,833**	**12,832**	**17,569**					Death	**154**	**681**	**1,459**	**2,161**
		6.8%	25.2%	47.3%	64.7%						0.14%	0.63%	1.35%	1.99%
	Case-1, heavy damage	**1,596**	**6,265**	**12,157**	**16,953**					Death	**132**	**619**	**1,368**	**2,067**
		5.9%	23.1%	44.8%	62.4%						0.12%	9.1%	6.2%	4.3%
	Case-2, heavy damage	**561**	**4,338**	**10,273**	**15,467**					Death	**46**	**438**	**1,174**	**1,903**
		2.1%	16.0%	37.8%	57.0%						70.1%	35.7%	19.5%	11.9%
	Case-3, heavy damage	**512**	**3,928**	**9,475**	**14,542**					Death	**40**	**375**	**1,034**	**1,726**
		1.9%	14.5%	34.9%	53.6%						74.0%	44.9%	29.1%	20.1%
	Case-4, heavy damage	**871**	**4,190**	**9,394**	**14,272**					Death	**75**	**450**	**1,175**	**1,951**
		3.2%	15.4%	34.6%	52.6%						51.3%	33.9%	19.5%	9.7%
	Case-5, heavy damage	**578**	**3,327**	**8,225**	**13,126**					Death	**51**	**378**	**1,086**	**1,891**
		2.1%	12.3%	30.3%	48.3%						66.9%	44.5%	25.6%	12.5%
School (Total building 251)	Heavy damage	**12**	**61**	**120**	**165**	**1,002.0**	**3,564.0**	**6,040.0**	**7,708.0**	Death	**16**	**90**	**199**	**291**
		4.8%	24.3%	47.8%	65.7%						0.07%	0.39%	0.86%	1.26%
	Moderate damage	**13**	**33**	**38**	**33**					Injured	**63**	**352**	**779**	**1,140**
		5.2%	13.1%	15.1%	13.1%						0.27%	1.52%	3.37%	4.93%
	Slight damage	**28**	**48**	**41**	**28**									
		11.2%	19.1%	16.3%	11.2%									
Health facility (Total building 31)	Heavy damage	**2**	**7**	**14**	**20**	**2,753.4**	**7,501.8**	**15,160.5**	**19,811.2**					
		6.5%	22.6%	45.2%	64.5%									
	Moderate damage	**1**	**4**	**5**	**4**									
		3.2%	12.9%	16.1%	12.9%									
	Slight damage	**3**	**5**	**5**	**4**									
		9.7%	16.1%	16.1%	12.9%									
Government building (Total building 8)	Heavy damage	**1**	**3**	**4**	**6**	**122.2**	**440.8**	**524.3**	**732.5**					
		12.5%	37.5%	50.0%	75.0%									
	Moderate damage	**1**	**2**	**1**	**1**									
		12.5%	25.0%	12.5%	12.5%									
	Slight damage	**1**	**2**	**1**	**1**									
		12.5%	25.0%	12.5%	12.5%									
Road*3 (Total length 572 km)	Length in landslide area (km)	**0.0**	**1.5**	**28.2**	**123.2**	**0.0**	**8.7**	**154.1**	**477.8**					
		0.0%	0.3%	4.9%	21.6%									
	Length in liquefaction area (km)	**0.0**	**0.0**	**7.4**	**17.2**									
		0.0%	0.0%	1.3%	3.0%									
Bridge (Total bridge 3)*4	Heavy damage	**0**	**0**	**0**	**1**	**0.0**	**23.0**	**30.2**	**42.5**					
		0.0%	0.0%	0.0%	33.3%									
	Moderate damage	**0**	**0**	**1**	**0**									
		0.0%	0.0%	33.3%	0.0%									
	Slight damage	**0**	**1**	**0**	**0**									
		0.0%	33.3%	0.0%	0.0%									
Water supply (Existing) (Total length 17 km)	Damage points	**5**	**14**	**26**	**38**	**0.2**	**0.5**	**0.9**	**1.4**					
		0.27	0.81	1.47	2.17									
Water supply (Planned) (Total length 0 km)	Damage points	**0**	**0**	**0**	**0**	**0.0**	**0.0**	**0.0**	**0.0**					
		0.0	0.0	0.0	0.0									
Sewage (Total length 0 km)	Damage length (km)	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**					
		0.0%	0.0%	0.0%	0.0%									
Power distribution (Total pole 4055)	Pole damage	**27**	**142**	**307**	**440**	**0.4**	**2.0**	**4.3**	**6.2**					
		0.7%	3.5%	7.6%	10.9%									
Mobile BTS tower (Total tower 44)	Tower damage	**1**	**8**	**20**	**32**	**1.9**	**15.2**	**38.0**	**60.8**					
		2.3%	18.2%	45.5%	72.7%									

Caution:

1. Scenario earthquake is not the prediction of future earthquake
2. Hazard and risk assessment were carried out based on the research results of past earthquakes and the available data of Nepal for the purpose of policy and planning development and the activities related to disaster risk reduction and management in Kathmandu Valley.

Note:

*1 Economic loss is the direct loss due to the damage of building, infrastructure and lifeline, calculated by reconstruction or repair cost.

*2 The building damage of 2030 accounts for heavy damage only.

Case-0: The composition of the structure type of 2030 is assumed as same as that of 2016.

Case-1: Buildings increased from 2016 to 2030 are assumed masonry with cement mortar and RC engineered only. The ratio of masonry and RC is assumed as same as that at the time of 2016.

Case-2: 1) Same as Case-1, 2) All of the existing masonry building are assumed to change to masonry with cement mortar.

Case-3: 1) Same as Case-2, 2) All of the existing RC non-engineered building are assumed to change to RC engineered.

Case-4: 1) 50% of increased new masonry buildings are changed to RC engineered, 2) 50% of existing masonry buildings at 2016 are assumed be reconstructed to RC Engineered, 3) 30% of existing non-engineered RC buildings are assumed be reconstructed to RC engineered.

Case-5: 1) 70% of increased new masonry buildings are changed to RC engineered, 2) 70% of existing masonry buildings at 2016 are assumed be reconstructed to RC Engineered,

*3 The damage length of road means the road length which located in the high liquefaction and landslide potential area, not the damage length which will happen in the scenario earthquakes.

*4 There are a total of 145 bridges. 45 RC multi span bridges were quantitatively assessed. The remaining single span (RC and masonry) and multi span (masonry) bridges were qualitatively assessed.

9 Summary of Risk Assessment Results of GOKARNESHWAR Municipality

Category		Physical Damage				Economic Loss (mil. NPR)*1				Human Casualty (Population: 2016:129591; 2030: 187702)				
		Scenario Earthquake Ground Motion				Scenario Earthquake Ground Motion					Scenario Earthquake Ground Motion			
		WN	CNS-1	CNS-2	CNS-3	WN	CNS-1	CNS-2	CNS-3		WN	CNS-1	CNS-2	CNS-3
Building (2016) (Total building 17463)	Heavy damage (EMS DL4&5)	**767**	**1,292**	**3,258**	**5,545**	**4,117.0**	**7,981.0**	**20,586.0**	**34,319.0**	Night (Weekday and weekend)				
		4.4%	7.4%	18.7%	31.8%					Death	**99**	**202**	**592**	**1,118**
											0.08%	0.16%	0.46%	0.86%
										Injured	**389**	**791**	**2,320**	**4,380**
											0.30%	0.61%	1.79%	3.38%
										Evacuee	**9,568**	**17,198**	**38,714**	**59,399**
											7.38%	13.27%	29.87%	45.84%
	Moderate damage (EMS DL3)	**698**	**1,100**	**2,095**	**2,680**					Weekday (noon, 12:00)				
		4.0%	6.3%	12.0%	15.3%					Death	**71**	**145**	**424**	**801**
											0.07%	0.14%	0.41%	0.78%
										Injured	**279**	**566**	**1,662**	**3,137**
											0.27%	0.55%	1.61%	3.04%
										Evacuee	**7,623**	**13,703**	**30,858**	**47,362**
											7.39%	13.29%	29.92%	45.92%
	Slight damage (EMS DL2)	**1,453**	**2,068**	**3,057**	**3,197**					Weekend (afternoon, 18:00)				
		8.3%	11.8%	17.5%	18.3%					Death	**69**	**141**	**415**	**783**
											0.05%	0.11%	0.32%	0.60%
										Injured	**273**	**553**	**1,624**	**3,066**
											0.21%	0.43%	1.25%	2.37%
										Evacuee	**9,598**	**17,258**	**38,892**	**59,735**
											7.41%	13.32%	30.01%	46.10%
Building (2030), (Total building 25734)*2	Case-0, heavy damage	**1,135**	**1,907**	**4,817**	**8,209**					Death	**146**	**295**	**863**	**1,628**
		4.4%	7.4%	18.7%	31.9%						0.08%	0.16%	0.46%	0.87%
	Case-1, heavy damage	**887**	**1,562**	**4,220**	**7,449**					Death	**115**	**244**	**756**	**1,468**
		3.4%	6.1%	16.4%	28.9%						0.06%	17.3%	12.4%	9.8%
	Case-2, heavy damage	**416**	**969**	**3,395**	**6,585**					Death	**57**	**163**	**636**	**1,336**
		1.6%	3.8%	13.2%	25.6%						61.0%	44.7%	26.3%	17.9%
	Case-3, heavy damage	**371**	**847**	**2,969**	**5,841**					Death	**47**	**131**	**513**	**1,102**
		1.4%	3.3%	11.5%	22.7%						67.8%	55.6%	40.6%	32.3%
	Case-4, heavy damage	**497**	**951**	**2,963**	**5,737**					Death	**68**	**160**	**579**	**1,234**
		1.9%	3.7%	11.5%	22.3%						53.4%	45.8%	32.9%	24.2%
	Case-5, heavy damage	**338**	**696**	**2,426**	**4,993**					Death	**48**	**124**	**499**	**1,122**
		1.3%	2.7%	9.4%	19.4%						67.1%	58.0%	42.2%	31.1%
School (Total building 201)	Heavy damage	**7**	**14**	**38**	**65**	**629.0**	**1,139.0**	**2,564.0**	**4,115.0**	Death	**13**	**31**	**103**	**201**
		3.5%	7.0%	18.9%	32.3%						0.04%	0.09%	0.28%	0.55%
	Moderate damage	**8**	**13**	**25**	**31**					Injured	**51**	**121**	**403**	**787**
		4.0%	6.5%	12.4%	15.4%						0.14%	0.33%	1.11%	2.17%
	Slight damage	**18**	**26**	**37**	**38**									
		9.0%	12.9%	18.4%	18.9%									
Health facility (Total building 13)	Heavy damage	**0**	**0**	**1**	**2**	**0.0**	**0.0**	**1,082.9**	**1,981.1**					
		0.0%	0.0%	7.7%	15.4%									
	Moderate damage	**0**	**1**	**1**	**2**									
		0.0%	7.7%	7.7%	15.4%									
	Slight damage	**1**	**1**	**2**	**2**									
		7.7%	7.7%	15.4%	15.4%									
Government building (Total building 1)	Heavy damage	**0**	**0**	**0**	**0**	**0.0**	**0.0**	**0.0**	**0.0**					
		0.0%	0.0%	0.0%	0.0%									
	Moderate damage	**0**	**0**	**0**	**0**									
		0.0%	0.0%	0.0%	0.0%									
	Slight damage	**0**	**0**	**0**	**0**									
		0.0%	0.0%	0.0%	0.0%									
Road*3 (Total length 261 km)	Length in landslide area (km)	**0.0**	**0.0**	**0.0**	**0.1**	**0.0**	**0.0**	**0.0**	**4.2**					
		0.0%	0.0%	0.0%	0.0%									
	Length in liquefaction area (km)	**0.0**	**0.0**	**0.0**	**1.2**									
		0.0%	0.0%	0.0%	0.4%									
Bridge (Total bridge 4)*4	Heavy damage	**0**	**0**	**0**	**0**	**18.9**	**46.1**	**60.4**	**85.1**					
		0.0%	0.0%	0.0%	0.0%									
	Moderate damage	**0**	**0**	**2**	**2**									
		0.0%	0.0%	50.0%	50.0%									
	Slight damage	**1**	**2**	**0**	**0**									
		25.0%	50.0%	0.0%	0.0%									
Water supply (Existing) (Total length 44 km)	Damage points	**25**	**40**	**75**	**112**	**0.9**	**1.5**	**2.8**	**4.2**					
		0.57	0.91	1.71	2.55									
Water supply (Planned) (Total length 1 km)	Damage points	**0**	**0**	**0**	**0**	**0.0**	**0.0**	**0.0**	**0.0**					
		0.0	0.0	0.0	0.0									
Sewage (Total length 41 km)	Damage length (km)	**0.2**	**0.2**	**0.4**	**0.4**	**2.5**	**2.6**	**5.6**	**5.9**					
		0.4%	0.4%	0.9%	0.9%									
Power distribution (Total pole 7093)	Pole damage	**34**	**70**	**198**	**357**	**0.5**	**1.0**	**2.8**	**5.0**					
		0.5%	1.0%	2.8%	5.0%									
Mobile BTS tower (Total tower 29)	Tower damage	**1**	**2**	**7**	**12**	**1.9**	**3.8**	**13.3**	**22.8**					
		3.4%	6.9%	24.1%	41.4%									

Caution:

1. Scenario earthquake is not the prediction of future earthquake
2. Hazard and risk assessment were carried out based on the research results of past earthquakes and the available data of Nepal for the purpose of policy and planning development and the activities related to disaster risk reduction and management in Kathmandu Valley.

Note:

*1 Economic loss is the direct loss due to the damage of building, infrastructure and lifeline, calculated by reconstruction or repair cost.

*2 The building damage of 2030 accounts for heavy damage only.

Case-0: The composition of the structure type of 2030 is assumed as same as that of 2016.

Case-1: Buildings increased from 2016 to 2030 are assumed masonry with cement mortar and RC engineered only. The ratio of masonry and RC is assumed as same as that at the time of 2016.

Case-2: 1) Same as Case-1, 2) All of the existing masonry building are assumed to change to masonry with cement mortar.

Case-3: 1) Same as Case-2, 2) All of the existing RC non-engineered building are assumed to change to RC engineered.

Case-4: 1) 50% of increased new masonry buildings are changed to RC engineered, 2) 50% of existing masonry buildings at 2016 are assumed be reconstructed to RC Engineered, 3) 30% of existing non-engineered RC buildings are assumed be reconstructed to RC engineered.

Case-5: 1) 70% of increased new masonry buildings are changed to RC engineered, 2) 70% of existing masonry buildings at 2016 are assumed be reconstructed to RC Engineered,

*3 The damage length of road means the road length which located in the high liquefaction and landslide potential area, not the damage length which will happen in the scenario earthquakes.

*4 There are a total of 145 bridges. 45 RC multi span bridges were quantitatively assessed. The remaining single span (RC and masonry) and multi span (masonry) bridges were qualitatively assessed.

10 Summary of Risk Assessment Results of KAGESHWORI MANOHARA Municipality

Category		Physical Damage				Economic Loss (mil. NPR)*1				Human Casualty (Population: 2016:71894; 2030: 118684)				
		Scenario Earthquake Ground Motion				Scenario Earthquake Ground Motion					Scenario Earthquake Ground Motion			
		WN	CNS-1	CNS-2	CNS-3	WN	CNS-1	CNS-2	CNS-3		WN	CNS-1	CNS-2	CNS-3
Building (2016) (Total building 13949)	Heavy damage (EMS DL4&5)	**573**	**1,071**	**2,591**	**4,249**	**2,622.0**	**6,045.0**	**15,452.0**	**25,248.0**	Night (Weekday and weekend)				
		4.1%	7.7%	18.6%	30.5%					Death	**55**	**117**	**322**	**578**
											0.08%	0.16%	0.45%	0.80%
										Injured	**217**	**458**	**1,263**	**2,262**
											0.30%	0.64%	1.76%	3.15%
										Evacuee	**5,204**	**9,788**	**21,266**	**31,746**
											7.24%	13.61%	29.58%	44.16%
	Moderate damage (EMS DL3)	**505**	**876**	**1,639**	**2,090**					Weekday (noon, 12:00)				
		3.6%	6.3%	11.7%	15.0%					Death	**39**	**81**	**223**	**399**
											0.07%	0.15%	0.40%	0.72%
										Injured	**152**	**317**	**871**	**1,562**
											0.28%	0.58%	1.58%	2.84%
										Evacuee	**4,042**	**7,521**	**16,332**	**24,412**
											7.34%	13.65%	29.64%	44.31%
	Slight damage (EMS DL2)	**1,058**	**1,643**	**2,422**	**2,565**					Weekend (afternoon, 18:00)				
		7.6%	11.8%	17.4%	18.4%					Death	**39**	**82**	**226**	**404**
											0.05%	0.11%	0.31%	0.56%
										Injured	**152**	**321**	**884**	**1,583**
											0.21%	0.45%	1.23%	2.20%
										Evacuee	**5,220**	**9,823**	**21,362**	**31,919**
											7.26%	13.66%	29.71%	44.40%
Building (2030), (Total building 22277)*2	Case-0, heavy damage	**895**	**1,710**	**4,144**	**6,801**					Death	**90**	**194**	**535**	**960**
		4.0%	7.7%	18.6%	30.5%						0.08%	0.16%	0.45%	0.81%
	Case-1, heavy damage	**658**	**1,338**	**3,525**	**6,035**					Death	**64**	**149**	**445**	**832**
		3.0%	6.0%	15.8%	27.1%						0.05%	23.2%	16.8%	13.3%
	Case-2, heavy damage	**255**	**784**	**2,759**	**5,242**					Death	**25**	**89**	**356**	**734**
		1.1%	3.5%	12.4%	23.5%						72.2%	54.1%	33.5%	23.5%
	Case-3, heavy damage	**232**	**696**	**2,453**	**4,712**					Death	**21**	**75**	**298**	**625**
		1.0%	3.1%	11.0%	21.2%						76.7%	61.3%	44.3%	34.9%
	Case-4, heavy damage	**358**	**802**	**2,432**	**4,557**					Death	**36**	**94**	**332**	**683**
		1.6%	3.6%	10.9%	20.5%						60.0%	51.5%	37.9%	28.9%
	Case-5, heavy damage	**236**	**580**	**1,970**	**3,924**					Death	**24**	**71**	**282**	**615**
		1.1%	2.6%	8.8%	17.6%						73.3%	63.4%	47.3%	35.9%
School (Total building 110)	Heavy damage	**2**	**6**	**18**	**32**	**240.0**	**543.0**	**1,269.0**	**1,946.0**	Death	**4**	**12**	**39**	**74**
		1.8%	5.5%	16.4%	29.1%						0.03%	0.08%	0.26%	0.50%
	Moderate damage	**3**	**7**	**13**	**17**					Injured	**16**	**47**	**153**	**290**
		2.7%	6.4%	11.8%	15.5%						0.11%	0.32%	1.03%	1.94%
	Slight damage	**8**	**14**	**20**	**21**									
		7.3%	12.7%	18.2%	19.1%									
Health facility (Total building 14)	Heavy damage	**0**	**1**	**3**	**4**	**0.0**	**1,071.7**	**3,248.7**	**3,962.2**					
		0.0%	7.1%	21.4%	28.6%									
	Moderate damage	**0**	**1**	**2**	**2**									
		0.0%	7.1%	14.3%	14.3%									
	Slight damage	**1**	**2**	**3**	**3**									
		7.1%	14.3%	21.4%	21.4%									
Government building (Total building 1)	Heavy damage	**0**	**0**	**0**	**0**	**0.0**	**0.0**	**0.0**	**0.0**					
		0.0%	0.0%	0.0%	0.0%									
	Moderate damage	**0**	**0**	**0**	**0**									
		0.0%	0.0%	0.0%	0.0%									
	Slight damage	**0**	**0**	**0**	**0**									
		0.0%	0.0%	0.0%	0.0%									
Road*3 (Total length 230 km)	Length in landslide area (km)	**0.0**	**0.0**	**0.0**	**0.8**	**0.0**	**0.0**	**1.7**	**9.9**					
		0.0%	0.0%	0.0%	0.3%									
	Length in liquefaction area (km)	**0.0**	**0.0**	**0.4**	**2.2**									
		0.0%	0.0%	0.2%	0.9%									
Bridge (Total bridge 2)*4	Heavy damage	**0**	**0**	**0**	**1**	**0.0**	**46.1**	**60.4**	**85.1**					
		0.0%	0.0%	0.0%	50.0%									
	Moderate damage	**0**	**1**	**2**	**1**									
		0.0%	50.0%	100.0%	50.0%									
	Slight damage	**0**	**1**	**0**	**0**									
		0.0%	50.0%	0.0%	0.0%									
Water supply (Existing) (Total length 4 km)	Damage points	**1**	**2**	**3**	**4**	**0.0**	**0.1**	**0.1**	**0.2**					
		0.22	0.37	0.69	1.03									
Water supply (Planned) (Total length 0 km)	Damage points	**0**	**0**	**0**	**0**	**0.0**	**0.0**	**0.0**	**0.0**					
		0.0	0.0	0.0	0.0									
Sewage (Total length 23 km)	Damage length (km)	**0.1**	**0.1**	**0.2**	**0.2**	**1.5**	**1.6**	**3.4**	**3.5**					
		0.4%	0.4%	0.9%	0.9%									
Power distribution (Total pole 6348)	Pole damage	**25**	**65**	**173**	**295**	**0.4**	**0.9**	**2.4**	**4.2**					
		0.4%	1.0%	2.7%	4.6%									
Mobile BTS tower (Total tower 25)	Tower damage	**1**	**2**	**5**	**10**	**1.9**	**3.8**	**9.5**	**19.0**					
		4.0%	8.0%	20.0%	40.0%									

Caution:

1. Scenario earthquake is not the prediction of future earthquake
2. Hazard and risk assessment were carried out based on the research results of past earthquakes and the available data of Nepal for the purpose of policy and planning development and the activities related to disaster risk reduction and management in Kathmandu Valley.

Note:

*1 Economic loss is the direct loss due to the damage of building, infrastructure and lifeline, calculated by reconstruction or repair cost.

*2 The building damage of 2030 accounts for heavy damage only.

Case-0: The composition of the structure type of 2030 is assumed as same as that of 2016.

Case-1: Buildings increased from 2016 to 2030 are assumed masonry with cement mortar and RC engineered only. The ratio of masonry and RC is assumed as same as that at the time of 2016.

Case-2: 1) Same as Case-1, 2) All of the existing masonry building are assumed to change to masonry with cement mortar.

Case-3: 1) Same as Case-2, 2) All of the existing RC non-engineered building are assumed to change to RC engineered.

Case-4: 1) 50% of increased new masonry buildings are changed to RC engineered, 2) 50% of existing masonry buildings at 2016 are assumed be reconstructed to RC Engineered, 3) 30% of existing non-engineered RC buildings are assumed be reconstructed to RC engineered.

Case-5: 1) 70% of increased new masonry buildings are changed to RC engineered, 2) 70% of existing masonry buildings at 2016 are assumed be reconstructed to RC Engineered,

*3 The damage length of road means the road length which located in the high liquefaction and landslide potential area, not the damage length which will happen in the scenario earthquakes.

*4 There are a total of 145 bridges. 45 RC multi span bridges were quantitatively assessed. The remaining single span (RC and masonry) and multi span (masonry) bridges were qualitatively assessed.

11 Summary of Risk Assessment Results of KIRTIPUR Municipality

Category		Physical Damage				Economic Loss (mil. NPR)*1				Human Casualty (Population: 2016:77811; 2030: 127886)				
		Scenario Earthquake Ground Motion				Scenario Earthquake Ground Motion					Scenario Earthquake Ground Motion			
		WN	CNS-1	CNS-2	CNS-3	WN	CNS-1	CNS-2	CNS-3		WN	CNS-1	CNS-2	CNS-3
Building (2016) (Total building 11471)	Heavy damage (EMS DL4&5)	**912**	**3,072**	**5,848**	**7,863**	**5,833.0**	**18,771.0**	**33,123.0**	**42,936.0**	Night (Weekday and weekend)				
		8.0%	26.8%	51.0%	68.5%					Death	**123**	**524**	**1,184**	**1,749**
											0.16%	0.67%	1.52%	2.25%
										Injured	**481**	**2,053**	**4,637**	**6,849**
											0.62%	2.64%	5.96%	8.80%
										Evacuee	**10,270**	**29,336**	**48,758**	**60,227**
											13.20%	37.70%	62.66%	77.40%
	Moderate damage (EMS DL3)	**756**	**1,555**	**1,696**	**1,391**					Weekday (noon, 12:00)				
		6.6%	13.6%	14.8%	12.1%					Death	**97**	**413**	**932**	**1,376**
											0.14%	0.61%	1.37%	2.02%
										Injured	**380**	**1,617**	**3,650**	**5,388**
											0.56%	2.38%	5.37%	7.92%
										Evacuee	**8,999**	**25,706**	**42,733**	**52,800**
											13.23%	37.80%	62.84%	77.64%
	Slight damage (EMS DL2)	**1,385**	**1,977**	**1,624**	**1,101**					Weekend (afternoon, 18:00)				
		12.1%	17.2%	14.2%	9.6%					Death	**86**	**367**	**829**	**1224**
											0.11%	0.47%	1.07%	1.57%
										Injured	**337**	**1,437**	**3,246**	**4,794**
											0.43%	1.85%	4.17%	6.16%
										Evacuee	**10,307**	**29,494**	**49,114**	**60,752**
											13.25%	37.90%	63.12%	78.08%
Building (2030), (Total building 19707)*2	Case-0, heavy damage	**1,638**	**5,463**	**10,275**	**13,711**					Death	**212**	**895**	**1,998**	**2,928**
		8.3%	27.7%	52.1%	69.6%						0.17%	0.70%	1.56%	2.29%
	Case-1, heavy damage	**1,319**	**4,862**	**9,586**	**13,107**					Death	**169**	**781**	**1,830**	**2,757**
		6.7%	24.7%	48.6%	66.5%						0.13%	12.7%	8.4%	5.8%
	Case-2, heavy damage	**994**	**4,420**	**9,199**	**12,820**					Death	**127**	**714**	**1,763**	**2,702**
		5.0%	22.4%	46.7%	65.1%						40.1%	20.2%	11.8%	7.7%
	Case-3, heavy damage	**905**	**4,046**	**8,603**	**12,214**					Death	**109**	**618**	**1,579**	**2,494**
		4.6%	20.5%	43.7%	62.0%						48.6%	30.9%	21.0%	14.8%
	Case-4, heavy damage	**848**	**3,775**	**8,301**	**11,987**					Death	**116**	**661**	**1,730**	**2,756**
		4.3%	19.2%	42.1%	60.8%						45.3%	26.1%	13.4%	5.9%
	Case-5, heavy damage	**653**	**3,311**	**7,740**	**11,491**					Death	**94**	**605**	**1,675**	**2,739**
		3.3%	16.8%	39.3%	58.3%						55.7%	32.4%	16.2%	6.5%
School (Total building 98)	Heavy damage	**7**	**26**	**50**	**67**	**542.0**	**1,579.0**	**2,686.0**	**3,413.0**	Death	**13**	**64**	**143**	**208**
		7.1%	26.5%	51.0%	68.4%						0.09%	0.44%	0.97%	1.42%
	Moderate damage	**6**	**13**	**15**	**12**					Injured	**51**	**251**	**560**	**815**
		6.1%	13.3%	15.3%	12.2%						0.35%	1.71%	3.82%	5.56%
	Slight damage	**13**	**18**	**14**	**10**									
		13.3%	18.4%	14.3%	10.2%									
Health facility (Total building 12)	Heavy damage	**1**	**3**	**6**	**8**	**1,376.7**	**3,215.1**	**6,497.4**	**7,924.5**					
		8.3%	25.0%	50.0%	66.7%									
	Moderate damage	**1**	**2**	**2**	**2**									
		8.3%	16.7%	16.7%	16.7%									
	Slight damage	**2**	**2**	**2**	**1**									
		16.7%	16.7%	16.7%	8.3%									
Government building (Total building 3)	Heavy damage	**0**	**0**	**1**	**1**	**0.0**	**0.0**	**131.1**	**122.1**					
		0.0%	0.0%	33.3%	33.3%									
	Moderate damage	**0**	**1**	**1**	**1**									
		0.0%	33.3%	33.3%	33.3%									
	Slight damage	**0**	**1**	**1**	**0**									
		0.0%	33.3%	33.3%	0.0%									
Road*3 (Total length 174 km)	Length in landslide area (km)	**0.0**	**0.9**	**3.0**	**6.1**	**0.0**	**12.1**	**33.9**	**55.5**					
		0.0%	0.5%	1.7%	3.5%									
	Length in liquefaction area (km)	**0.0**	**1.3**	**4.8**	**10.2**									
		0.0%	0.7%	2.7%	5.9%									
Bridge (Total bridge 2)*4	Heavy damage	**0**	**0**	**0**	**0**	**0.0**	**0.0**	**0.0**	**0.0**					
		0.0%	0.0%	0.0%	0.0%									
	Moderate damage	**0**	**0**	**0**	**0**									
		0.0%	0.0%	0.0%	0.0%									
	Slight damage	**0**	**0**	**0**	**0**									
		0.0%	0.0%	0.0%	0.0%									
Water supply (Existing) (Total length 56 km)	Damage points	**31**	**80**	**146**	**216**	**1.1**	**3.0**	**5.4**	**8.0**					
		0.55	1.42	2.60	3.86									
Water supply (Planned) (Total length 0 km)	Damage points	**0**	**0**	**0**	**0**	**0.0**	**0.0**	**0.0**	**0.0**					
		0.0	0.0	0.0	0.0									
Sewage (Total length 22 km)	Damage length (km)	**0.1**	**0.2**	**0.4**	**0.5**	**1.6**	**3.1**	**5.7**	**7.6**					
		0.5%	0.9%	1.6%	2.2%									
Power distribution (Total pole 5864)	Pole damage	**56**	**226**	**474**	**663**	**0.8**	**3.2**	**6.7**	**9.3**					
		1.0%	3.9%	8.1%	11.3%									
Mobile BTS tower (Total tower 22)	Tower damage	**2**	**7**	**15**	**19**	**3.8**	**13.3**	**28.5**	**36.1**					
		9.1%	31.8%	68.2%	86.4%									

Caution:

1. Scenario earthquake is not the prediction of future earthquake
2. Hazard and risk assessment were carried out based on the research results of past earthquakes and the available data of Nepal for the purpose of policy and planning development and the activities related to disaster risk reduction and management in Kathmandu Valley.

Note:

*1 Economic loss is the direct loss due to the damage of building, infrastructure and lifeline, calculated by reconstruction or repair cost.

*2 The building damage of 2030 accounts for heavy damage only.

Case-0: The composition of the structure type of 2030 is assumed as same as that of 2016.

Case-1: Buildings increased from 2016 to 2030 are assumed masonry with cement mortar and RC engineered only. The ratio of masonry and RC is assumed as same as that at the time of 2016.

Case-2: 1) Same as Case-1, 2) All of the existing masonry building are assumed to change to masonry with cement mortar.

Case-3: 1) Same as Case-2, 2) All of the existing RC non-engineered building are assumed to change to RC engineered.

Case-4: 1) 50% of increased new masonry buildings are changed to RC engineered, 2) 50% of existing masonry buildings at 2016 are assumed be reconstructed to RC Engineered, 3) 30% of existing non-engineered RC buildings are assumed be reconstructed to RC engineered.

Case-5: 1) 70% of increased new masonry buildings are changed to RC engineered, 2) 70% of existing masonry buildings at 2016 are assumed be reconstructed to RC Engineered,

*3 The damage length of road means the road length which located in the high liquefaction and landslide potential area, not the damage length which will happen in the scenario earthquakes.

*4 There are a total of 145 bridges. 45 RC multi span bridges were quantitatively assessed. The remaining single span (RC and masonry) and multi span (masonry) bridges were qualitatively assessed.

12 Summary of Risk Assessment Results of KATHMANDU METROPOLITAN CITY

Category		Physical Damage				Economic Loss (mil. NPR)*1				Human Casualty (Population: 2016:1098054; 2030: 1407870)				
		Scenario Earthquake Ground Motion				Scenario Earthquake Ground Motion					Scenario Earthquake Ground Motion			
		WN	CNS-1	CNS-2	CNS-3	WN	CNS-1	CNS-2	CNS-3		WN	CNS-1	CNS-2	CNS-3
Building (2016) (Total building 151863)	Heavy damage (EMS DL4&5)	**8,649**	**19,926**	**42,133**	**61,983**	**49,390.0**	**118,000.0**	**244,421.0**	**352,694.0**	Night (Weekday and weekend)				
										Death	**1,230**	**3,242**	**7,933**	**12,759**
		5.7%	13.1%	27.7%	40.8%						0.11%	0.30%	0.72%	1.16%
										Injured	**4,819**	**12,697**	**31,070**	**49,970**
											0.44%	1.16%	2.83%	4.55%
										Evacuee	**115,628**	**242,998**	**454,434**	**611,274**
											10.53%	22.13%	41.39%	55.67%
	Moderate damage (EMS DL3)	**7,908**	**14,388**	**21,768**	**24,075**					Weekday (noon, 12:00)				
										Death	**1,387**	**3,616**	**8,727**	**13,930**
		5.2%	9.5%	14.3%	15.9%						0.10%	0.27%	0.66%	1.05%
										Injured	**5,433**	**14,161**	**34,176**	**54,555**
											0.41%	1.07%	2.58%	4.12%
										Evacuee	**144,349**	**300,265**	**556,068**	**744,626**
											10.90%	22.68%	41.99%	56.23%
	Slight damage (EMS DL2)	**15,849**	**23,702**	**27,951**	**26,052**					Weekend (afternoon, 18:00)				
										Death	**861**	**2269**	**5553**	**8932**
		10.4%	15.6%	18.4%	17.2%						0.08%	0.21%	0.51%	0.81%
										Injured	**3,373**	**8,888**	**21,749**	**34,979**
											0.31%	0.81%	1.98%	3.19%
										Evacuee	**115,998**	**243,971**	**456,814**	**615,102**
											10.56%	22.21%	41.60%	56.02%
Building (2030), (Total building 192055)*2	Case-0, heavy damage	**10,827**	**25,071**	**53,345**	**78,674**					Death	**1,565**	**4,160**	**10,266**	**16,562**
		5.6%	13.1%	27.8%	41.0%						0.11%	0.30%	0.73%	1.18%
	Case-1, heavy damage	**9,501**	**22,788**	**49,947**	**74,811**					Death	**1,354**	**3,727**	**9,472**	**15,533**
		4.9%	11.9%	26.0%	39.0%						0.10%	10.4%	7.7%	6.2%
	Case-2, heavy damage	**4,483**	**15,371**	**41,475**	**66,874**					Death	**661**	**2,601**	**8,051**	**14,117**
		2.3%	8.0%	21.6%	34.8%						57.8%	37.5%	21.6%	14.8%
	Case-3, heavy damage	**3,968**	**13,420**	**36,439**	**59,645**					Death	**548**	**2,120**	**6,640**	**11,910**
		2.1%	7.0%	19.0%	31.1%						65.0%	49.0%	35.3%	28.1%
	Case-4, heavy damage	**5,345**	**14,430**	**36,265**	**58,816**					Death	**797**	**2,540**	**7,517**	**13,408**
		2.8%	7.5%	18.9%	30.6%						49.1%	38.9%	26.8%	19.0%
	Case-5, heavy damage	**3,641**	**10,931**	**30,389**	**51,839**					Death	**565**	**2,026**	**6,622**	**12,381**
		1.9%	5.7%	15.8%	27.0%						63.9%	51.3%	35.5%	25.2%
School (Total building 2203)	Heavy damage	**91**	**244**	**568**	**862**	**7,968.0**	**17,923.0**	**35,032.0**	**48,315.0**	Death	**228**	**653**	**1,699**	**2,789**
		4.1%	11.1%	25.8%	39.1%						0.06%	0.16%	0.42%	0.69%
	Moderate damage	**98**	**198**	**312**	**348**					Injured	**893**	**2,557**	**6,654**	**10,923**
		4.4%	9.0%	14.2%	15.8%						0.22%	0.64%	1.66%	2.72%
	Slight damage	**223**	**354**	**426**	**398**									
		10.1%	16.1%	19.3%	18.1%									
Health facility (Total building 272)	Heavy damage	**10**	**27**	**63**	**97**	**13,767.0**	**28,935.6**	**68,222.4**	**96,084.5**					
		3.7%	9.9%	23.2%	35.7%									
	Moderate damage	**11**	**22**	**38**	**44**									
		4.0%	8.1%	14.0%	16.2%									
	Slight damage	**23**	**39**	**50**	**48**									
		8.5%	14.3%	18.4%	17.6%									
Government building (Total building 269)	Heavy damage	**12**	**32**	**66**	**96**	**1,466.4**	**4,701.8**	**8,650.2**	**11,720.3**					
		4.5%	11.9%	24.5%	35.7%									
	Moderate damage	**12**	**23**	**36**	**41**									
		4.5%	8.6%	13.4%	15.2%									
	Slight damage	**26**	**40**	**49**	**48**									
		9.7%	14.9%	18.2%	17.8%									
Road*3 (Total length 886 km)	Length in landslide area (km)	**0.0**	**0.0**	**0.0**	**0.3**	**0.0**	**275.8**	**669.9**	**745.2**					
		0.0%	0.0%	0.0%	0.0%									
	Length in liquefaction area (km)	**0.0**	**48.4**	**154.4**	**218.7**									
		0.0%	5.5%	17.4%	24.7%									
Bridge (Total bridge 59)*4	Heavy damage	**0**	**1**	**8**	**22**	**245.1**	**598.7**	**845.6**	**1,190.9**					
		0.0%	1.7%	13.6%	37.3%									
	Moderate damage	**2**	**12**	**18**	**5**									
		3.4%	20.3%	30.5%	8.5%									
	Slight damage	**11**	**13**	**2**	**1**									
		18.6%	22.0%	3.4%	1.7%									
Water supply (Existing) (Total length 615 km)	Damage points	**583**	**1072**	**1956**	**2889**	**21.6**	**39.7**	**72.4**	**106.9**					
		0.95	1.74	3.18	4.70									
Water supply (Planned) (Total length 493 km)	Damage points	**84**	**162**	**294**	**433**	**3.1**	**6.0**	**10.9**	**16.0**					
		0.2	0.3	0.6	0.9									
Sewage (Total length 639 km)	Damage length (km)	**2.6**	**4.2**	**6.1**	**9.3**	**40.6**	**70.0**	**103.0**	**147.9**					
		0.4%	0.7%	1.0%	1.5%									
Power distribution (Total pole 64979)	Pole damage	**545**	**1,328**	**2,973**	**4,509**	**7.7**	**18.7**	**41.9**	**63.5**					
		0.8%	2.0%	4.6%	6.9%									
Mobile BTS tower (Total tower 428)	Tower damage	**14**	**47**	**133**	**224**	**26.6**	**89.3**	**252.7**	**425.6**					
		3.3%	11.0%	31.1%	52.3%									

Caution:

1. Scenario earthquake is not the prediction of future earthquake
2. Hazard and risk assessment were carried out based on the research results of past earthquakes and the available data of Nepal for the purpose of policy and planning development and the activities related to disaster risk reduction and management in Kathmandu Valley.

Note:

*1 Economic loss is the direct loss due to the damage of building, infrastructure and lifeline, calculated by reconstruction or repair cost.

*2 The building damage of 2030 accounts for heavy damage only.

Case-0: The composition of the structure type of 2030 is assumed as same as that of 2016.

Case-1: Buildings increased from 2016 to 2030 are assumed masonry with cement mortar and RC engineered only. The ratio of masonry and RC is assumed as same as that at the time of 2016.

Case-2: 1) Same as Case-1, 2) All of the existing masonry building are assumed to change to masonry with cement mortar.

Case-3: 1) Same as Case-2, 2) All of the existing RC non-engineered building are assumed to change to RC engineered.

Case-4: 1) 50% of increased new masonry buildings are changed to RC engineered, 2) 50% of existing masonry buildings at 2016 are assumed be reconstructed to RC Engineered, 3) 30% of existing non-engineered RC buildings are assumed be reconstructed to RC engineered.

Case-5: 1) 70% of increased new masonry buildings are changed to RC engineered, 2) 70% of existing masonry buildings at 2016 are assumed be reconstructed to RC Engineered,

*3 The damage length of road means the road length which located in the high liquefaction and landslide potential area, not the damage length which will happen in the scenario earthquakes.

*4 There are a total of 145 bridges. 45 RC multi span bridges were quantitatively assessed. The remaining single span (RC and masonry) and multi span (masonry) bridges were qualitatively assessed.

13 Summary of Risk Assessment Results of KONJYOSOM Municipality

Category		Physical Damage				Economic Loss (mil. NPR)*1				Human Casualty (Population: 2016:4656; 2030: 5390)				
		Scenario Earthquake Ground Motion				Scenario Earthquake Ground Motion					Scenario Earthquake Ground Motion			
		WN	CNS-1	CNS-2	CNS-3	WN	CNS-1	CNS-2	CNS-3		WN	CNS-1	CNS-2	CNS-3
Building (2016) (Total building 1564)	Heavy damage (EMS DL4&5)	**96**	**353**	**637**	**888**	**147.0**	**761.0**	**1,649.0**	**2,511.0**	Night (Weekday and weekend)				
		6.1%	22.6%	40.7%	56.8%					Death	**6**	**23**	**45**	**67**
											0.13%	0.49%	0.97%	1.44%
										Injured	**22**	**91**	**177**	**263**
											0.47%	1.95%	3.80%	5.65%
										Evacuee	**513**	**1,534**	**2,496**	**3,221**
											11.02%	32.95%	53.61%	69.18%
	Moderate damage (EMS DL3)	**75**	**165**	**212**	**212**					Weekday (noon, 12:00)				
		4.8%	10.5%	13.6%	13.6%					Death	**4**	**17**	**33**	**49**
											0.11%	0.45%	0.88%	1.30%
										Injured	**16**	**66**	**129**	**192**
											0.42%	1.75%	3.43%	5.10%
										Evacuee	**416**	**1,243**	**2,022**	**2,610**
											11.05%	33.01%	53.71%	69.32%
	Slight damage (EMS DL2)	**127**	**244**	**257**	**212**					Weekend (afternoon, 18:00)				
		8.1%	15.6%	16.4%	13.6%					Death	**4**	**16**	**32**	**47**
											0.09%	0.34%	0.69%	1.01%
										Injured	**16**	**64**	**124**	**184**
											0.34%	1.37%	2.66%	3.95%
										Evacuee	**515**	**1,541**	**2,509**	**3,241**
											11.06%	33.10%	53.89%	69.61%
Building (2030), (Total building 1811)*2	Case-0, heavy damage	**111**	**409**	**737**	**1,028**					Death	**7**	**27**	**52**	**78**
		6.1%	22.6%	40.7%	56.8%						0.13%	0.50%	0.96%	1.45%
	Case-1, heavy damage	**97**	**369**	**688**	**983**					Death	**6**	**24**	**48**	**74**
		5.4%	20.4%	38.0%	54.3%						0.11%	11.1%	7.7%	5.1%
	Case-2, heavy damage	**6**	**121**	**400**	**730**					Death	**-**	**7**	**26**	**53**
		0.3%	6.7%	22.1%	40.3%						100.0%	74.1%	50.0%	32.1%
	Case-3, heavy damage	**6**	**115**	**380**	**695**					Death	**-**	**7**	**24**	**49**
		0.3%	6.4%	21.0%	38.4%						100.0%	74.1%	53.8%	37.2%
	Case-4, heavy damage	**48**	**198**	**422**	**686**					Death	**3**	**13**	**31**	**57**
		2.7%	10.9%	23.3%	37.9%						57.1%	51.9%	40.4%	26.9%
	Case-5, heavy damage	**29**	**129**	**314**	**564**					Death	**2**	**9**	**24**	**49**
		1.6%	7.1%	17.3%	31.1%						71.4%	66.7%	53.8%	37.2%
School (Total building 22)	Heavy damage	**1**	**5**	**10**	**13**	**69.0**	**273.0**	**473.0**	**640.0**	Death	**1**	**4**	**7**	**10**
		4.5%	22.7%	45.5%	59.1%						0.09%	0.35%	0.62%	0.88%
	Moderate damage	**1**	**3**	**4**	**3**					Injured	**4**	**16**	**27**	**39**
		4.5%	13.6%	18.2%	13.6%						0.35%	1.41%	2.39%	3.45%
	Slight damage	**3**	**4**	**4**	**3**									
		13.6%	18.2%	18.2%	13.6%									
Health facility (Total building 2)	Heavy damage	**0**	**0**	**0**	**1**	**0.0**	**0.0**	**0.0**	**990.6**					
		0.0%	0.0%	0.0%	50.0%									
	Moderate damage	**0**	**0**	**0**	**0**									
		0.0%	0.0%	0.0%	0.0%									
	Slight damage	**0**	**0**	**0**	**0**									
		0.0%	0.0%	0.0%	0.0%									
Government building (Total building 2)	Heavy damage	**0**	**0**	**0**	**1**	**0.0**	**0.0**	**0.0**	**122.1**					
		0.0%	0.0%	0.0%	50.0%									
	Moderate damage	**0**	**0**	**1**	**1**									
		0.0%	0.0%	50.0%	50.0%									
	Slight damage	**0**	**0**	**0**	**0**									
		0.0%	0.0%	0.0%	0.0%									
Road*3 (Total length 61 km)	Length in landslide area (km)	**0.0**	**0.4**	**5.0**	**22.6**	**0.0**	**2.5**	**21.6**	**77.0**					
		0.0%	0.7%	8.1%	37.0%									
	Length in liquefaction area (km)	**0.0**	**0.0**	**0.0**	**0.0**									
		0.0%	0.0%	0.0%	0.0%									
Bridge (Total bridge 0)*4	Heavy damage	**0**	**0**	**0**	**0**	**0.0**	**0.0**	**0.0**	**0.0**					
		0.0%	0.0%	0.0%	0.0%									
	Moderate damage	**0**	**0**	**0**	**0**									
		0.0%	0.0%	0.0%	0.0%									
	Slight damage	**0**	**0**	**0**	**0**									
		0.0%	0.0%	0.0%	0.0%									
Water supply (Existing) (Total length 0 km)	Damage points	**0**	**0**	**0**	**0**	**0.0**	**0.0**	**0.0**	**0.0**					
		0.00	0.00	0.00	0.00									
Water supply (Planned) (Total length 0 km)	Damage points	**0**	**0**	**0**	**0**	**0.0**	**0.0**	**0.0**	**0.0**					
		0.0	0.0	0.0	0.0									
Sewage (Total length 0 km)	Damage length (km)	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**					
		0.0%	0.0%	0.0%	0.0%									
Power distribution (Total pole 0)	Pole damage	**0**	**0**	**0**	**0**	**0.0**	**0.0**	**0.0**	**0.0**					
		0.0%	0.0%	0.0%	0.0%									
Mobile BTS tower (Total tower 1)	Tower damage	**0**	**0**	**0**	**1**	**0.0**	**0.0**	**0.0**	**1.9**					
		0.0%	0.0%	0.0%	100.0%									

Caution:

1. Scenario earthquake is not the prediction of future earthquake
2. Hazard and risk assessment were carried out based on the research results of past earthquakes and the available data of Nepal for the purpose of policy and planning development and the activities related to disaster risk reduction and management in Kathmandu Valley.

Note:

*1 Economic loss is the direct loss due to the damage of building, infrastructure and lifeline, calculated by reconstruction or repair cost.

*2 The building damage of 2030 accounts for heavy damage only.

Case-0: The composition of the structure type of 2030 is assumed as same as that of 2016.

Case-1: Buildings increased from 2016 to 2030 are assumed masonry with cement mortar and RC engineered only. The ratio of masonry and RC is assumed as same as that at the time of 2016.

Case-2: 1) Same as Case-1, 2) All of the existing masonry building are assumed to change to masonry with cement mortar.

Case-3: 1) Same as Case-2, 2) All of the existing RC non-engineered building are assumed to change to RC engineered.

Case-4: 1) 50% of increased new masonry buildings are changed to RC engineered, 2) 50% of existing masonry buildings at 2016 are assumed be reconstructed to RC Engineered, 3) 30% of existing non-engineered RC buildings are assumed be reconstructed to RC engineered.

Case-5: 1) 70% of increased new masonry buildings are changed to RC engineered, 2) 70% of existing masonry buildings at 2016 are assumed be reconstructed to RC Engineered,

*3 The damage length of road means the road length which located in the high liquefaction and landslide potential area, not the damage length which will happen in the scenario earthquakes.

*4 There are a total of 145 bridges. 45 RC multi span bridges were quantitatively assessed. The remaining single span (RC and masonry) and multi span (masonry) bridges were qualitatively assessed.

14 Summary of Risk Assessment Results of LALITPUR METROPOLITAN CITY

Category		Physical Damage				Economic Loss (mil. NPR)*1				Human Casualty (Population: 2016:321841; 2030: 415525)				
		Scenario Earthquake Ground Motion				Scenario Earthquake Ground Motion					Scenario Earthquake Ground Motion			
		WN	CNS-1	CNS-2	CNS-3	WN	CNS-1	CNS-2	CNS-3		WN	CNS-1	CNS-2	CNS-3
Building (2016) (Total building 52821)	Heavy damage (EMS DL4&5)	**2,737**	**9,603**	**19,030**	**26,694**	**15,861.0**	**57,355.0**	**107,349.0**	**145,934.0**	Night (Weekday and weekend)				
		5.2%	18.2%	36.0%	50.5%					Death	**321**	**1,364**	**3,136**	**4,810**
											0.10%	0.42%	0.97%	1.49%
										Injured	**1,257**	**5,341**	**12,281**	**18,838**
											0.39%	1.66%	3.82%	5.85%
										Evacuee	**30,437**	**91,975**	**160,202**	**205,929**
											9.46%	28.58%	49.78%	63.98%
	Moderate damage (EMS DL3)	**2,564**	**6,277**	**8,391**	**8,434**					Weekday (noon, 12:00)				
		4.9%	11.9%	15.9%	16.0%					Death	**301**	**1,308**	**3,050**	**4,710**
											0.08%	0.37%	0.85%	1.32%
										Injured	**1,180**	**5,124**	**11,946**	**18,447**
											0.33%	1.43%	3.34%	5.16%
										Evacuee	**32,127**	**99,030**	**174,468**	**225,554**
											8.99%	27.72%	48.84%	63.14%
	Slight damage (EMS DL2)	**5,255**	**9,322**	**9,540**	**8,031**					Weekend (afternoon, 18:00)				
		9.9%	17.6%	18.1%	15.2%					Death	**225**	**955**	**2195**	**3367**
											0.07%	0.30%	0.68%	1.05%
										Injured	**880**	**3,739**	**8,597**	**13,187**
											0.27%	1.16%	2.67%	4.10%
										Evacuee	**30,534**	**92,384**	**161,142**	**207,372**
											9.49%	28.70%	50.07%	64.43%
Building (2030), (Total building 68126)*2	Case-0, heavy damage	**3,457**	**12,362**	**24,595**	**34,543**					Death	**404**	**1,761**	**4,076**	**6,264**
		5.1%	18.1%	36.1%	50.7%						0.10%	0.42%	0.98%	1.51%
	Case-1, heavy damage	**3,032**	**11,384**	**23,245**	**33,102**					Death	**352**	**1,600**	**3,796**	**5,920**
		4.5%	16.7%	34.1%	48.6%						0.08%	9.1%	6.9%	5.5%
	Case-2, heavy damage	**1,575**	**9,065**	**20,975**	**31,175**					Death	**181**	**1,284**	**3,450**	**5,605**
		2.3%	13.3%	30.8%	45.8%						55.2%	27.1%	15.4%	10.5%
	Case-3, heavy damage	**1,381**	**7,842**	**18,454**	**28,000**					Death	**148**	**1,028**	**2,833**	**4,741**
		2.0%	11.5%	27.1%	41.1%						63.4%	41.6%	30.5%	24.3%
	Case-4, heavy damage	**1,734**	**7,865**	**18,197**	**27,726**					Death	**209**	**1,185**	**3,212**	**5,371**
		2.5%	11.5%	26.7%	40.7%						48.3%	32.7%	21.2%	14.3%
	Case-5, heavy damage	**1,199**	**6,359**	**15,977**	**25,322**					Death	**150**	**999**	**2,929**	**5,083**
		1.8%	9.3%	23.5%	37.2%						62.9%	43.3%	28.1%	18.9%
School (Total building 780)	Heavy damage	**33**	**132**	**269**	**380**	**2,902.0**	**8,985.0**	**15,727.0**	**20,470.0**	Death	**57**	**272**	**643**	**986**
		4.2%	16.9%	34.5%	48.7%						0.05%	0.25%	0.58%	0.89%
	Moderate damage	**36**	**91**	**122**	**124**					Injured	**223**	**1,065**	**2,518**	**3,861**
		4.6%	11.7%	15.6%	15.9%						0.20%	0.97%	2.28%	3.50%
	Slight damage	**80**	**143**	**147**	**125**									
		10.3%	18.3%	18.8%	16.0%									
Health facility (Total building 70)	Heavy damage	**3**	**11**	**23**	**34**	**4,130.1**	**11,788.6**	**24,906.6**	**33,679.1**					
		4.3%	15.7%	32.9%	48.6%									
	Moderate damage	**3**	**8**	**11**	**12**									
		4.3%	11.4%	15.7%	17.1%									
	Slight damage	**6**	**12**	**13**	**11**									
		8.6%	17.1%	18.6%	15.7%									
Government building (Total building 107)	Heavy damage	**6**	**18**	**36**	**51**	**733.2**	**2,644.8**	**4,718.3**	**6,226.4**					
		5.6%	16.8%	33.6%	47.7%									
	Moderate damage	**5**	**12**	**16**	**17**									
		4.7%	11.2%	15.0%	15.9%									
	Slight damage	**11**	**18**	**19**	**17**									
		10.3%	16.8%	17.8%	15.9%									
Road*3 (Total length 534 km)	Length in landslide area (km)	**0.0**	**0.0**	**0.0**	**6.3**	**0.0**	**137.4**	**204.8**	**228.3**					
		0.0%	0.0%	0.0%	1.2%									
	Length in liquefaction area (km)	**0.0**	**24.1**	**47.2**	**60.8**									
		0.0%	4.5%	8.8%	11.4%									
Bridge (Total bridge 7)*4	Heavy damage	**0**	**0**	**1**	**2**	**37.7**	**46.1**	**60.4**	**85.1**					
		0.0%	0.0%	14.3%	28.6%									
	Moderate damage	**0**	**2**	**1**	**0**									
		0.0%	28.6%	14.3%	0.0%									
	Slight damage	**2**	**0**	**0**	**0**									
		28.6%	0.0%	0.0%	0.0%									
Water supply (Existing) (Total length 213 km)	Damage points	**184**	**444**	**791**	**1159**	**6.8**	**16.4**	**29.3**	**42.9**					
		0.86	2.08	3.72	5.44									
Water supply (Planned) (Total length 204 km)	Damage points	**40**	**92**	**165**	**242**	**1.5**	**3.4**	**6.1**	**8.9**					
		0.2	0.5	0.8	1.2									
Sewage (Total length 172 km)	Damage length (km)	**0.7**	**1.5**	**1.8**	**3.2**	**11.0**	**25.0**	**33.0**	**50.1**					
		0.4%	0.9%	1.1%	1.8%									
Power distribution (Total pole 27814)	Pole damage	**171**	**739**	**1,598**	**2,324**	**2.4**	**10.4**	**22.5**	**32.7**					
		0.6%	2.7%	5.7%	8.4%									
Mobile BTS tower (Total tower 140)	Tower damage	**5**	**28**	**66**	**98**	**9.5**	**53.2**	**125.4**	**186.2**					
		3.6%	20.0%	47.1%	70.0%									

Caution:

1. Scenario earthquake is not the prediction of future earthquake
2. Hazard and risk assessment were carried out based on the research results of past earthquakes and the available data of Nepal for the purpose of policy and planning development and the activities related to disaster risk reduction and management in Kathmandu Valley.

Note:

*1 Economic loss is the direct loss due to the damage of building, infrastructure and lifeline, calculated by reconstruction or repair cost.

*2 The building damage of 2030 accounts for heavy damage only.

Case-0: The composition of the structure type of 2030 is assumed as same as that of 2016.

Case-1: Buildings increased from 2016 to 2030 are assumed masonry with cement mortar and RC engineered only. The ratio of masonry and RC is assumed as same as that at the time of 2016.

Case-2: 1) Same as Case-1, 2) All of the existing masonry building are assumed to change to masonry with cement mortar.

Case-3: 1) Same as Case-2, 2) All of the existing RC non-engineered building are assumed to change to RC engineered.

Case-4: 1) 50% of increased new masonry buildings are changed to RC engineered, 2) 50% of existing masonry buildings at 2016 are assumed be reconstructed to RC Engineered, 3) 30% of existing non-engineered RC buildings are assumed be reconstructed to RC engineered.

Case-5: 1) 70% of increased new masonry buildings are changed to RC engineered, 2) 70% of existing masonry buildings at 2016 are assumed be reconstructed to RC Engineered,

*3 The damage length of road means the road length which located in the high liquefaction and landslide potential area, not the damage length which will happen in the scenario earthquakes.

*4 There are a total of 145 bridges. 45 RC multi span bridges were quantitatively assessed. The remaining single span (RC and masonry) and multi span (masonry) bridges were qualitatively assessed.

15 Summary of Risk Assessment Results of MADHYAPUR THIMI Municipality

Category		Physical Damage				Economic Loss (mil. NPR)*1				Human Casualty (Population: 2016:95990; 2030: 129564)				
		Scenario Earthquake Ground Motion				Scenario Earthquake Ground Motion					Scenario Earthquake Ground Motion			
		WN	CNS-1	CNS-2	CNS-3	WN	CNS-1	CNS-2	CNS-3		WN	CNS-1	CNS-2	CNS-3
Building (2016) (Total building 13257)	Heavy damage (EMS DL4&5)	**507**	**1,581**	**3,531**	**5,297**	**3,426.0**	**11,378.0**	**23,877.0**	**34,396.0**	Night (Weekday and weekend)				
		3.8%	11.9%	26.6%	40.0%					Death	**74**	**280**	**726**	**1,189**
											0.08%	0.29%	0.76%	1.24%
										Injured	**290**	**1,096**	**2,844**	**4,658**
											0.30%	1.14%	2.96%	4.85%
										Evacuee	**7,231**	**20,685**	**40,021**	**54,131**
											7.53%	21.55%	41.69%	56.39%
	Moderate damage (EMS DL3)	**512**	**1,249**	**1,955**	**2,166**					Weekday (noon, 12:00)				
		3.9%	9.4%	14.7%	16.3%					Death	**63**	**229**	**594**	**976**
											0.07%	0.25%	0.66%	1.08%
										Injured	**248**	**898**	**2,324**	**3,822**
											0.28%	1.00%	2.58%	4.24%
										Evacuee	**6,835**	**18,998**	**36,887**	**50,169**
											7.58%	21.07%	40.91%	55.64%
	Slight damage (EMS DL2)	**1,115**	**2,078**	**2,476**	**2,295**					Weekend (afternoon, 18:00)				
		8.4%	15.7%	18.7%	17.3%					Death	**52**	**196**	**508**	**833**
											0.05%	0.20%	0.53%	0.87%
										Injured	**203**	**767**	**1,991**	**3,261**
											0.21%	0.80%	2.07%	3.40%
										Evacuee	**7,253**	**20,769**	**40,239**	**54,487**
											7.56%	21.64%	41.92%	56.76%
Building (2030), (Total building 17922)*2	Case-0, heavy damage	**683**	**2,127**	**4,760**	**7,153**					Death	**100**	**376**	**978**	**1,605**
		3.8%	11.9%	26.6%	39.9%						0.08%	0.29%	0.75%	1.24%
	Case-1, heavy damage	**574**	**1,902**	**4,410**	**6,745**					Death	**83**	**333**	**895**	**1,496**
		3.2%	10.6%	24.6%	37.6%						0.06%	11.4%	8.5%	6.8%
	Case-2, heavy damage	**302**	**1,475**	**3,949**	**6,331**					Death	**44**	**264**	**815**	**1,419**
		1.7%	8.2%	22.0%	35.3%						56.0%	29.8%	16.7%	11.6%
	Case-3, heavy damage	**262**	**1,255**	**3,411**	**5,584**					Death	**36**	**209**	**660**	**1,187**
		1.5%	7.0%	19.0%	31.2%						64.0%	44.4%	32.5%	26.0%
	Case-4, heavy damage	**329**	**1,281**	**3,383**	**5,552**					Death	**50**	**241**	**745**	**1,337**
		1.8%	7.1%	18.9%	31.0%						50.0%	35.9%	23.8%	16.7%
	Case-5, heavy damage	**228**	**1,015**	**2,929**	**5,016**					Death	**36**	**200**	**673**	**1,255**
		1.3%	5.7%	16.3%	28.0%						64.0%	46.8%	31.2%	21.8%
School (Total building 170)	Heavy damage	**7**	**23**	**49**	**73**	**607.0**	**1,606.0**	**2,985.0**	**4,033.0**	Death	**12**	**44**	**112**	**177**
		4.1%	13.5%	28.8%	42.9%						0.05%	0.19%	0.49%	0.78%
	Moderate damage	**8**	**17**	**25**	**27**					Injured	**47**	**172**	**439**	**693**
		4.7%	10.0%	14.7%	15.9%						0.21%	0.76%	1.93%	3.05%
	Slight damage	**16**	**29**	**32**	**29**									
		9.4%	17.1%	18.8%	17.1%									
Health facility (Total building 18)	Heavy damage	**0**	**1**	**4**	**6**	**0.0**	**1,071.7**	**4,331.6**	**5,943.4**					
		0.0%	5.6%	22.2%	33.3%									
	Moderate damage	**0**	**2**	**3**	**3**									
		0.0%	11.1%	16.7%	16.7%									
	Slight damage	**1**	**3**	**3**	**3**									
		5.6%	16.7%	16.7%	16.7%									
Government building (Total building 32)	Heavy damage	**0**	**1**	**4**	**6**	**0.0**	**146.9**	**524.3**	**732.5**					
		0.0%	3.1%	12.5%	18.8%									
	Moderate damage	**1**	**2**	**3**	**4**									
		3.1%	6.3%	9.4%	12.5%									
	Slight damage	**2**	**4**	**5**	**6**									
		6.3%	12.5%	15.6%	18.8%									
Road*3 (Total length 159 km)	Length in landslide area (km)	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**5.1**	**77.1**	**123.3**					
		0.0%	0.0%	0.0%	0.0%									
	Length in liquefaction area (km)	**0.0**	**0.9**	**17.8**	**36.2**									
		0.0%	0.6%	11.2%	22.8%									
Bridge (Total bridge 4)*4	Heavy damage	**0**	**0**	**1**	**3**	**37.7**	**69.1**	**120.8**	**170.1**					
		0.0%	0.0%	25.0%	75.0%									
	Moderate damage	**0**	**3**	**2**	**0**									
		0.0%	75.0%	50.0%	0.0%									
	Slight damage	**2**	**0**	**1**	**1**									
		50.0%	0.0%	25.0%	25.0%									
Water supply (Existing) (Total length 50 km)	Damage points	**33**	**71**	**129**	**189**	**1.2**	**2.6**	**4.8**	**7.0**					
		0.67	1.43	2.59	3.81									
Water supply (Planned) (Total length 0 km)	Damage points	**0**	**0**	**0**	**0**	**0.0**	**0.0**	**0.0**	**0.0**					
		0.0	0.0	0.0	0.0									
Sewage (Total length 57 km)	Damage length (km)	**0.2**	**0.5**	**0.6**	**0.9**	**3.6**	**7.2**	**9.2**	**14.9**					
		0.4%	0.8%	1.0%	1.6%									
Power distribution (Total pole 9338)	Pole damage	**49**	**170**	**404**	**625**	**0.7**	**2.4**	**5.7**	**8.8**					
		0.5%	1.8%	4.3%	6.7%									
Mobile BTS tower (Total tower 31)	Tower damage	**1**	**5**	**12**	**19**	**1.9**	**9.5**	**22.8**	**36.1**					
		3.2%	16.1%	38.7%	61.3%									

Caution:

1. Scenario earthquake is not the prediction of future earthquake
2. Hazard and risk assessment were carried out based on the research results of past earthquakes and the available data of Nepal for the purpose of policy and planning development and the activities related to disaster risk reduction and management in Kathmandu Valley.

Note:

*1 Economic loss is the direct loss due to the damage of building, infrastructure and lifeline, calculated by reconstruction or repair cost.

*2 The building damage of 2030 accounts for heavy damage only.

Case-0: The composition of the structure type of 2030 is assumed as same as that of 2016.

Case-1: Buildings increased from 2016 to 2030 are assumed masonry with cement mortar and RC engineered only. The ratio of masonry and RC is assumed as same as that at the time of 2016.

Case-2: 1) Same as Case-1, 2) All of the existing masonry building are assumed to change to masonry with cement mortar.

Case-3: 1) Same as Case-2, 2) All of the existing RC non-engineered building are assumed to change to RC engineered.

Case-4: 1) 50% of increased new masonry buildings are changed to RC engineered, 2) 50% of existing masonry buildings at 2016 are assumed be reconstructed to RC Engineered, 3) 30% of existing non-engineered RC buildings are assumed be reconstructed to RC engineered.

Case-5: 1) 70% of increased new masonry buildings are changed to RC engineered, 2) 70% of existing masonry buildings at 2016 are assumed be reconstructed to RC Engineered,

*3 The damage length of road means the road length which located in the high liquefaction and landslide potential area, not the damage length which will happen in the scenario earthquakes.

*4 There are a total of 145 bridges. 45 RC multi span bridges were quantitatively assessed. The remaining single span (RC and masonry) and multi span (masonry) bridges were qualitatively assessed.

16 Summary of Risk Assessment Results of MAHALAXMI Municipality

Category		Physical Damage				Economic Loss (mil. NPR)*1				Human Casualty (Population: 2016:73402; 2030: 105188)				
		Scenario Earthquake Ground Motion				Scenario Earthquake Ground Motion					Scenario Earthquake Ground Motion			
		WN	CNS-1	CNS-2	CNS-3	WN	CNS-1	CNS-2	CNS-3		WN	CNS-1	CNS-2	CNS-3
Building (2016) (Total building 15698)	Heavy damage (EMS DL4&5)	**693**	**2,719**	**5,489**	**7,806**	**3,837.0**	**16,670.0**	**32,493.0**	**45,053.0**	Night (Weekday and weekend)				
		4.4%	17.3%	35.0%	49.7%					Death	**63**	**296**	**691**	**1,071**
											0.09%	0.40%	0.94%	1.46%
										Injured	**245**	**1,159**	**2,706**	**4,195**
											0.33%	1.58%	3.69%	5.72%
										Evacuee	**5,861**	**19,841**	**35,347**	**46,020**
											7.98%	27.03%	48.16%	62.70%
	Moderate damage (EMS DL3)	**634**	**1,751**	**2,418**	**2,474**					Weekday (noon, 12:00)				
		4.0%	11.2%	15.4%	15.8%					Death	**42**	**197**	**459**	**712**
											0.08%	0.36%	0.85%	1.31%
										Injured	**163**	**771**	**1,799**	**2,789**
											0.30%	1.42%	3.32%	5.14%
										Evacuee	**4,334**	**14,680**	**26,165**	**34,078**
											7.99%	27.07%	48.25%	62.84%
	Slight damage (EMS DL2)	**1,322**	**2,634**	**2,788**	**2,380**					Weekend (afternoon, 18:00)				
		8.4%	16.8%	17.8%	15.2%					Death	**44**	**207**	**484**	**750**
											0.06%	0.28%	0.66%	1.02%
										Injured	**171**	**811**	**1,894**	**2,936**
											0.23%	1.10%	2.58%	4.00%
										Evacuee	**5,880**	**19,930**	**35,554**	**46,341**
											8.01%	27.15%	48.44%	63.13%
Building (2030), (Total building 22790)*2	Case-0, heavy damage	**1,011**	**3,963**	**7,996**	**11,353**					Death	**90**	**427**	**997**	**1,543**
		4.4%	17.4%	35.1%	49.8%						0.09%	0.41%	0.95%	1.47%
	Case-1, heavy damage	**806**	**3,494**	**7,365**	**10,687**					Death	**71**	**372**	**905**	**1,431**
		3.5%	15.3%	32.3%	46.9%						0.07%	12.9%	9.2%	7.3%
	Case-2, heavy damage	**392**	**2,745**	**6,606**	**10,046**					Death	**35**	**296**	**819**	**1,354**
		1.7%	12.0%	29.0%	44.1%						61.1%	30.7%	17.9%	12.2%
	Case-3, heavy damage	**349**	**2,422**	**5,921**	**9,167**					Death	**29**	**244**	**693**	**1,175**
		1.5%	10.6%	26.0%	40.2%						67.8%	42.9%	30.5%	23.8%
	Case-4, heavy damage	**457**	**2,419**	**5,794**	**9,011**					Death	**42**	**277**	**773**	**1,314**
		2.0%	10.6%	25.4%	39.5%						53.3%	35.1%	22.5%	14.8%
	Case-5, heavy damage	**313**	**1,964**	**5,111**	**8,270**					Death	**30**	**235**	**710**	**1,253**
		1.4%	8.6%	22.4%	36.3%						66.7%	45.0%	28.8%	18.8%
School (Total building 124)	Heavy damage	**3**	**18**	**40**	**60**	**299.0**	**1,267.0**	**2,383.0**	**3,213.0**	Death	**5**	**38**	**98**	**153**
		2.4%	14.5%	32.3%	48.4%						0.03%	0.24%	0.62%	0.96%
	Moderate damage	**4**	**14**	**19**	**20**					Injured	**20**	**149**	**384**	**599**
		3.2%	11.3%	15.3%	16.1%						0.13%	0.94%	2.42%	3.77%
	Slight damage	**10**	**22**	**24**	**20**									
		8.1%	17.7%	19.4%	16.1%									
Health facility (Total building 11)	Heavy damage	**0**	**1**	**4**	**5**	**0.0**	**1,071.7**	**4,331.6**	**4,952.8**					
		0.0%	9.1%	36.4%	45.5%									
	Moderate damage	**0**	**1**	**2**	**2**									
		0.0%	9.1%	18.2%	18.2%									
	Slight damage	**1**	**2**	**2**	**2**									
		9.1%	18.2%	18.2%	18.2%									
Government building (Total building 1)	Heavy damage	**0**	**0**	**0**	**1**	**0.0**	**0.0**	**0.0**	**122.1**					
		0.0%	0.0%	0.0%	100.0%									
	Moderate damage	**0**	**0**	**0**	**0**									
		0.0%	0.0%	0.0%	0.0%									
	Slight damage	**0**	**0**	**0**	**0**									
		0.0%	0.0%	0.0%	0.0%									
Road*3 (Total length 277 km)	Length in landslide area (km)	**0.0**	**0.0**	**9.1**	**31.0**	**0.0**	**7.8**	**77.8**	**156.5**					
		0.0%	0.0%	3.3%	11.2%									
	Length in liquefaction area (km)	**0.0**	**1.4**	**8.8**	**15.0**									
		0.0%	0.5%	3.2%	5.4%									
Bridge (Total bridge 6)*4	Heavy damage	**0**	**0**	**0**	**1**	**0.0**	**23.0**	**30.2**	**42.5**					
		0.0%	0.0%	0.0%	16.7%									
	Moderate damage	**0**	**1**	**1**	**0**									
		0.0%	16.7%	16.7%	0.0%									
	Slight damage	**0**	**0**	**0**	**0**									
		0.0%	0.0%	0.0%	0.0%									
Water supply (Existing) (Total length 5 km)	Damage points	**4**	**11**	**19**	**28**	**0.2**	**0.4**	**0.7**	**1.0**					
		0.94	2.35	4.17	6.08									
Water supply (Planned) (Total length 0 km)	Damage points	**0**	**0**	**0**	**0**	**0.0**	**0.0**	**0.0**	**0.0**					
		0.0	0.0	0.0	0.0									
Sewage (Total length 20 km)	Damage length (km)	**0.1**	**0.2**	**0.2**	**0.3**	**1.3**	**2.7**	**3.2**	**5.3**					
		0.4%	0.8%	1.0%	1.6%									
Power distribution (Total pole 6692)	Pole damage	**34**	**162**	**360**	**532**	**0.5**	**2.3**	**5.1**	**7.5**					
		0.5%	2.4%	5.4%	7.9%									
Mobile BTS tower (Total tower 33)	Tower damage	**1**	**6**	**14**	**22**	**1.9**	**11.4**	**26.6**	**41.8**					
		3.0%	18.2%	42.4%	66.7%									

Caution:

1. Scenario earthquake is not the prediction of future earthquake
2. Hazard and risk assessment were carried out based on the research results of past earthquakes and the available data of Nepal for the purpose of policy and planning development and the activities related to disaster risk reduction and management in Kathmandu Valley.

Note:

*1 Economic loss is the direct loss due to the damage of building, infrastructure and lifeline, calculated by reconstruction or repair cost.

*2 The building damage of 2030 accounts for heavy damage only.

Case-0: The composition of the structure type of 2030 is assumed as same as that of 2016.

Case-1: Buildings increased from 2016 to 2030 are assumed masonry with cement mortar and RC engineered only. The ratio of masonry and RC is assumed as same as that at the time of 2016.

Case-2: 1) Same as Case-1, 2) All of the existing masonry building are assumed to change to masonry with cement mortar.

Case-3: 1) Same as Case-2, 2) All of the existing RC non-engineered building are assumed to change to RC engineered.

Case-4: 1) 50% of increased new masonry buildings are changed to RC engineered, 2) 50% of existing masonry buildings at 2016 are assumed be reconstructed to RC Engineered, 3) 30% of existing non-engineered RC buildings are assumed be reconstructed to RC engineered.

Case-5: 1) 70% of increased new masonry buildings are changed to RC engineered, 2) 70% of existing masonry buildings at 2016 are assumed be reconstructed to RC Engineered,

*3 The damage length of road means the road length which located in the high liquefaction and landslide potential area, not the damage length which will happen in the scenario earthquakes.

*4 There are a total of 145 bridges. 45 RC multi span bridges were quantitatively assessed. The remaining single span (RC and masonry) and multi span (masonry) bridges were qualitatively assessed.

17 Summary of Risk Assessment Results of NAGARJUN Municipality

Category		Physical Damage				Economic Loss (mil. NPR)*1				Human Casualty (Population: 2016:82733; 2030: 134118)				
		Scenario Earthquake Ground Motion				Scenario Earthquake Ground Motion					Scenario Earthquake Ground Motion			
		WN	CNS-1	CNS-2	CNS-3	WN	CNS-1	CNS-2	CNS-3		WN	CNS-1	CNS-2	CNS-3
Building (2016) (Total building 16000)	Heavy damage (EMS DL4&5)	**952**	**2,249**	**5,143**	**7,900**	**5,959.0**	**14,650.0**	**31,653.0**	**46,616.0**	Night (Weekday and weekend)				
		6.0%	14.1%	32.1%	49.4%					Death	**110**	**304**	**800**	**1,328**
											0.13%	0.37%	0.97%	1.61%
										Injured	**429**	**1,192**	**3,132**	**5,201**
											0.52%	1.44%	3.79%	6.29%
										Evacuee	**9,419**	**20,343**	**39,321**	**53,483**
											11.38%	24.59%	47.53%	64.65%
	Moderate damage (EMS DL3)	**848**	**1,570**	**2,357**	**2,458**					Weekday (noon, 12:00)				
		5.3%	9.8%	14.7%	15.4%					Death	**72**	**200**	**526**	**874**
											0.12%	0.33%	0.87%	1.44%
										Injured	**282**	**785**	**2,062**	**3,423**
											0.47%	1.30%	3.41%	5.66%
										Evacuee	**6,896**	**14,899**	**28,815**	**39,211**
											11.40%	24.62%	47.62%	64.81%
	Slight damage (EMS DL2)	**1,629**	**2,448**	**2,792**	**2,384**					Weekend (afternoon, 18:00)				
		10.2%	15.3%	17.5%	14.9%					Death	**76**	**213**	**560**	**930**
											0.09%	0.26%	0.68%	1.12%
										Injured	**300**	**834**	**2,193**	**3,641**
											0.36%	1.01%	2.65%	4.40%
										Evacuee	**9,452**	**20,434**	**39,561**	**53,881**
											11.42%	24.70%	47.82%	65.13%
Building (2030), (Total building 26337)*2	Case-0, heavy damage	**1,556**	**3,696**	**8,460**	**13,003**					Death	**176**	**494**	**1,300**	**2,160**
		5.9%	14.0%	32.1%	49.4%						0.13%	0.37%	0.97%	1.61%
	Case-1, heavy damage	**1,205**	**3,084**	**7,530**	**11,981**					Death	**137**	**411**	**1,148**	**1,972**
		4.6%	11.7%	28.6%	45.5%						0.10%	16.8%	11.7%	8.7%
	Case-2, heavy damage	**736**	**2,404**	**6,718**	**11,235**					Death	**88**	**337**	**1,051**	**1,877**
		2.8%	9.1%	25.5%	42.7%						50.0%	31.8%	19.2%	13.1%
	Case-3, heavy damage	**646**	**2,117**	**6,058**	**10,364**					Death	**73**	**280**	**906**	**1,671**
		2.5%	8.0%	23.0%	39.4%						58.5%	43.3%	30.3%	22.6%
	Case-4, heavy damage	**742**	**2,160**	**5,967**	**10,182**					Death	**90**	**316**	**999**	**1,837**
		2.8%	8.2%	22.7%	38.7%						48.9%	36.0%	23.2%	15.0%
	Case-5, heavy damage	**549**	**1,767**	**5,289**	**9,392**					Death	**70**	**273**	**928**	**1,767**
		2.1%	6.7%	20.1%	35.7%						60.2%	44.7%	28.6%	18.2%
School (Total building 147)	Heavy damage	**6**	**17**	**44**	**70**	**558.0**	**1,353.0**	**2,815.0**	**3,525.0**	Death	**10**	**39**	**117**	**201**
		4.1%	11.6%	29.9%	47.6%						0.05%	0.20%	0.59%	1.01%
	Moderate damage	**7**	**14**	**22**	**23**					Injured	**39**	**153**	**458**	**787**
		4.8%	9.5%	15.0%	15.6%						0.20%	0.77%	2.29%	3.94%
	Slight damage	**15**	**24**	**27**	**23**									
		10.2%	16.3%	18.4%	15.6%									
Health facility (Total building 7)	Heavy damage	**0**	**1**	**2**	**4**	**0.0**	**1,071.7**	**2,165.8**	**3,962.2**					
		0.0%	14.3%	28.6%	57.1%									
	Moderate damage	**1**	**1**	**1**	**1**									
		14.3%	14.3%	14.3%	14.3%									
	Slight damage	**1**	**1**	**1**	**1**									
		14.3%	14.3%	14.3%	14.3%									
Government building (Total building 3)	Heavy damage	**0**	**0**	**1**	**1**	**0.0**	**0.0**	**131.1**	**122.1**					
		0.0%	0.0%	33.3%	33.3%									
	Moderate damage	**0**	**0**	**1**	**1**									
		0.0%	0.0%	33.3%	33.3%									
	Slight damage	**0**	**0**	**1**	**1**									
		0.0%	0.0%	33.3%	33.3%									
Road*3 (Total length 238 km)	Length in landslide area (km)	**0.0**	**0.0**	**3.7**	**16.4**	**0.0**	**0.0**	**63.4**	**131.0**					
		0.0%	0.0%	1.6%	6.9%									
	Length in liquefaction area (km)	**0.0**	**0.0**	**10.9**	**22.1**									
		0.0%	0.0%	4.6%	9.3%									
Bridge (Total bridge 1)*4	Heavy damage	**0**	**0**	**0**	**0**	**0.0**	**0.0**	**0.0**	**0.0**					
		0.0%	0.0%	0.0%	0.0%									
	Moderate damage	**0**	**0**	**0**	**0**									
		0.0%	0.0%	0.0%	0.0%									
	Slight damage	**0**	**0**	**0**	**0**									
		0.0%	0.0%	0.0%	0.0%									
Water supply (Existing) (Total length 11 km)	Damage points	**11**	**21**	**39**	**58**	**0.4**	**0.8**	**1.4**	**2.1**					
		1.01	1.86	3.43	5.10									
Water supply (Planned) (Total length 0 km)	Damage points	**0**	**0**	**0**	**0**	**0.0**	**0.0**	**0.0**	**0.0**					
		0.2	0.4	0.8	1.1									
Sewage (Total length 60 km)	Damage length (km)	**0.3**	**0.4**	**0.7**	**1.2**	**4.1**	**8.0**	**10.5**	**18.3**					
		0.4%	0.7%	1.1%	1.9%									
Power distribution (Total pole 7432)	Pole damage	**60**	**167**	**410**	**642**	**0.8**	**2.4**	**5.8**	**9.0**					
		0.8%	2.2%	5.5%	8.6%									
Mobile BTS tower (Total tower 37)	Tower damage	**3**	**7**	**17**	**26**	**5.7**	**13.3**	**32.3**	**49.4**					
		8.1%	18.9%	45.9%	70.3%									

Caution:

1. Scenario earthquake is not the prediction of future earthquake
2. Hazard and risk assessment were carried out based on the research results of past earthquakes and the available data of Nepal for the purpose of policy and planning development and the activities related to disaster risk reduction and management in Kathmandu Valley.

Note:

*1 Economic loss is the direct loss due to the damage of building, infrastructure and lifeline, calculated by reconstruction or repair cost.

*2 The building damage of 2030 accounts for heavy damage only.

Case-0: The composition of the structure type of 2030 is assumed as same as that of 2016.

Case-1: Buildings increased from 2016 to 2030 are assumed masonry with cement mortar and RC engineered only. The ratio of masonry and RC is assumed as same as that at the time of 2016.

Case-2: 1) Same as Case-1, 2) All of the existing masonry building are assumed to change to masonry with cement mortar.

Case-3: 1) Same as Case-2, 2) All of the existing RC non-engineered building are assumed to change to RC engineered.

Case-4: 1) 50% of increased new masonry buildings are changed to RC engineered, 2) 50% of existing masonry buildings at 2016 are assumed be reconstructed to RC Engineered, 3) 30% of existing non-engineered RC buildings are assumed be reconstructed to RC engineered.

Case-5: 1) 70% of increased new masonry buildings are changed to RC engineered, 2) 70% of existing masonry buildings at 2016 are assumed be reconstructed to RC Engineered,

*3 The damage length of road means the road length which located in the high liquefaction and landslide potential area, not the damage length which will happen in the scenario earthquakes.

*4 There are a total of 145 bridges. 45 RC multi span bridges were quantitatively assessed. The remaining single span (RC and masonry) and multi span (masonry) bridges were qualitatively assessed.

18 Summary of Risk Assessment Results of SHANKHARAPUR Municipality

Category		Physical Damage				Economic Loss (mil. NPR)*1				Human Casualty (Population: 2016:26899; 2030: 34619)				
		Scenario Earthquake Ground Motion				Scenario Earthquake Ground Motion					Scenario Earthquake Ground Motion			
		WN	CNS-1	CNS-2	CNS-3	WN	CNS-1	CNS-2	CNS-3		WN	CNS-1	CNS-2	CNS-3
Building (2016) (Total building 7423)	Heavy damage (EMS DL4&5)	**380**	**521**	**1,210**	**2,006**	**939.0**	**1,441.0**	**3,931.0**	**7,090.0**	Night (Weekday and weekend)				
										Death	**27**	**39**	**98**	**175**
		5.1%	7.0%	16.3%	27.0%						0.10%	0.14%	0.36%	0.65%
										Injured	**106**	**151**	**385**	**686**
											0.39%	0.56%	1.43%	2.55%
										Evacuee	**2,495**	**3,311**	**6,879**	**10,522**
											9.28%	12.31%	25.57%	39.12%
	Moderate damage (EMS DL3)	**311**	**389**	**683**	**898**					Weekday (noon, 12:00)				
										Death	**20**	**29**	**74**	**132**
		4.2%	5.2%	9.2%	12.1%						0.09%	0.13%	0.33%	0.59%
										Injured	**80**	**114**	**290**	**516**
											0.36%	0.51%	1.29%	2.30%
										Evacuee	**2,087**	**2,771**	**5,757**	**8,808**
											9.28%	12.33%	25.61%	39.18%
	Slight damage (EMS DL2)	**579**	**699**	**1,071**	**1,232**					Weekend (afternoon, 18:00)				
										Death	**19**	**27**	**69**	**123**
		7.8%	9.4%	14.4%	16.6%						0.07%	0.10%	0.26%	0.46%
										Injured	**74**	**106**	**270**	**480**
											0.28%	0.39%	1.00%	1.78%
										Evacuee	**2,503**	**3,323**	**6,908**	**10,574**
											9.31%	12.35%	25.68%	39.31%
Building (2030), (Total building 9591)*2	Case-0, heavy damage	**491**	**674**	**1,565**	**2,593**					Death	**35**	**50**	**127**	**225**
		5.1%	7.0%	16.3%	27.0%						0.10%	0.14%	0.37%	0.65%
	Case-1, heavy damage	**395**	**552**	**1,344**	**2,308**					Death	**28**	**41**	**108**	**199**
		4.1%	5.8%	14.0%	24.1%						0.08%	18.0%	15.0%	11.6%
	Case-2, heavy damage	**69**	**143**	**631**	**1,430**					Death	**5**	**10**	**50**	**124**
		0.7%	1.5%	6.6%	14.9%						85.7%	80.0%	60.6%	44.9%
	Case-3, heavy damage	**66**	**134**	**586**	**1,330**					Death	**4**	**9**	**45**	**110**
		0.7%	1.4%	6.1%	13.9%						88.6%	82.0%	64.6%	51.1%
	Case-4, heavy damage	**203**	**291**	**777**	**1,462**					Death	**14**	**22**	**66**	**136**
		2.1%	3.0%	8.1%	15.2%						60.0%	56.0%	48.0%	39.6%
	Case-5, heavy damage	**126**	**186**	**546**	**1,116**					Death	**9**	**14**	**48**	**110**
		1.3%	1.9%	5.7%	11.6%						74.3%	72.0%	62.2%	51.1%
School (Total building 100)	Heavy damage	**1**	**2**	**9**	**18**	**139.0**	**223.0**	**657.0**	**1,189.0**	Death	**1**	**3**	**11**	**25**
		1.0%	2.0%	9.0%	18.0%						0.01%	0.04%	0.15%	0.35%
	Moderate damage	**2**	**3**	**8**	**12**					Injured	**4**	**12**	**43**	**98**
		2.0%	3.0%	8.0%	12.0%						0.06%	0.17%	0.61%	1.38%
	Slight damage	**5**	**7**	**14**	**19**									
		5.0%	7.0%	14.0%	19.0%									
Health facility (Total building 18)	Heavy damage	**1**	**1**	**4**	**7**	**1,376.7**	**1,071.7**	**4,331.6**	**6,933.9**					
		5.6%	5.6%	22.2%	38.9%									
	Moderate damage	**1**	**1**	**2**	**3**									
		5.6%	5.6%	11.1%	16.7%									
	Slight damage	**2**	**2**	**3**	**3**									
		11.1%	11.1%	16.7%	16.7%									
Government building (Total building 1)	Heavy damage	**0**	**0**	**0**	**0**	**0.0**	**0.0**	**0.0**	**0.0**					
		0.0%	0.0%	0.0%	0.0%									
	Moderate damage	**0**	**0**	**0**	**0**									
		0.0%	0.0%	0.0%	0.0%									
	Slight damage	**0**	**0**	**0**	**0**									
		0.0%	0.0%	0.0%	0.0%									
Road*3 (Total length 215 km)	Length in landslide area (km)	**0.0**	**0.0**	**0.0**	**0.3**	**0.0**	**0.0**	**0.0**	**0.9**					
		0.0%	0.0%	0.0%	0.1%									
	Length in liquefaction area (km)	**0.0**	**0.0**	**0.0**	**0.0**									
		0.0%	0.0%	0.0%	0.0%									
Bridge (Total bridge 4)*4	Heavy damage	**0**	**0**	**0**	**0**	**0.0**	**0.0**	**60.4**	**85.1**					
		0.0%	0.0%	0.0%	0.0%									
	Moderate damage	**0**	**0**	**0**	**2**									
		0.0%	0.0%	0.0%	50.0%									
	Slight damage	**0**	**0**	**2**	**0**									
		0.0%	0.0%	50.0%	0.0%									
Water supply (Existing) (Total length 0 km)	Damage points	**0**	**0**	**0**	**0**	**0.0**	**0.0**	**0.0**	**0.0**					
		0.00	0.00	0.00	0.00									
Water supply (Planned) (Total length 0 km)	Damage points	**0**	**0**	**0**	**0**	**0.0**	**0.0**	**0.0**	**0.0**					
		0.0	0.0	0.0	0.0									
Sewage (Total length 0 km)	Damage length (km)	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**					
		0.0%	0.0%	0.0%	0.0%									
Power distribution (Total pole 316)	Pole damage	**2**	**3**	**9**	**17**	**0.0**	**0.0**	**0.1**	**0.2**					
		0.6%	0.9%	2.8%	5.4%									
Mobile BTS tower (Total tower 8)	Tower damage	**1**	**1**	**1**	**2**	**1.9**	**1.9**	**1.9**	**3.8**					
		12.5%	12.5%	12.5%	25.0%									

Caution:

1. Scenario earthquake is not the prediction of future earthquake
2. Hazard and risk assessment were carried out based on the research results of past earthquakes and the available data of Nepal for the purpose of policy and planning development and the activities related to disaster risk reduction and management in Kathmandu Valley.

Note:

*1 Economic loss is the direct loss due to the damage of building, infrastructure and lifeline, calculated by reconstruction or repair cost.

*2 The building damage of 2030 accounts for heavy damage only.

Case-0: The composition of the structure type of 2030 is assumed as same as that of 2016.

Case-1: Buildings increased from 2016 to 2030 are assumed masonry with cement mortar and RC engineered only. The ratio of masonry and RC is assumed as same as that at the time of 2016.

Case-2: 1) Same as Case-1, 2) All of the existing masonry building are assumed to change to masonry with cement mortar.

Case-3: 1) Same as Case-2, 2) All of the existing RC non-engineered building are assumed to change to RC engineered.

Case-4: 1) 50% of increased new masonry buildings are changed to RC engineered, 2) 50% of existing masonry buildings at 2016 are assumed be reconstructed to RC Engineered, 3) 30% of existing non-engineered RC buildings are assumed be reconstructed to RC engineered.

Case-5: 1) 70% of increased new masonry buildings are changed to RC engineered, 2) 70% of existing masonry buildings at 2016 are assumed be reconstructed to RC Engineered,

*3 The damage length of road means the road length which located in the high liquefaction and landslide potential area, not the damage length which will happen in the scenario earthquakes.

*4 There are a total of 145 bridges. 45 RC multi span bridges were quantitatively assessed. The remaining single span (RC and masonry) and multi span (masonry) bridges were qualitatively assessed.

19 Summary of Risk Assessment Results of SURYABINAYAK Municipality

Category		Physical Damage				Economic Loss (mil. NPR)*1				Human Casualty (Population: 2016:87514; 2030: 114428)				
		Scenario Earthquake Ground Motion				Scenario Earthquake Ground Motion					Scenario Earthquake Ground Motion			
		WN	CNS-1	CNS-2	CNS-3	WN	CNS-1	CNS-2	CNS-3		WN	CNS-1	CNS-2	CNS-3
Building (2016) (Total building 19015)	Heavy damage (EMS DL4&5)	**962**	**3,391**	**7,117**	**10,354**	**4,260.0**	**15,769.0**	**32,751.0**	**47,208.0**	Night (Weekday and weekend)				
		5.1%	17.8%	37.4%	54.5%					Death	**88**	**373**	**915**	**1,457**
											0.10%	0.43%	1.05%	1.66%
										Injured	**345**	**1,462**	**3,582**	**5,705**
											0.39%	1.67%	4.09%	6.52%
										Evacuee	**8,062**	**24,829**	**45,316**	**59,495**
											9.21%	28.37%	51.78%	67.98%
	Moderate damage (EMS DL3)	**849**	**2,118**	**2,909**	**2,862**					Weekday (noon, 12:00)				
		4.5%	11.1%	15.3%	15.1%					Death	**54**	**229**	**560**	**892**
											0.09%	0.38%	0.94%	1.49%
										Injured	**212**	**896**	**2,193**	**3,495**
											0.35%	1.50%	3.67%	5.84%
										Evacuee	**5,510**	**16,947**	**30,952**	**40,686**
											9.21%	28.33%	51.74%	68.01%
	Slight damage (EMS DL2)	**1,709**	**3,173**	**3,287**	**2,645**					Weekend (afternoon, 18:00)				
		9.0%	16.7%	17.3%	13.9%					Death	**62**	**261**	**640**	**1020**
											0.07%	0.30%	0.73%	1.17%
										Injured	**242**	**1,023**	**2,507**	**3,994**
											0.28%	1.17%	2.86%	4.56%
										Evacuee	**8,088**	**24,941**	**45,591**	**59,932**
											9.24%	28.50%	52.10%	68.48%
Building (2030), (Total building 24185)*2	Case-0, heavy damage	**1,223**	**4,327**	**9,103**	**13,230**					Death	**116**	**494**	**1,213**	**1,929**
		5.1%	17.9%	37.6%	54.7%						0.10%	0.43%	1.06%	1.69%
	Case-1, heavy damage	**1,063**	**3,976**	**8,625**	**12,741**					Death	**98**	**445**	**1,130**	**1,831**
		4.4%	16.4%	35.7%	52.7%						0.09%	9.9%	6.8%	5.1%
	Case-2, heavy damage	**476**	**2,910**	**7,491**	**11,773**					Death	**47**	**340**	**1,008**	**1,720**
		2.0%	12.0%	31.0%	48.7%						59.5%	31.2%	16.9%	10.8%
	Case-3, heavy damage	**422**	**2,559**	**6,716**	**10,794**					Death	**39**	**281**	**855**	**1,507**
		1.7%	10.6%	27.8%	44.6%						66.4%	43.1%	29.5%	21.9%
	Case-4, heavy damage	**599**	**2,681**	**6,688**	**10,692**					Death	**58**	**327**	**965**	**1,696**
		2.5%	11.1%	27.7%	44.2%						50.0%	33.8%	20.4%	12.1%
	Case-5, heavy damage	**409**	**2,134**	**5,851**	**9,794**					Death	**42**	**275**	**886**	**1,624**
		1.7%	8.8%	24.2%	40.5%						63.8%	44.3%	27.0%	15.8%
School (Total building 189)	Heavy damage	**8**	**32**	**71**	**104**	**652.0**	**2,157.0**	**4,034.0**	**5,435.0**	Death	**8**	**45**	**120**	**195**
		4.2%	16.9%	37.6%	55.0%						0.05%	0.25%	0.68%	1.10%
	Moderate damage	**8**	**21**	**29**	**28**					Injured	**31**	**176**	**470**	**764**
		4.2%	11.1%	15.3%	14.8%						0.17%	0.99%	2.65%	4.30%
	Slight damage	**18**	**33**	**34**	**27**									
		9.5%	17.5%	18.0%	14.3%									
Health facility (Total building 11)	Heavy damage	**1**	**2**	**5**	**7**	**1,376.7**	**2,143.4**	**5,414.5**	**6,933.9**					
		9.1%	18.2%	45.5%	63.6%									
	Moderate damage	**1**	**2**	**2**	**2**									
		9.1%	18.2%	18.2%	18.2%									
	Slight damage	**2**	**2**	**2**	**1**									
		18.2%	18.2%	18.2%	9.1%									
Government building (Total building 8)	Heavy damage	**0**	**1**	**3**	**4**	**0.0**	**146.9**	**393.2**	**488.3**					
		0.0%	12.5%	37.5%	50.0%									
	Moderate damage	**0**	**1**	**2**	**1**									
		0.0%	12.5%	25.0%	12.5%									
	Slight damage	**1**	**1**	**2**	**1**									
		12.5%	12.5%	25.0%	12.5%									
Road*3 (Total length 379 km)	Length in landslide area (km)	**0.0**	**0.5**	**13.8**	**48.9**	**0.0**	**2.9**	**110.4**	**233.6**					
		0.0%	0.1%	3.6%	12.9%									
	Length in liquefaction area (km)	**0.0**	**0.0**	**11.7**	**19.7**									
		0.0%	0.0%	3.1%	5.2%									
Bridge (Total bridge 6)*4	Heavy damage	**0**	**0**	**2**	**2**	**37.7**	**46.1**	**60.4**	**85.1**					
		0.0%	0.0%	33.3%	33.3%									
	Moderate damage	**0**	**2**	**0**	**0**									
		0.0%	33.3%	0.0%	0.0%									
	Slight damage	**2**	**0**	**0**	**0**									
		33.3%	0.0%	0.0%	0.0%									
Water supply (Existing) (Total length 8 km)	Damage points	**3**	**8**	**14**	**21**	**0.1**	**0.3**	**0.5**	**0.8**					
		0.42	0.99	1.81	2.67									
Water supply (Planned) (Total length 0 km)	Damage points	**0**	**0**	**0**	**0**	**0.0**	**0.0**	**0.0**	**0.0**					
		0.0	0.0	0.0	0.0									
Sewage (Total length 16 km)	Damage length (km)	**0.1**	**0.1**	**0.3**	**0.3**	**1.0**	**2.3**	**4.0**	**4.9**					
		0.4%	0.9%	1.6%	1.9%									
Power distribution (Total pole 8146)	Pole damage	**48**	**208**	**489**	**738**	**0.7**	**2.9**	**6.9**	**10.4**					
		0.6%	2.6%	6.0%	9.1%									
Mobile BTS tower (Total tower 41)	Tower damage	**2**	**8**	**21**	**31**	**3.8**	**15.2**	**39.9**	**58.9**					
		4.9%	19.5%	51.2%	75.6%									

Caution:

1. Scenario earthquake is not the prediction of future earthquake
2. Hazard and risk assessment were carried out based on the research results of past earthquakes and the available data of Nepal for the purpose of policy and planning development and the activities related to disaster risk reduction and management in Kathmandu Valley.

Note:

*1 Economic loss is the direct loss due to the damage of building, infrastructure and lifeline, calculated by reconstruction or repair cost.

*2 The building damage of 2030 accounts for heavy damage only.

Case-0: The composition of the structure type of 2030 is assumed as same as that of 2016.

Case-1: Buildings increased from 2016 to 2030 are assumed masonry with cement mortar and RC engineered only. The ratio of masonry and RC is assumed as same as that at the time of 2016.

Case-2: 1) Same as Case-1, 2) All of the existing masonry building are assumed to change to masonry with cement mortar.

Case-3: 1) Same as Case-2, 2) All of the existing RC non-engineered building are assumed to change to RC engineered.

Case-4: 1) 50% of increased new masonry buildings are changed to RC engineered, 2) 50% of existing masonry buildings at 2016 are assumed be reconstructed to RC Engineered, 3) 30% of existing non-engineered RC buildings are assumed be reconstructed to RC engineered.

Case-5: 1) 70% of increased new masonry buildings are changed to RC engineered, 2) 70% of existing masonry buildings at 2016 are assumed be reconstructed to RC Engineered,

*3 The damage length of road means the road length which located in the high liquefaction and landslide potential area, not the damage length which will happen in the scenario earthquakes.

*4 There are a total of 145 bridges. 45 RC multi span bridges were quantitatively assessed. The remaining single span (RC and masonry) and multi span (masonry) bridges were qualitatively assessed.

20 Summary of Risk Assessment Results of TARKESHWAR Municipality

Category		Physical Damage				Economic Loss (mil. NPR)*1				Human Casualty (Population: 2016:100643; 2030: 162793)				
		Scenario Earthquake Ground Motion				Scenario Earthquake Ground Motion					Scenario Earthquake Ground Motion			
		WN	CNS-1	CNS-2	CNS-3	WN	CNS-1	CNS-2	CNS-3		WN	CNS-1	CNS-2	CNS-3
Building (2016) (Total building 15608)	Heavy damage (EMS DL4&5)	**990**	**1,341**	**3,266**	**5,443**	**4,521.0**	**6,875.0**	**17,998.0**	**30,095.0**	Night (Weekday and weekend)				
		6.3%	8.6%	20.9%	34.9%					Death	**105**	**167**	**505**	**965**
											0.10%	0.17%	0.50%	0.96%
										Injured	**411**	**653**	**1,977**	**3,779**
											0.41%	0.65%	1.96%	3.75%
										Evacuee	**9,360**	**13,794**	**31,744**	**48,906**
											9.30%	13.71%	31.54%	48.59%
	Moderate damage (EMS DL3)	**787**	**1,026**	**1,877**	**2,336**					Weekday (noon, 12:00)				
		5.0%	6.6%	12.0%	15.0%					Death	**66**	**106**	**320**	**612**
											0.09%	0.15%	0.45%	0.86%
										Injured	**261**	**414**	**1,254**	**2,397**
											0.37%	0.58%	1.77%	3.38%
										Evacuee	**6,605**	**9,735**	**22,411**	**34,541**
											9.31%	13.72%	31.59%	48.69%
	Slight damage (EMS DL2)	**1,516**	**1,863**	**2,675**	**2,736**					Weekend (afternoon, 18:00)				
		9.7%	11.9%	17.1%	17.5%					Death	**73**	**117**	**353**	**675**
											0.07%	0.12%	0.35%	0.67%
										Injured	**288**	**457**	**1,384**	**2,645**
											0.29%	0.45%	1.38%	2.63%
										Evacuee	**9,392**	**13,844**	**31,895**	**49,196**
											9.33%	13.76%	31.69%	48.88%
Building (2030), (Total building 25008)*2	Case-0, heavy damage	**1,569**	**2,154**	**5,263**	**8,777**					Death	**169**	**271**	**821**	**1,569**
		6.3%	8.6%	21.0%	35.1%						0.10%	0.17%	0.50%	0.96%
	Case-1, heavy damage	**1,198**	**1,696**	**4,508**	**7,857**					Death	**126**	**211**	**694**	**1,383**
		4.8%	6.8%	18.0%	31.4%						0.08%	22.1%	15.5%	11.9%
	Case-2, heavy damage	**593**	**1,003**	**3,543**	**6,855**					Death	**68**	**139**	**587**	**1,266**
		2.4%	4.0%	14.2%	27.4%						59.8%	48.7%	28.5%	19.3%
	Case-3, heavy damage	**543**	**906**	**3,198**	**6,256**					Death	**58**	**116**	**491**	**1,082**
		2.2%	3.6%	12.8%	25.0%						65.7%	57.2%	40.2%	31.0%
	Case-4, heavy damage	**683**	**1,022**	**3,156**	**6,058**					Death	**77**	**139**	**543**	**1,192**
		2.7%	4.1%	12.6%	24.2%						54.4%	48.7%	33.9%	24.0%
	Case-5, heavy damage	**473**	**745**	**2,587**	**5,290**					Death	**56**	**109**	**475**	**1,101**
		1.9%	3.0%	10.3%	21.2%						66.9%	59.8%	42.1%	29.8%
School (Total building 152)	Heavy damage	**6**	**10**	**29**	**52**	**550.0**	**842.0**	**2,041.0**	**3,200.0**	Death	**10**	**18**	**67**	**131**
		3.9%	6.6%	19.1%	34.2%						0.05%	0.09%	0.33%	0.64%
	Moderate damage	**7**	**10**	**19**	**24**					Injured	**39**	**70**	**262**	**513**
		4.6%	6.6%	12.5%	15.8%						0.19%	0.34%	1.28%	2.50%
	Slight damage	**15**	**19**	**28**	**28**									
		9.9%	12.5%	18.4%	18.4%									
Health facility (Total building 10)	Heavy damage	**0**	**0**	**2**	**3**	**0.0**	**0.0**	**2,165.8**	**2,971.7**					
		0.0%	0.0%	20.0%	30.0%									
	Moderate damage	**0**	**1**	**1**	**1**									
		0.0%	10.0%	10.0%	10.0%									
	Slight damage	**1**	**1**	**2**	**2**									
		10.0%	10.0%	20.0%	20.0%									
Government building (Total building 2)	Heavy damage	**0**	**0**	**1**	**1**	**0.0**	**0.0**	**131.1**	**122.1**					
		0.0%	0.0%	50.0%	50.0%									
	Moderate damage	**0**	**0**	**0**	**0**									
		0.0%	0.0%	0.0%	0.0%									
	Slight damage	**0**	**0**	**1**	**0**									
		0.0%	0.0%	50.0%	0.0%									
Road*3 (Total length 240 km)	Length in landslide area (km)	**0.0**	**0.0**	**0.0**	**2.5**	**0.0**	**0.0**	**0.0**	**21.7**					
		0.0%	0.0%	0.0%	1.0%									
	Length in liquefaction area (km)	**0.0**	**0.0**	**0.0**	**3.9**									
		0.0%	0.0%	0.0%	1.6%									
Bridge (Total bridge 6)*4	Heavy damage	**0**	**0**	**0**	**0**	**0.0**	**0.0**	**0.0**	**0.0**					
		0.0%	0.0%	0.0%	0.0%									
	Moderate damage	**0**	**0**	**0**	**0**									
		0.0%	0.0%	0.0%	0.0%									
	Slight damage	**0**	**0**	**0**	**0**									
		0.0%	0.0%	0.0%	0.0%									
Water supply (Existing) (Total length 17 km)	Damage points	**12**	**16**	**30**	**45**	**0.4**	**0.6**	**1.1**	**1.7**					
		0.67	0.92	1.74	2.62									
Water supply (Planned) (Total length 0 km)	Damage points	**0**	**0**	**0**	**0**	**0.0**	**0.0**	**0.0**	**0.0**					
		0.0	0.0	0.0	0.0									
Sewage (Total length 0 km)	Damage length (km)	**0.0**	**0.0**	**0.0**	**0.0**	**0.1**	**0.1**	**0.2**	**0.3**					
		0.0%	0.0%	0.0%	0.0%									
Power distribution (Total pole 5142)	Pole damage	**28**	**47**	**142**	**263**	**0.4**	**0.7**	**2.0**	**3.7**					
		0.5%	0.9%	2.8%	5.1%									
Mobile BTS tower (Total tower 31)	Tower damage	**2**	**2**	**8**	**14**	**3.8**	**3.8**	**15.2**	**26.6**					
		6.5%	6.5%	25.8%	45.2%									

Caution:

1. Scenario earthquake is not the prediction of future earthquake
2. Hazard and risk assessment were carried out based on the research results of past earthquakes and the available data of Nepal for the purpose of policy and planning development and the activities related to disaster risk reduction and management in Kathmandu Valley.

Note:

*1 Economic loss is the direct loss due to the damage of building, infrastructure and lifeline, calculated by reconstruction or repair cost.

*2 The building damage of 2030 accounts for heavy damage only.

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Case-4: 1) 50% of increased new masonry buildings are changed to RC engineered, 2) 50% of existing masonry buildings at 2016 are assumed be reconstructed to RC Engineered, 3) 30% of existing non-engineered RC buildings are assumed be reconstructed to RC engineered.

Case-5: 1) 70% of increased new masonry buildings are changed to RC engineered, 2) 70% of existing masonry buildings at 2016 are assumed be reconstructed to RC Engineered,

*3 The damage length of road means the road length which located in the high liquefaction and landslide potential area, not the damage length which will happen in the scenario earthquakes.

*4 There are a total of 145 bridges. 45 RC multi span bridges were quantitatively assessed. The remaining single span (RC and masonry) and multi span (masonry) bridges were qualitatively assessed.

21 Summary of Risk Assessment Results of TOKHA Municipality

Category		Physical Damage				Economic Loss (mil. NPR)*1				Human Casualty (Population: 2016:123239; 2030: 173418)				
		Scenario Earthquake Ground Motion				Scenario Earthquake Ground Motion					Scenario Earthquake Ground Motion			
		WN	CNS-1	CNS-2	CNS-3	WN	CNS-1	CNS-2	CNS-3		WN	CNS-1	CNS-2	CNS-3
Building (2016) (Total building 13961)	Heavy damage (EMS DL4&5)	**546**	**843**	**2,267**	**3,978**	**3,396.0**	**5,911.0**	**15,983.0**	**27,094.0**	Night (Weekday and weekend)				
		3.9%	6.0%	16.2%	28.5%					Death	**86**	**157**	**513**	**1,014**
											0.07%	0.13%	0.42%	0.82%
										Injured	**335**	**614**	**2,008**	**3,970**
											0.27%	0.50%	1.63%	3.22%
										Evacuee	**8,466**	**13,971**	**34,089**	**53,931**
											6.87%	11.34%	27.66%	43.76%
	Moderate damage (EMS DL3)	**530**	**786**	**1,600**	**2,117**					Weekday (noon, 12:00)				
		3.8%	5.6%	11.5%	15.2%					Death	**59**	**109**	**355**	**703**
											0.06%	0.11%	0.37%	0.74%
										Injured	**232**	**426**	**1,392**	**2,752**
											0.24%	0.45%	1.47%	2.90%
										Evacuee	**6,527**	**10,773**	**26,296**	**41,617**
											6.88%	11.35%	27.70%	43.84%
	Slight damage (EMS DL2)	**1,138**	**1,541**	**2,406**	**2,599**					Weekend (afternoon, 18:00)				
		8.2%	11.0%	17.2%	18.6%					Death	**60**	**110**	**359**	**710**
											0.05%	0.09%	0.29%	0.58%
										Injured	**234**	**430**	**1,406**	**2,779**
											0.19%	0.35%	1.14%	2.25%
										Evacuee	**8,491**	**14,018**	**34,243**	**54,235**
											6.89%	11.37%	27.79%	44.01%
Building (2030), (Total building 20578)*2	Case-0, heavy damage	**812**	**1,249**	**3,344**	**5,857**					Death	**121**	**221**	**719**	**1,419**
		3.9%	6.1%	16.3%	28.5%						0.07%	0.13%	0.41%	0.82%
	Case-1, heavy damage	**636**	**1,020**	**2,925**	**5,300**					Death	**97**	**183**	**631**	**1,280**
		3.1%	5.0%	14.2%	25.8%						0.06%	17.2%	12.2%	9.8%
	Case-2, heavy damage	**317**	**643**	**2,387**	**4,729**					Death	**53**	**126**	**544**	**1,183**
		1.5%	3.1%	11.6%	23.0%						56.2%	43.0%	24.3%	16.6%
	Case-3, heavy damage	**276**	**549**	**2,043**	**4,117**					Death	**42**	**99**	**428**	**957**
		1.3%	2.7%	9.9%	20.0%						65.3%	55.2%	40.5%	32.6%
	Case-4, heavy damage	**363**	**626**	**2,076**	**4,109**					Death	**59**	**122**	**490**	**1,085**
		1.8%	3.0%	10.1%	20.0%						51.2%	44.8%	31.8%	23.5%
	Case-5, heavy damage	**250**	**461**	**1,709**	**3,584**					Death	**42**	**95**	**425**	**989**
		1.2%	2.2%	8.3%	17.4%						65.3%	57.0%	40.9%	30.3%
School (Total building 202)	Heavy damage	**5**	**11**	**33**	**60**	**553.0**	**955.0**	**2,324.0**	**3,659.0**	Death	**9**	**21**	**79**	**159**
		2.5%	5.4%	16.3%	29.7%						0.03%	0.07%	0.26%	0.51%
	Moderate damage	**7**	**12**	**24**	**31**					Injured	**35**	**82**	**309**	**623**
		3.5%	5.9%	11.9%	15.3%						0.11%	0.27%	1.00%	2.01%
	Slight damage	**18**	**25**	**38**	**39**									
		8.9%	12.4%	18.8%	19.3%									
Health facility (Total building 18)	Heavy damage	**0**	**1**	**2**	**4**	**0.0**	**1,071.7**	**2,165.8**	**3,962.2**					
		0.0%	5.6%	11.1%	22.2%									
	Moderate damage	**1**	**1**	**2**	**3**									
		5.6%	5.6%	11.1%	16.7%									
	Slight damage	**1**	**2**	**3**	**4**									
		5.6%	11.1%	16.7%	22.2%									
Government building (Total building 1)	Heavy damage	**0**	**0**	**0**	**0**	**0.0**	**0.0**	**0.0**	**0.0**					
		0.0%	0.0%	0.0%	0.0%									
	Moderate damage	**0**	**0**	**0**	**0**									
		0.0%	0.0%	0.0%	0.0%									
	Slight damage	**0**	**0**	**0**	**0**									
		0.0%	0.0%	0.0%	0.0%									
Road*3 (Total length 165 km)	Length in landslide area (km)	**0.0**	**0.0**	**0.0**	**0.1**	**0.0**	**0.0**	**5.6**	**38.4**					
		0.0%	0.0%	0.0%	0.1%									
	Length in liquefaction area (km)	**0.0**	**0.0**	**1.3**	**11.1**									
		0.0%	0.0%	0.8%	6.7%									
Bridge (Total bridge 4)*4	Heavy damage	**0**	**0**	**0**	**0**	**0.0**	**0.0**	**0.0**	**0.0**					
		0.0%	0.0%	0.0%	0.0%									
	Moderate damage	**0**	**0**	**0**	**0**									
		0.0%	0.0%	0.0%	0.0%									
	Slight damage	**0**	**0**	**0**	**0**									
		0.0%	0.0%	0.0%	0.0%									
Water supply (Existing) (Total length 28 km)	Damage points	**34**	**48**	**89**	**133**	**1.2**	**1.8**	**3.3**	**4.9**					
		1.20	1.70	3.18	4.75									
Water supply (Planned) (Total length 0 km)	Damage points	**0**	**0**	**0**	**0**	**0.0**	**0.0**	**0.0**	**0.0**					
		0.0	0.0	0.0	0.0									
Sewage (Total length 48 km)	Damage length (km)	**0.2**	**0.2**	**0.4**	**0.5**	**3.0**	**3.0**	**6.8**	**8.6**					
		0.4%	0.4%	0.9%	1.1%									
Power distribution (Total pole 7301)	Pole damage	**37**	**64**	**187**	**338**	**0.5**	**0.9**	**2.6**	**4.8**					
		0.5%	0.9%	2.6%	4.6%									
Mobile BTS tower (Total tower 31)	Tower damage	**1**	**2**	**7**	**14**	**1.9**	**3.8**	**13.3**	**26.6**					
		3.2%	6.5%	22.6%	45.2%									

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THE PROJECT FOR ASSESSMENT OF EARTHQUAKE DISASTER RISK FOR THE KATHMANDU VALLEY (ERAKV)

Disaster Prevention and Risk Reduction Measures.

These materials has been prepared by JICA in support with MoUD, MoHA, MoFALD, in collaboration with ENPHO.

Prevention and Risk reduction Measures for Fire Hazards.

Before Fire Hazard.

1. Safely extinguish fire after use and dispose cigarettes properly after smoking.
2. Keep inflammable items away from the access of children
3. Frequently check the electricity wires and manage safe electrical wiring.
4. Ensure the gas regulators are properly turned off in kitchen and other places.
5. Mapping and awareness of possible fire hazard area.
6. Mandatory installation of fire extinguisher in public buildings, places and houses.







During Fire

1. As soon as the fire occurs, inform locals by shouting and call fire brigade immediately.
2. Use local materials like water, sand and jut bags for fire control.


3. If fire becomes uncontrollable, evacuate to safe place.
4. If you catch fire, try to extinguish fire by rolling on ground or by other means.
5. If fire place is smoky, evacuate by kneeling.

After Fire Hazard:

1. Don't touch or enter immediately after the control of fire.
2. If someone is burnt by fire, take to the nearest hospital immediately and don't touch the burnt part.

3. Don't take inflammable items in fire occurred zone.

Prevention and Risk reduction Measures of Floods/ Landslide

Before Flood/Landslide:

1. Identify the flood and landslide vulnerable zone and place "Danger" sign or siren in that place.
2. Plant trees along the river ways, terrain land, vacant land and areas vulnerable to soil-erosion should be done embanked with wire-mesh box with stones, bags of sands or piles of bamboos to retain the soil.
3. During the season of flood/landslide, lifesaving items should be kept near the river like: Tube, Life Jackets, Ropes etc. If the area is more vulnerable, early warning should be installed and should be made ready. Items like: Mike, whistle or loud speakers should be prepared for information dissemination.




During Flood/Landslide:

1. Keep the information of weather and update timely.
2. Don't allow any community members or vehicles to go near the flood prone zone during the flood.

After Flood

1. Properly dispose the solid wastes and dead animals by burying under the ground.
2. Rescue the family members of flood affected zone and console the family members of deceased.
3. Don't move randomly in flood/landslide zone.
4. Gather the required relief materials of own self and for the neighbours. Only enter your house after the conformity of safety with local government and security personnel.

Prevention and Risk reduction Measures for Earthquake

Before Earthquake:

1. Tightly stich the heavy and large furniture of room so that they won't move during earthquake.
2. Follow the building codes and bylaws during the construction of new house and also ask the neighbour to follow accordingly.
3. Inform and aware to the family members about the pre-earthquake preparation.
4. Important items like: Torch light, medicine/ first aid box, cash important documents and precious things should be kept in convenient place so that they can be found and used easily after disaster.





During Earthquake

1. Stay calm during the earthquake.
2. Don’t jump from upper floors, balcony or from windows of the house.
3. If inside house, hold rigid thing and stay closer to column or under the threshold of doors.
4. If outside house, don’t stay under/closer to electric poles, large trees or tall buildings.
5. If driving, one should stop the vehicle parking it to the safe site.

After Earthquake

1. Be aware of the aftershocks after the earthquake which might cause damage as well.
2. If inside house, looking out the safer situation, get out of the house and evacuate to safer location.
3. If outside house, don’t enter the house until it is confirmed that the house is safe for habitat.

विपद् जोखिम रोकथाम तथा न्यूनीकरणका उपायहरू

भूकम्पीय जोखिम रोकथाम तथा न्यूनीकरणका उपायहरु

भूकम्पबाट बच्न निम्न पूर्व तयारी गरौं :

१. कोठा भित्रका अग्लो दराज लगायत गमला, पानी ट्याङ्की जस्ता गह्रौं सामानहरू नढल्ने र नखस्ने गरी बलियोसँग अंकुश लगाऔं ।

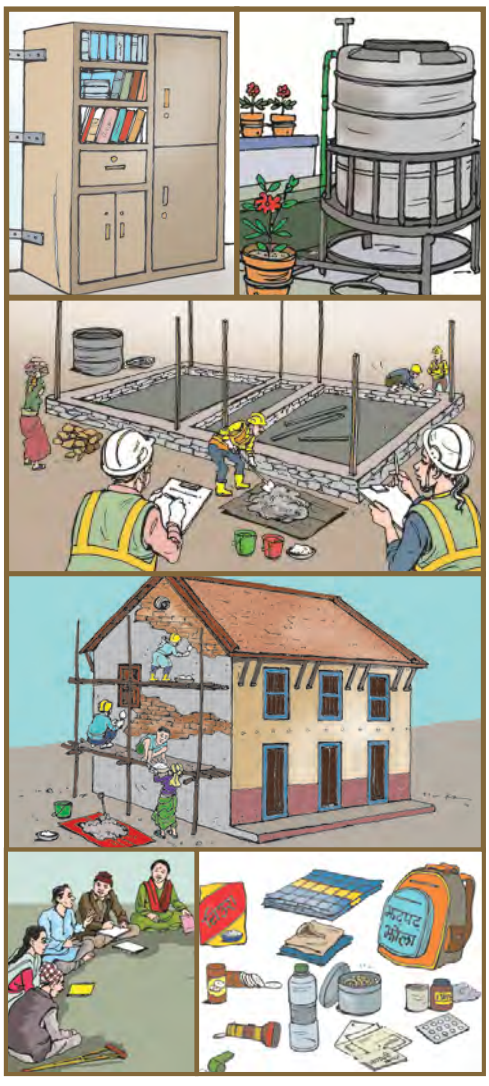
२. नयाँ घर निर्माण गर्दा नगरपालिकाको भवन निर्माण आचार संहिता पालना गरौं ।

३. यदि आफनो घर भूकम्प सुरक्षित छैन भनी पहिचान गरिएको छ भने विज्ञको सल्लाह लिई छिट्टै नै घरलाई सबलिकरण गरी सुरक्षित बनाऔं ।

४. भूकम्प पूर्व तयारी सम्बन्धी घर परिवारसँग छलफल गरी घर भित्रका सुरक्षित स्थानहरूको पहिचान गरौं । साथै, भूकम्प पश्चात् परिवारका सदस्यहरू जम्मा हुनको लागि घर बाहिरको सुरक्षित स्थानको पनि पहिचान गरौं ।

५. अत्यावश्यक सामानहरू जस्तैः टर्च, औषधीको बाकस, नगद आदि तत्काल प्रयोग गर्न सक्ने गरी झट्पट् झोला तयार राखौं ।

६. समुदायमा आपत्कालिन सहयोगका लागि खोज तथा उद्धार, प्राथमिक उपचार, खानेपानी र सरसफाइका सामाग्रीहरू भण्डारण गरौं ।



भूकम्प आइरहेको समयमा निम्न सावधानी अपनाऔं :

१. नजिकै रहेको कुनै झोला, तकिया, चकटी वा टेबल आदि प्रयोग गरी आफ्नो शीर/टाउको बचाऔं ।

२. घर भित्रका प्रज्ज्वलनशील वस्तु वा आगोको स्रोतलाई जाँच गरी तुरून्त बन्द गरौं ।

३. नआत्तिकन शान्तसँग सुरक्षित स्थानमा बसौं र अरूलाई पनि नअत्याऔं/नतर्साऔं ।

४. आत्तिएर घरको बार्दली वा झ्यालबाट हाम नफालौं ।

५. घर भित्र हुनुहुन्छ भने कुनै बलियो बस्तु, लट्ठा/पिल्लर समाएर वा काठको चौकोस मुनि बसौं ।
६. घर बाहिर हुनुहुन्छ भने बिजुलीको पोल, ठूलो रूख वा अग्लो भवन र पर्खाल मुनि नबसौं । खुला स्थानमा भेला भइ बसौं ।
७. सवारी चलाइरहेको अवस्थामा सुरक्षित स्थानमा लगेर रोकौं ।
८. आधिकारीक संचार माध्यमको मात्र सुचना सुन्ने र सुनाउने गरौं ।

भूकम्प गए पश्चात् के गर्ने ?

१. भूकम्प गैइसकेपछि पनि भूकम्पको पुनः झट्काहरू (पराकम्पन) आइरहन सक्छ । तसर्थ, सजग भई नआत्तिकन सुरक्षित स्थानमा बसौं । साधारणतया भूकम्प गएको एक हप्तासम्म ठूला पुनः झट्काहरू आइरहन सक्छ ।
२. आफू घरभित्र हुनुहुन्छ भने भूकम्प रोकिएपछि सुरक्षाको स्थिति हेरेर मात्र घर बाहिर जाऔं ।
३. घर बाहिर हुनुहुन्छ भने घर बस्नका लागि सुरक्षित छ भनी आधिकारीक रूपमा सुनिश्चित भएपछि मात्र घरभित्र पसौं ।
४. आधिकारीक सुचना बिनाको कुनै हल्लाको भरमा आत्तिने र अरूलाई पनि तर्साउने नगरौं ।
५. सम्बन्धित निकायका व्यक्तिलाई जानकारी संकलन गर्न आउँदा सहयोग गरौं ।

आगलागीको जोखिम रोकथाम तथा न्यूनीकरणका उपायहरु

आगलागीबाट बच्न निम्न पूर्व तयारी गरौं :

१. प्रयोगपछि आगो निभेको सुनिश्चित गर्ने र चुरोटका ठुटाहरू निभाएर मात्र फालौं ।
२. प्रज्ज्वलनशील वस्तुहरू आगो र केटाकेटीहरूले नभेट्ने ठाउँमा राखौं ।
३. समय-समयमा विद्युतीय तारहरू जाँच गर्ने र सुरक्षित वायरिङ्गको व्यवस्था गरौं ।
४. भान्छा र अन्य काममा प्रयोग हुने ग्यास सिलिण्डरको रेगुलेटर बन्द भए नभएको सुनिश्चित गरौं ।
५. आगलागीको सम्भावित क्षेत्रको नक्साङ्कन गरी सचेत गरौं ।
६. सामुदायिक भवन, स्थान र निजी घरमा अग्नी नियन्त्रण यन्त्र (फायर एक्सटिङगुइसर) अनिवार्य जडान गरौं ।

आगलागी भएको समयमा निम्न सावधानी अपनाऔं :

१. आगलागी भएको थाहा पाउने बित्तिकै ठूलो स्वरमा अरूको मद्दतको लागि आवाज दिऔं र दमकललाई तुरून्त खबर गरौं ।
२. आगो नियन्त्रण गर्नको लागि स्थानीय स्तरमै उपलब्ध पानी, बालुवा र भिजाएको जुटको बोरा प्रयोग गरौं ।
३. यदि आफ्नो प्रयासले आगो नियन्त्रण गर्न नसकिएमा आगलागी भएको स्थानबाट तुरून्तै सुरक्षित स्थान तर्फ जाऔं ।
४. यदि आफ्नो शरिरमा आगो लागेमा तुरून्तै पानी खनाएर वा भुईंमा पल्टिएर गुल्टिँदै आगो निभाउने प्रयास गरौं ।
५. आगोको धुवाँ स्वास्थ्यको लागि निकै हानिकारक हुन्छ । आगलागी भएको स्थान धुवाँ धुवाँ भएमा घुँडाले टेकेर वा निहुरिएर नाक मुख छोप्दै बाहिर भाग्ने प्रयास गरौं ।

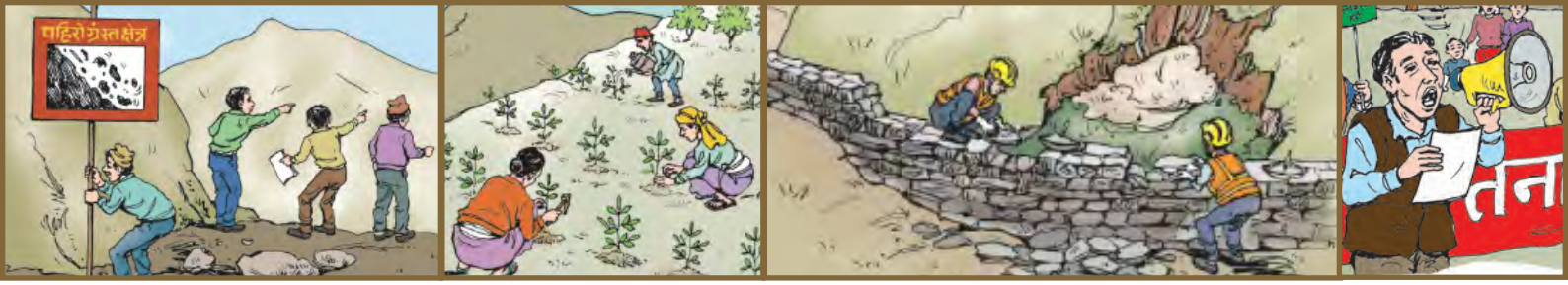
आगलागी भइसकेपछि के गर्ने ?

१. आगो नियन्त्रण भइसकेपछि पनि सो स्थानमा तुरून्तै नजाऔं र कुनै पनि सामाग्रीहरू नछोऔं ।
२. कसैलाई आगोले पोलेमा तुरून्तै अस्पताल लैजाऔं र पोलेको भाग नचलाऔं ।
३. कुनै पनि प्रज्ज्वलनशील वस्तुहरू आगलागी भएको स्थानमा नलैजाऔं ।

बाढी/पहिरोको जोखिम रोकथाम तथा न्यूनीकरणका उपायहरु

बाढी/पहिरोबाट बच्न निम्न पूर्व तयारी गरौं :

१. बाढी/पहिरो सम्भावित स्थान पहिचान गरी सो स्थानमा खतराको संकेत चिन्ह वा साइरनको व्यवस्था गरौं ।
२. नदी/खोलाको किनार, खाली जमिन, नाङ्गो डाँडा, भीर पाखामा रूख विरूवा रोपी वृक्षारोपन गरौं ।
३. पहिरो (भू-स्खलन) को बढी जोखिम भएको खोला किनार र भीर पाखामा ढुङ्गाको तारजाली, बालुवाको बोराहरू वा बाँसको भकारी बनाई माटोले भरी तटबन्धन तयार गरौं ।
४. बाढी/पहिरोको सम्भावना भएको मौसममा नदीको किनारामा ट्युब, रक्षा ज्याकेट, डोरी जस्ता सामाग्रीहरू तयारी अवस्थामा राखौं ।



५. बाढी/पहिरोको जोखिम स्थानमा पूर्व चेतावनी दिने यन्त्र जडान गरी तयारी अवस्थामा राखौं । सबैलाई जनाकारी दिन माइक, सिट्ठी जस्ता सामाग्रीहरू तयारी अवस्थामा राखौं ।

६. बाढी/पहिरो आइहालेमा भेला हुनको लागि सुरक्षित स्थानहरूको पहिचान गरौं ।

७. अत्यावश्यक सामानहरू जस्तैः टर्च, औषधीको बाकस, नगद आदि तत्काल प्रयोग गर्न सक्ने गरी झट्पट् झोला तयार राखौं ।

बाढी/पहिरो गइरहेको समयमा निम्न सावधानी अपनाऔं :

१. समय समयमा मौसम सम्बन्धी जानकारी बुझ्ने गरौं ।

२. बाढी/पहिरो गइरहेको समयमा समुदायका कसैलाई वा कुनै पनि सवारी साधनलाई जोखिम स्थानमा जानबाट रोकौं ।

बाढी/पहिरो गइसकेपछि के गर्ने ?

१. बाढी/पहिरोले थुपारेको फोहर, मरेका जीवजन्तु आदिलाई खाल्डो खनी गाडौं ।

२. प्रभावित क्षेत्रका मानिसहरूलाई उद्धार गर्ने र मृतकका परिवारलाई सहयोग र सान्त्वना दिऔं ।

३. बाढी/पहिरो गएको स्थानमा जथाभावी हिड्डुल नगरौं ।

४. बाढी/पहिरोले प्रभावित आफु र समुदायलाई तत्काल राहत सामाग्रीको व्यवस्था गरौं र सम्बन्धित स्थानीय निकायले खतरा नरहेको सुनिश्चित गरेपछि मात्र घर फर्कौं ।

यो सामाग्री जापान अन्तर्राष्ट्रिय सहयोग नियोग (जाइका) को सहयोगमा सहरी विकास मन्त्रालय, गृह मन्त्रालय, सङ्घीय मामिला तथा स्थानीय विकास मन्त्रालयको समन्वय तथा वातावरण र जनस्वास्थ्य संस्था (एन्फो) को सहकार्यमा तयार पारिएको हो ।

थप जानकारीका लागि
वातावरण र जनस्वास्थ्य संस्था (एन्फो)
११०/२५ आदर्श मार्ग-१, नयाँ बानेश्वर । पो.व.नं. ४१०२, काठमाडौं, नेपाल । फोन : ४४६१७०९, ४४६८६४१
फ्याक्स : ९७७-१-४४९१३७६ । इमेल : enpho@enpho.org । वेबसाइट : www.enpho.org

डिसेम्बर २०१७

ラジオ・プログラム脚本

＜ネパール語・オリジナル＞

स्थान : भक्तपुरको धानवाली नजिकैको कुनै बस्ती ।

पात्र : चिनीमाया(कृषक महिला) र विकु नारन (एक वयस्क ब्यक्ति)

(चिनीमाया,गीत गुन्गुनाउदै धान गोड्दै हुन्छिन् ।)

विकु : हैन चिनीमाया तताजु (भाउजु), दंग पर्दै धान गोड्दै हुनुहुन्छ त ?

चिनी : के गर्नु त विकु नारन बाबु , भुईचालोले खत्तम गर्यो भन्दै दुख मनाउ गरेर भएन क्यारे? मर्ने त मरेर गईहाले , बाचेकाले त हात खुट्टा बाध्नु भएननी ।

विकु : गज्जब खःला त । अनि उ त्यो खाली ठाँउ के का लागि ?

चिनी : घर बनाउन, सधै टहरा बसेर के साध्य ।

विकु : लौं , ढिलो भएन ? हाम्रा बा ले त शुरु गरिसके ।

चिनी : होईन ,घर जस्तो कुरो ,राष्ट्रिय भवन संहिता अनुसार भुईचालो थेग्ने बनाउ भनेर नी । हिजोको गल्ती किन दोहोराउने ?(दौडेको ईफेक्ट) लौं विकु बावु किन दौंडेको त्यसरी ?

विकु : (टाडावाट) हाम्रो घर ,राष्ट्रिय भवन संहिता पालना नगरी बनाउन लाग्या छन् , त्यो रोक्न जान लाको । हामी पनि ,राष्ट्रिय भवन संहिता अनुसारनै घर बनाएर सुरक्षित हुन्छौं के तताजु ।

चिनी : (हाँस्दै) बुद्धि फुरेछ यो विकु नारनचाको ।
आवाज : राष्ट्रिय भवन संहिता पालना गरी,भुकम्प थेग्ने घर बनाऔं, आफ्नो परिवारलाई सुखी र सुरक्षित राखौं ।

राष्ट्रिय भवन संहिता संबन्धी विस्तृत जानकारीका लागि नेपाल सरकार, सहरी विकास मन्त्रालय अन्तर्गतको सहरी विकास तथा भवन निर्माण विभाग र डिभिजन कार्यालयहरु वा आफु बस्ने नगरपालिका वा गा.वि.स कार्यालयमा सम्पर्क राख्नुहोला ।

जाइका परियोजनाद्धारा संचालित 'भूकम्पीय जोखिम प्रतिरोधात्मक र सुरक्षित काठमाण्डौं उपत्यका अभियान'

※仮訳

Situation: Conversation between two persons in a place near by the village
Character: Chini maya (female farmer) and Biku (a male)
Chini maya is singing a song for planting rice.

Biku: Sister, You look very happy with planting paddy?

Chini maya: Yes, I am. What is good in wasting time doing nothing and just thinking what Earthquake has caused and damaged? People who died and past can't see or feel but those who are saved and survived need to awake and work hard in order to continue living.

Biku: Good! Well, what is the empty place for?

Chini maya: To built house. It is not good to stay in hurt always, so we will built a house.

Biku: Well is it not too late? My Father has already started to build a house.

Chini maya: We should not hurry while building a house since we need to think, plan and implement. A house should be built according to the National Building Code, otherwise again earthquake will damage our house. We should not repeat yesterday's mistake.

(Bike runs.)

Chini maya: Why are you running, brother?

Biku: (From far away.) Our house is being built without any plan, without following the National Building Code. So I need to stop my father. We will also need to build a proper house so that next earthquake will not affect.

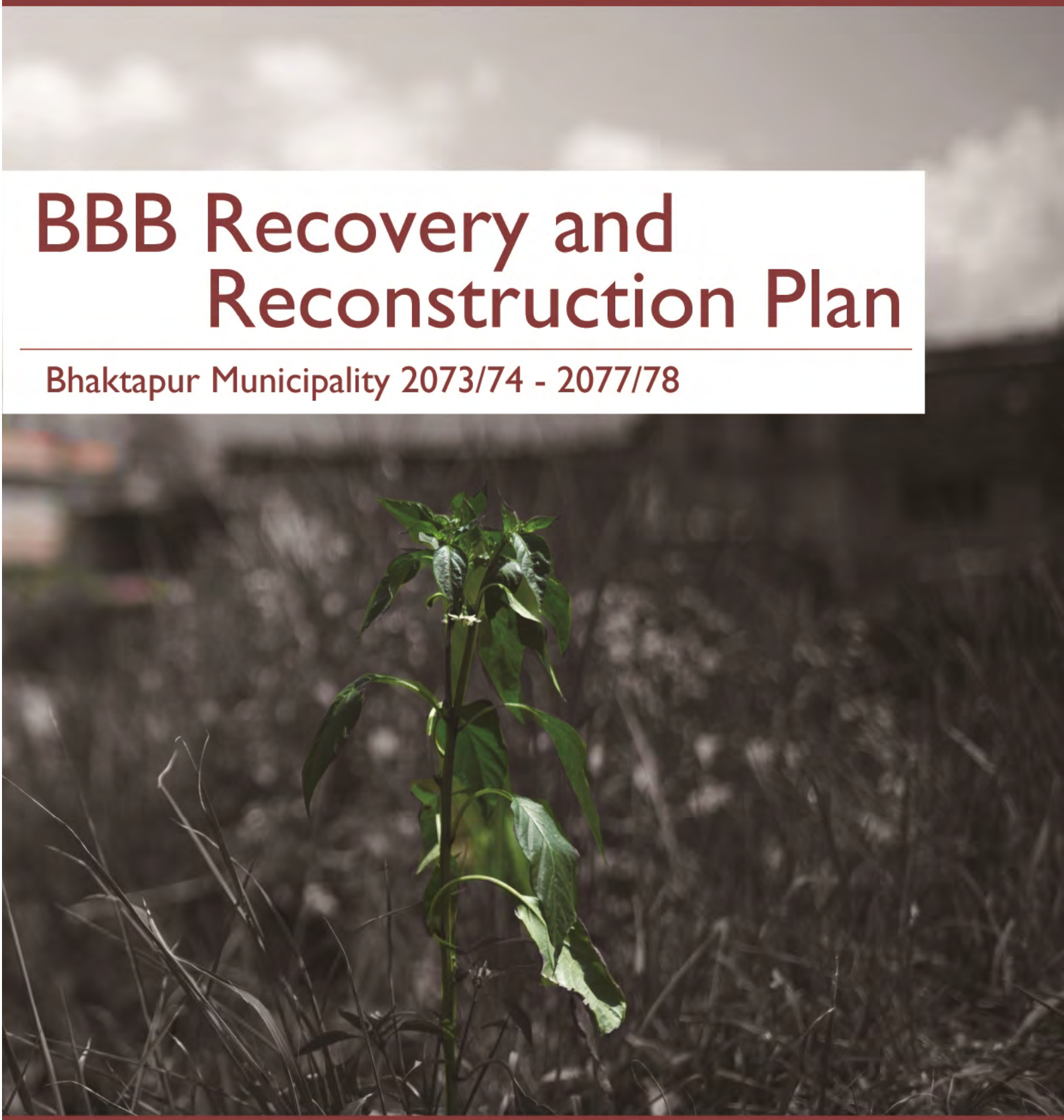
Chini maya: (Smile) Now he has wisdom, I think.

For detailed information on the National Building Code, please contact, ent of Nepal, Ministry of Urban Development (MoUD) and the Department of Urban Development and Building Construction (DUDBC) or living in your own office municipality or VDC.

Presented by JICA Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley.

BBB Recovery and Reconstruction Plan

Bhaktapur Municipality 2073/74 - 2077/78



Government of Nepal
Bhaktapur Municipality
Japan International Cooperation Agency

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Abbreviation

Abbreviation	Official Name (English)
AED	Automated External Defibrillator
BBB	Build Back Better
BCP	Business Continuity Planning
BPS	Building Permit System
CBDRM	Community Based Disaster Risk Management
CBS	Central Bureau of Statistics
CDMC	Community Disaster Management Committee
DDC	District Development Committee
DEOC	District Emergency Operation Center
DED	Department of Electricity Development
DM	Disaster Management
DMG	Department of Mines and Geology
DRM	Disaster Risk Management
DRR	Disaster Risk Reduction
DoR	Department of Road
DUDBC	Department of Urban Development and Building Construction
DWSS	Department of Water Supply and Sewerage
EQ	Earthquake
GDP	Gross Domestic Product
GIS	Geographic Information System
GoN	Government of Nepal
HFA	Hyogo Framework for Action
IOE	Institute of Engineering
JICA	Japan International Cooperation Agency
KUKL	Kathmandu Upatyaka Khanepani Limited
KV	Kathmandu Valley
KVDA	Kathmandu Valley Development Authority
MMI	Modified Mercalli intensity scale
MoE	Ministry of Education
MoF	Ministry of Finance
MoFALD	Ministry of Federal Affairs and Local Development
MoHA	Ministry of Home Affairs
MoHP	Ministry of Health and Population
MoIC	Ministry of Information and Communications
MoTCA	Ministry of Culture, Tourism and Civil Aviation
MoUD	Ministry of Urban Development

Abbreviation	Official Name (English)
Mw	Moment Magnitude
NBC	National Building Code
NGO	Non-Government Organization
NPC	National Planning Commission
NRA	National Reconstruction Authority
NRC	National Reconstruction Committee
NRCS	Nepal Red Cross Society
NRRC	Nepal Risk Reduction Consortium
NSC	National Seismic Center
NSET	National Society for Earthquake Technology Nepal
PDNA	Post Disaster Needs Assessment
PGA	Peak Ground Acceleration
PGV	Peak Ground Velocity
RC	Reinforced Concrete
RDMP	Regional Disaster Management Plan
RRP	Recovery and Reconstruction Plan
SAR	Search and Rescue
SFDRR	Sendai Framework for Disaster Risk Reduction
SOP	Standard Operation Procedure
TOT	Training-of-Trainers
UNDP	United Nations Development Program
UNISDR	United Nations International Strategy for Disaster Reduction
UNOCHA	United Nations Office for Coordination of Humanitarian Affairs
UNOSAT	United Nations Institute for Training and Research Operational Satellite Applications Programme
USAID	United States Agency for International Development
USGS	United States Geological Survey
VDC	Village Development Committees
WB	World Bank
WCDRR	Third UN World Conference on Disaster Risk Reduction
WG	Working Group
WS	Workshop

BASIC PLAN

CHAPTER 1.

OUTLINE OF PLAN

1-1. Background

Gorkha EQ was occurred on 25th April, 2015

On Saturday, 25 April 2015, at 11:56 local time, a huge 7.8 magnitude (USGS) earthquake (Gorkha EQ) struck Barpak in the historic district of Gorkha, about 76 km northwest of Kathmandu. Nepal had not faced a natural shock of comparable magnitude for over 80 years since the Bihar earthquake in 1934. In addition numerous aftershocks have occurred since the Gorkha EQ, the largest aftershock having a magnitude 7.3 on May 12.

The Gorkha EQ and aftershocks caused massive damage and losses, a lot of vulnerable buildings collapsed, which increased the number of deaths. Remarkable and regrettable damage also affected many historical buildings including World Heritage sites. A latest damage and loss assessment shows that over 8,800 people lost their lives and 22,000 people were injured. In addition, over 602,000 private houses and 2,600 public buildings were completely collapsed and 285,000 private houses and 3,700 public buildings were partially damaged. 19,000 classrooms were completely damaged and more than 11,000 classrooms were damaged partially (Data source: Ministry of Home Affairs, as of Nov, 2015). In addition, the national economy has faced a severe negative impact from this earthquake. On the Post Disaster Needs Assessment (PDNA) prepared by the participation of ministries and agencies, the representatives of international organizations and led by the National Planning Commission (NPC), a preliminary projection has estimated a budget amount of 669 Billion Nepalese rupees for the reconstruction.

Bhaktapur Municipality was affected by the Gorkha EQ

In particular, Bhaktapur Municipality has been affected by the Gorkha EQ, 252 people lost their lives and 397 people were injured. For the building damage, around 6,000 private houses collapsed completely, and around 2,000 buildings were damaged partially. In addition, several public buildings such as governmental buildings, schools and hospitals have collapsed or have been affected. Moreover, several cultural heritages, which were designated UNESCO World Heritage Sites such as Bhaktapur Durbar Square, were severely damaged.

Build Back Better Recovery and Reconstruction is necessary toward future

Though Bhaktapur Municipality is still in the recovery stage, from now on, the necessary actions must be conducted towards the reconstruction. Residents hope for a quick recovery to normal conditions, however, it will not reduce the vulnerabilities of area for future disasters. Bhaktapur Municipality has the risk of suffering from more catastrophic earthquakes in the future. To build a more resilient society than before the Gorkha EQ, the concept of "Build Back Better (BBB)" is necessary for the policies of recovery, rehabilitation and reconstruction. The concept "BBB" has become one of the priorities for action of the "Sendai Framework for Disaster Risk Reduction (2015-2030) ", adopted in Sendai, Japan 2015. Therefore, a recovery and reconstruction plan with the primary vision of BBB is prerequisite toward a more resilient society.

Reconstruction is required not only for urban development but also for the revitalization of livelihood, industry development, social welfare, education and widely various fields. This BBB Recovery and Reconstruction plan (RRP) of the Bhaktapur Municipality shall be contributed as the Master Plan compiled of the necessary measures and actions in order to smoothly and quickly implement reconstruction for victims of life, industry and economy, urban planning for safety and a resilient city in the future through integrating disaster risk reduction into development measures. Furthermore, this plan shall be contributed as the clarification of the roles and responsibilities, and be contributed to the vital implementation with the coordination among all stakeholders.

1-2. Damage Status

1-2-1. Summary of the Gorkha earthquake

A huge earthquake of magnitude 7.8 (USGS) struck Nepal including Kathmandu, the capital city of Nepal, and the vicinity on 25th April 2015, Saturday, at 11:56 a.m. NST, the strongest one since the 1934 Bihar earthquake. The quake is believed to have occurred at the boundary area of the India Plate and Eurasia Plate with the epicentre approximately 80 km to the northwest of Kathmandu and a focal depth of 15 km. The fault plane is estimated as 150 km * 120 km (Yagi, http://www.geol.tsukuba.ac.jp/yagi-y/EQ/20150425). The rupture of the fault started at the hypocentre and transmitted southeast. The maximum slip is around 4m, which happened close to Kathmandu, which in turn caused strong ground motion and then severe damage near Kathmandu. The intensity of MMI at the fault area is mainly VIII with a very limited area of IX (Figure 1-1). There is one strong ground motion record available in KV opened by USGS. There were several great earthquakes which have occurred historically along the thrust boundary of the India Plate and the Eurasia Plate (Figure 1-2).

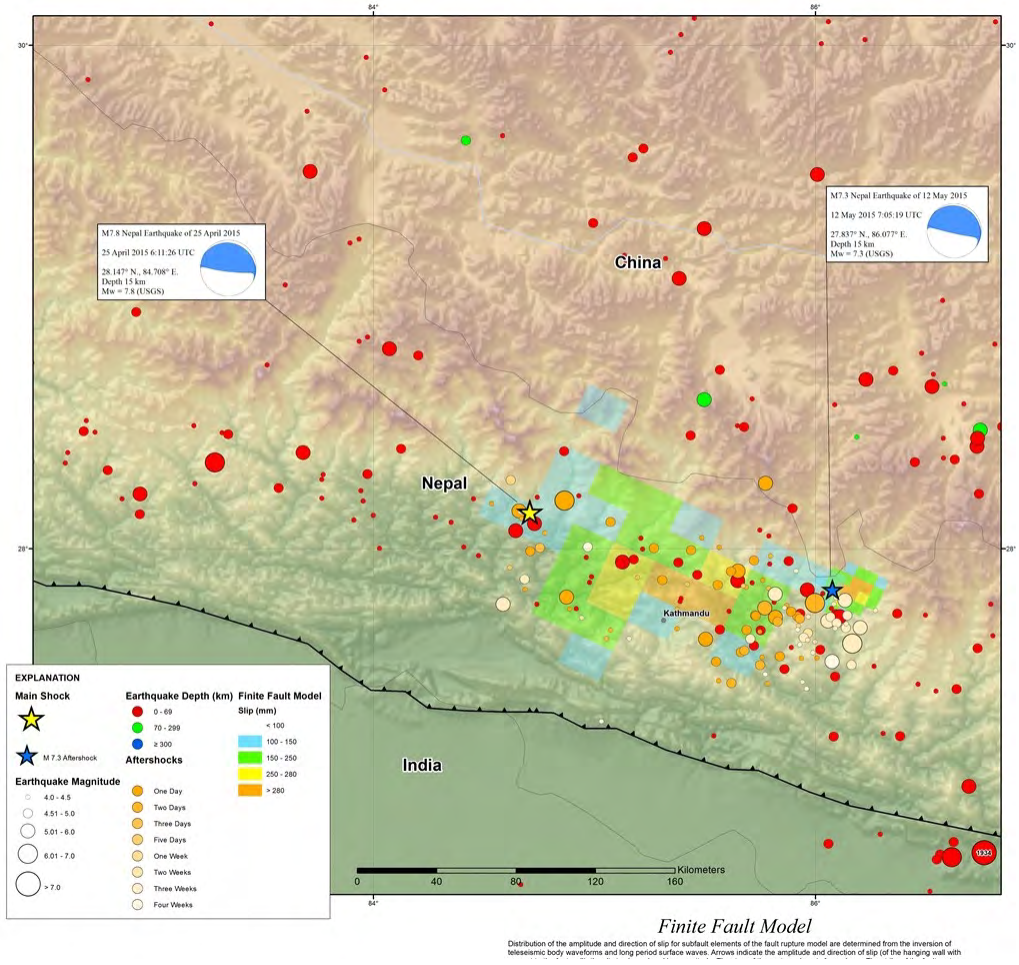


Figure 1-1 Distribution of intensity and estimated fault plane

Source: USGS, http://earthquake.usgs.gov/earthquakes/eqarchives/poster/2015/NepalSummary.php

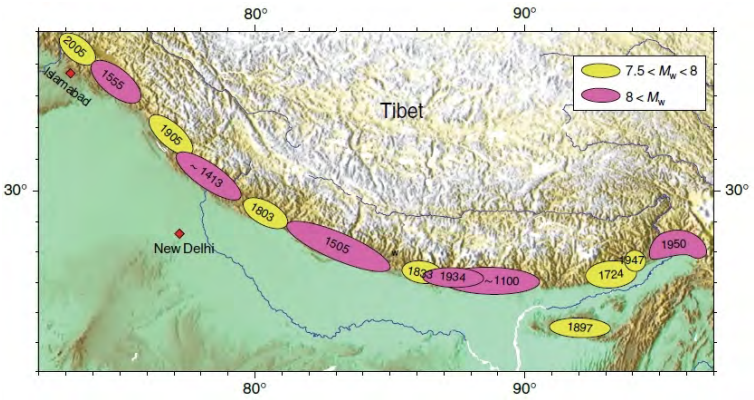


Figure 1-2 Historical earthquakes and central seismic gap

Source: Avouac, Treatise on Geophysics Vol.6, 2007

Hundreds of aftershocks have occurred to date from the Gorkha EQ (Figure 1-3). Three aftershocks larger than M6.0 have happened, and the largest one, with a magnitude of M7.3, happened on 12 May, which caused more than 200 deaths and 2,500 people injured. The large aftershocks are strong enough to cause vulnerable structure damage and it makes the situation worse since the main shock has caused damage for some structures, making them more vulnerable.

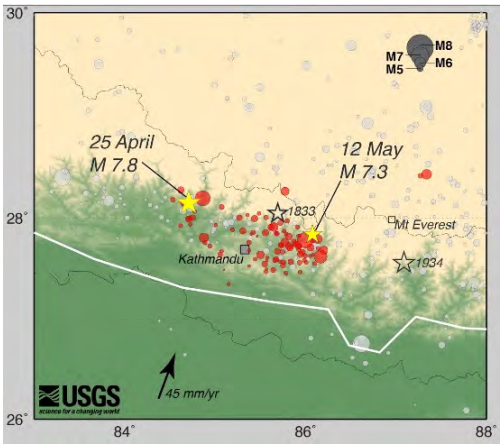


Figure 1-3 Spatial and time distribution of aftershocks more than M5.0

Source: USGS, http://www.usgs.gov/blogs/features/usgs_top_story/magnitude-7-8-earthquake-in-nepal

The seismic intensity of Bhaktapur Municipality at the Gorkha EQ is shown in Figure 1-4.

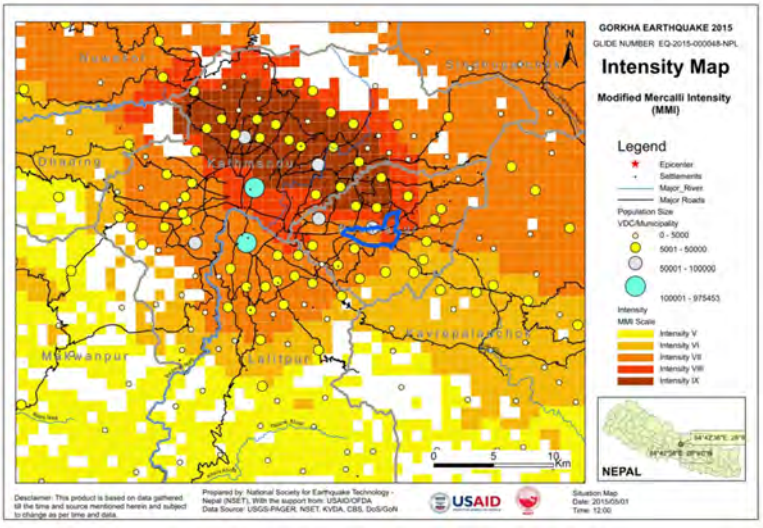


Figure 1-4 Seismic Intensity (MMI) of Bhaktapur Municipality

Source: NSET, http://www.nset.org.np/eq2015/

1-2-2. Summary of Damage status

(1) Summary of Human Casualties

The following table shows the summary of damaged buildings from the Gorkha EQ in Bhaktapur Municipality.

Table 1-1 Number of Human Casualties

Ward No.	Human Casualties		Census 2011			
	Death	Injured	Population			Household
			Male	Female	Total	
1	43	56	2,379	2,426	4,805	972
2	33	66	3,440	3,254	6,694	1,456
3	15	21	1,698	1,729	3,427	697
4	14	18	5,625	5,386	11,011	2,632
5	8	14	2,601	2,540	5,141	1,124
6	29	43	1,573	1,553	3,126	604
7	34	35	2,217	2,220	4,437	960
8	16	12	1,555	1,583	3,138	620
9	13	6	1,033	1,038	2,071	405
10	10	11	2,240	2,269	4,509	899
11	3	4	1,606	1,681	3,287	629
12	9	19	1,876	1,906	3,782	761
13	3	5	1,084	1,141	2,225	417
14	8	1	2,238	2,228	4,466	954
15	3	2	3,031	3,013	6,044	1,374
16	6	15	1,834	1,850	3,684	793
17	5	69	5,051	4,850	9,901	2,342
Total	252	397	41,081	40,667	81,748	17,639

Source: [Damage data] Bhaktapur Municipality, [Census 2011] CBS

(2) Summary of Damaged Buildings

The following table shows the summary of human casualties from the Gorkha EQ in Bhaktapur Municipality.

Table 1-2 Number of Damaged Buildings

Ward No.	Damaged Buildings			Census 2011						
	Fully damaged and non functional	Partially Damaged	Total	Household by Type of foundation of house						Total
				MBBS	CBBS	RCCpill	Wpiller	Others	NS	
1	513	155	668	563	125	22	2	0	4	716
2	527	66	593	421	245	196	3	3	15	883
3	290	78	368	383	45	87	0	1	4	520
4	307	343	650	600	287	476	13	2	9	1,387
5	322	66	388	413	152	119	14	1	5	704
6	252	66	318	308	115	7	0	0	5	435
7	564	156	720	446	129	45	1	0	0	621
8	214	162	376	349	86	32	2	0	2	471
9	152	42	194	230	69	2	0	0	2	303
10	421	69	490	336	151	91	0	0	6	584
11	304	126	430	298	102	79	0	0	5	484
12	428	26	454	335	44	117	0	0	3	499
13	345	111	456	301	24	10	0	0	0	335
14	584	60	644	371	119	60	0	0	21	571
15	237	199	436	448	164	201	3	0	5	821
16	260	159	419	314	155	24	0	1	6	500
17	230	208	438	378	292	466	4	5	5	1,150
Total	5,950	2,092	8,042	6,494	2,304	2,034	42	13	97	10,984

Source: [Damage data] Bhaktapur Municipality, [Census 2011] CBS
MBBS: Mud bonded bricks/stone
CBBS: Cement bonded bricks/stone
RCCpill : RCC with pillar
Wpiller : Wooden pillar
NS: Not stated

(3) Damage distribution maps

Several damage distribution maps of Bhaktapur Municipality from the Gorkha EQ are shown as the following maps: Human Casualties, Damage of Buildings, Governmental Buildings, Schools, Hospitals and Cultural Heritages.

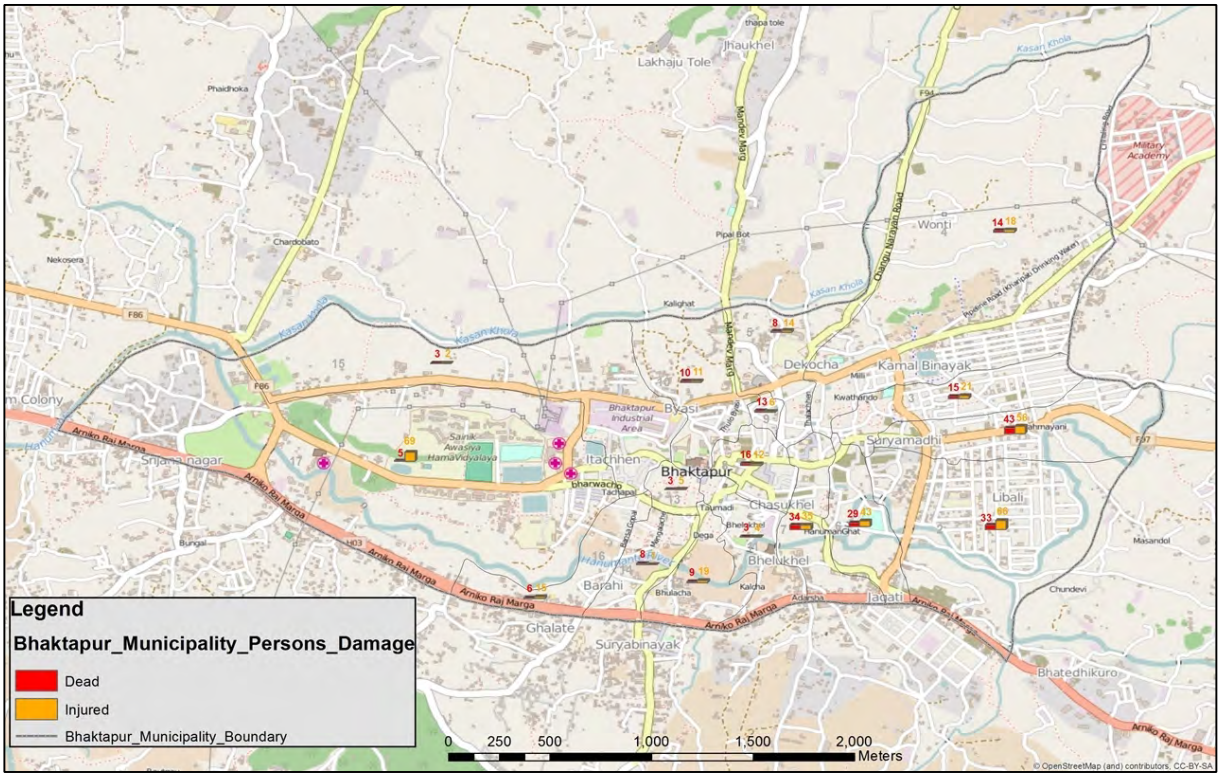


Figure 1-5 Map of Human Casualties

Data Source: Bhaktapur Municipality

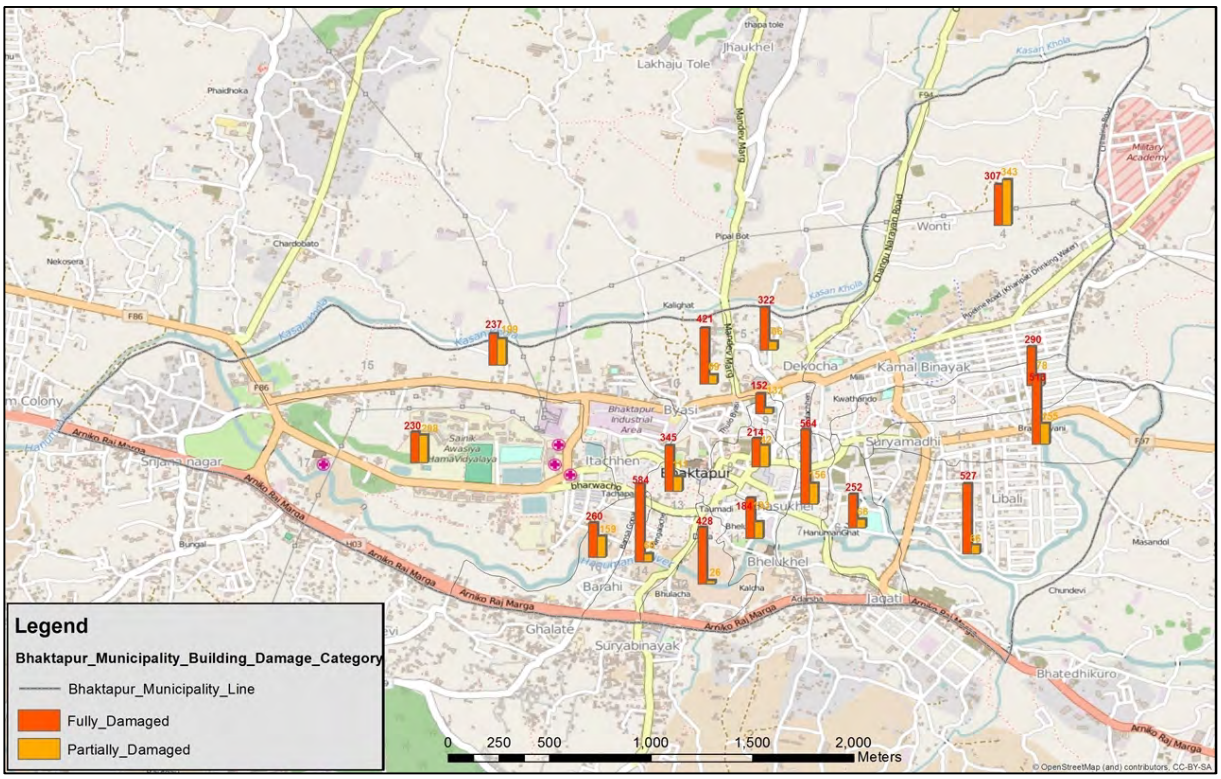


Figure 1-6 Damage Map of Buildings

Data Source: Bhaktapur Municipality

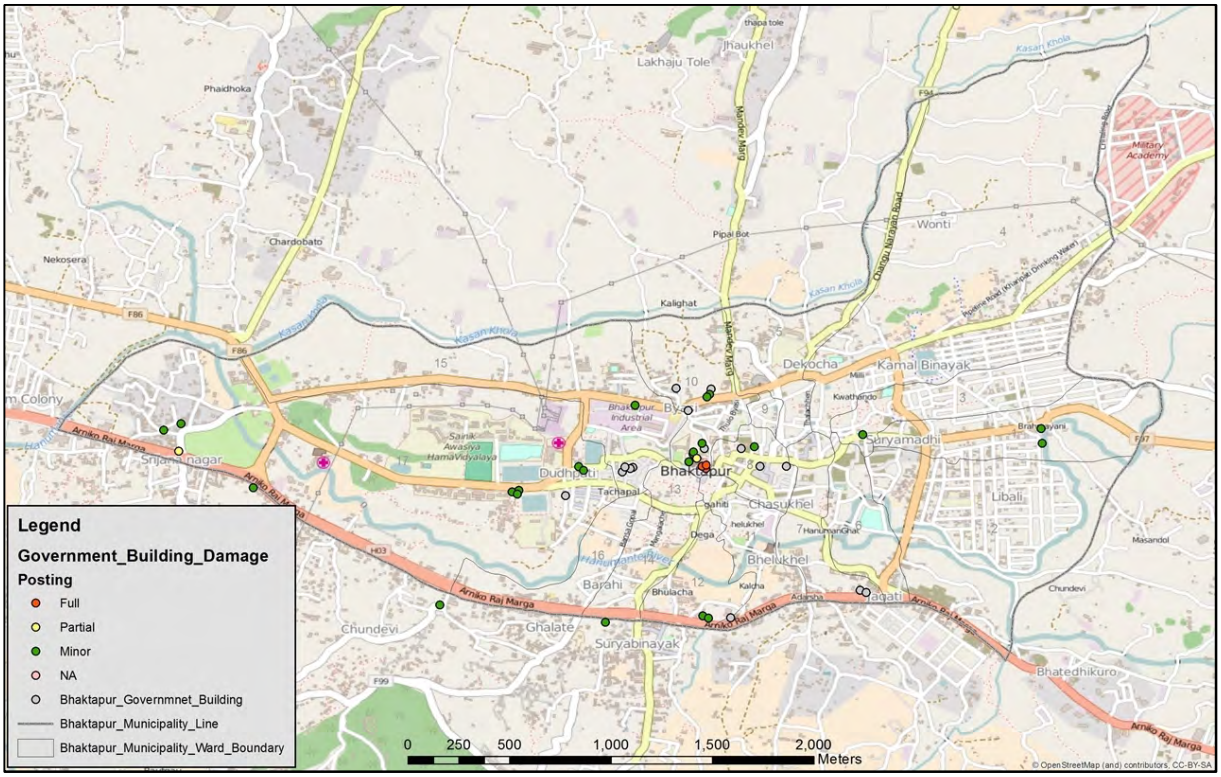


Figure 1-7 Damage Map of Governmental Buildings

Data Source: DUDBC

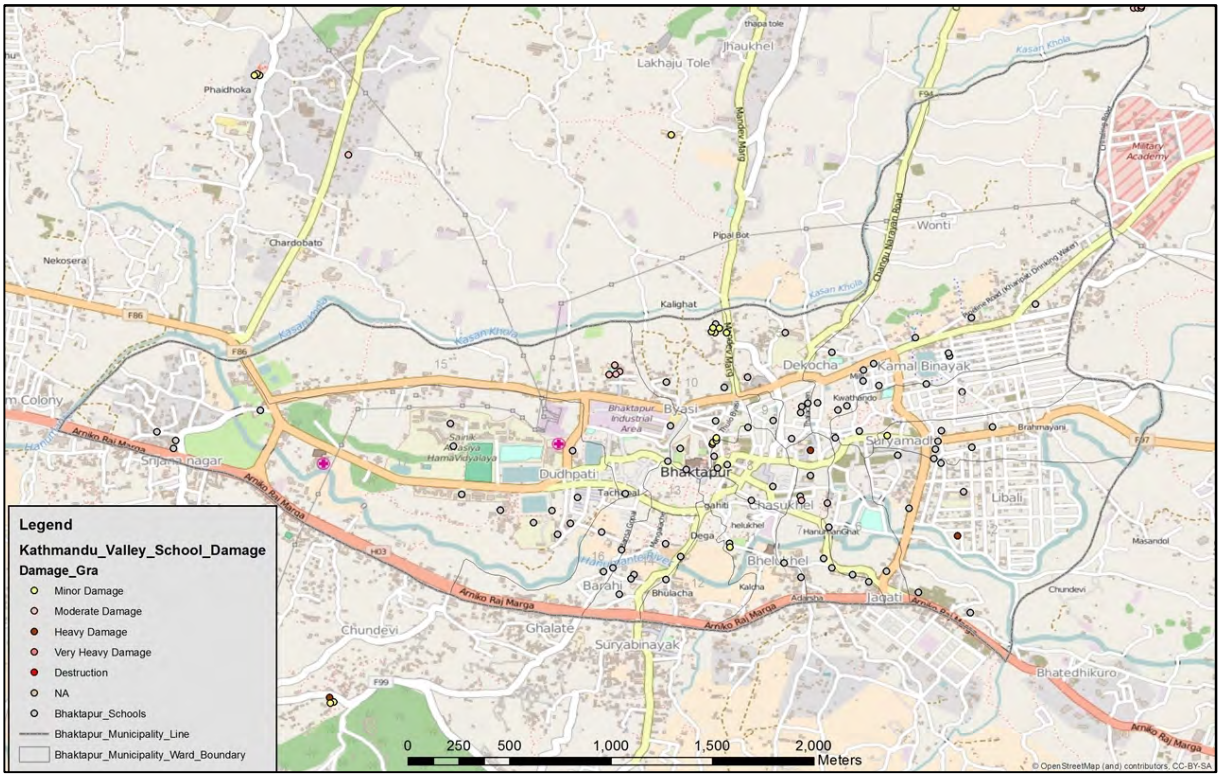


Figure 1-8 Damage Map of Schools

Data Source: Department of Education

Figure 1-9 Damage Map of Hospitals

Data Source: Ministry of Health and Population

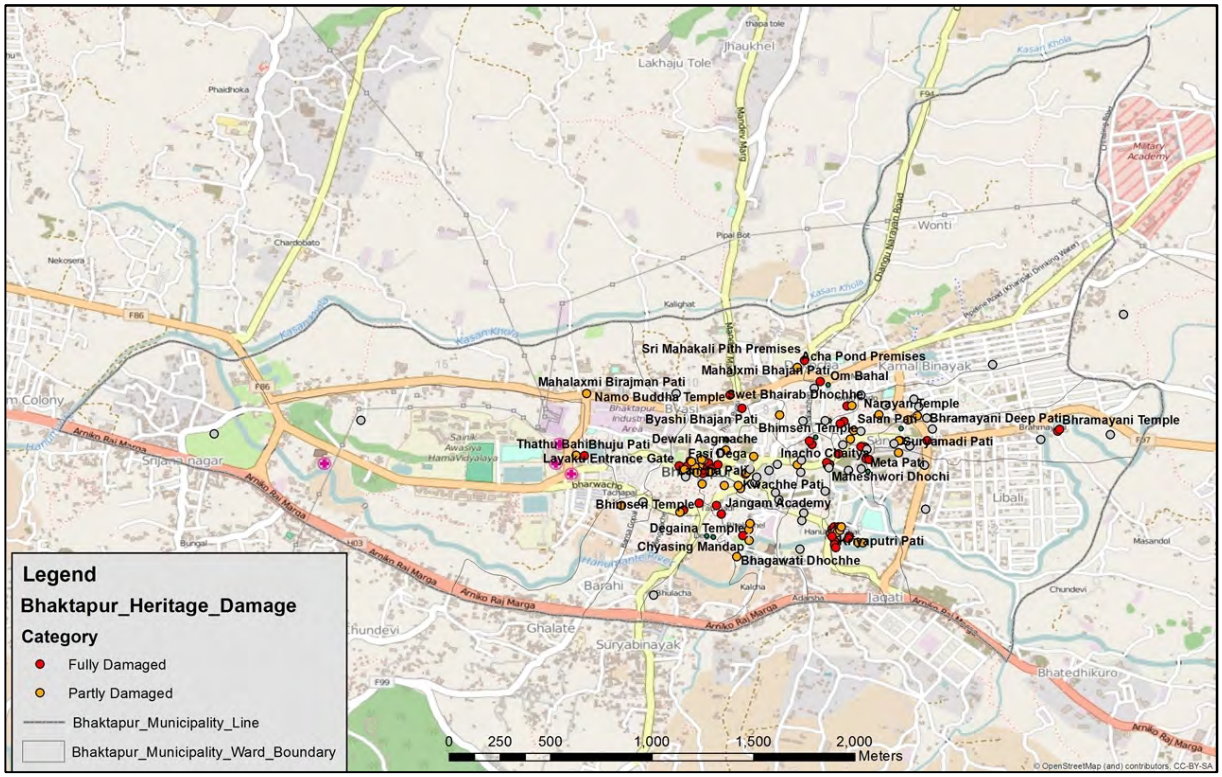


Figure 1-10 Damage Map of Cultural Heritage Sites

Data Source: DUDBC

(4) Damage status from PDNA

Damage statuses of several sectors from PDNA are shown as follows:

1) Housing and human Settlements

Table 1-3 Calculation of Rental Loss

District	Average monthly rent (NPR)	Damaged rental units	Destroyed rental units
Bhaktapur, Lalitpur, Patan	14,850	5,415	13,063

2) Health and Population

Table 1-4 Damage Status of Health Facilities

District	Hospital		Public Health Care Centre		Health Post		Others		Private sector facilities	
	CD	PD	CD	PD	CD	PD	CD	PD	CD	PD
Bhaktapur	0	1	1	1	6	9	0	0	0	6

(CD: Completely Damaged, PD: Partially Damaged)

Table 1-5 Estimates of Damages and Losses by District (NPR million)

District	Infra-structure	Medical equipment	Office equipment	Medicines &supplies	Other logistics	Others losses	Total
Bhaktapur	95	3	0	-	1	16	115

3) Nutrition

Table 1-6 Estimated Number of Affected Children under Five Years, and Pregnant and Lactating Women

District	Children <2years*	Children 6-23 months	Children< 5 years	Children 6-59 months	Pregnant women	Lactating women
Bhaktapur	12,763	9,465	12,220	10,875	3,187	2,702

* Also gives an estimation of the number of mothers breastfeeding children under two years of age

4) Cultural Heritage

Table 1-7 Damages, Losses and Reconstruction Costs

District	Damage USD	Losses USD	Losses USD	Losses USD	Cost of Recovery and Reconstruction USD
	Damage to physical assets and infrastructure	Impact on livelihood estimated at 10% of damage	Losses from tourist ticket sales	Total value	20% added for the cost of retrofitting and improved seismic design of new structures
Bhaktapur	$5,330,000	$533,000	$2,275,849	$2,808,849	$6,396,000

5) Agriculture

Table 1-8 District-wise Summary of Damages and Losses (NPR million)

District	Crop subsector			Livestock subsector			Agriculture total				
	Damage	Losses	Total Effect	Damage	Losses	Total Effect	Damage	Losses	Total Effect	Private (%)	Public (%)
Bhaktapur	176.00	185.71	361.70	84.35	55.55	139.90	260.35	241.26	501.61	88.37	11.63

6) Commerce and Industry

Table 1-9 Estimated Damages and Losses to Commerce and Industry (NPR)

Industry	Micro		Cottage/Small		Medium & Large		District wise consolidated	
District	Damage	Loss	Damage	Loss	Damage	Loss	Damage	Loss
Bhaktapur	145,525,000	308,437,500	41,694,387	16,772,061	71,160,500	425,950,000	257,379,887	751,159,562

Commerce	Micro		Cottage/Small		Medium & Large		District wise consolidated	
District	Damage	Loss	Damage	Loss	Damage	Loss	Damage	Loss
Bhaktapur	414,450,960	321,636,000	8,743,360	2,122,571	6,700,947	36,128,050	429,895,267	359,886,621

7) Waste, Sanitation and Hygiene

Table 1-10 Damages and Losses in the 14 Severely-affected Districts

District	Water damages (NPR)	Sanitation damages (NPR)	Losses (NPR)
Bhaktapur	191,295,000.0	93,522,000.0	41,253,844.3

Table 1-11 Recovery and Reconstruction Initiatives and Costs (Based on needs, DRM/BBB and recovery and reconstruction strategy)

District	Sanitation (NPR)	Water Systems (NPR)	Build Back Better (NPR)			Total Cost (NPR)	Total Cost, US$
			WSP/ Upgrading water quality	Infrastructure	Institutional capacity development		
Bhaktapur	93,522,000.0	191,295,000.0	19,129,500.0	28,694,250.0	4,272,255.0	336,913,005.0	3,369,130.1

District	Budget allocation, US$		
	2015/16 (25%)	2016/17 (40%)	2017/18 (35%)
Bhaktapur	842,282.5	1,347,652.0	1,179,195.5

8) Employment and Livelihoods

Table 1-12 Employment and Livelihoods Sector: Work Days Lost and Income Lost per District

District	Lost work days	Losses in personal income(in millions)	
		NPR	USD
Bhaktapur	3,288,619	594.0	5.9

1-2-3. Result of Detail Building Damage Survey

JICA Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley in Nepal has conducted the detail building damage survey for each building of Gorkha EQ in Bhaktapur Municipality. The result is shown as follows.

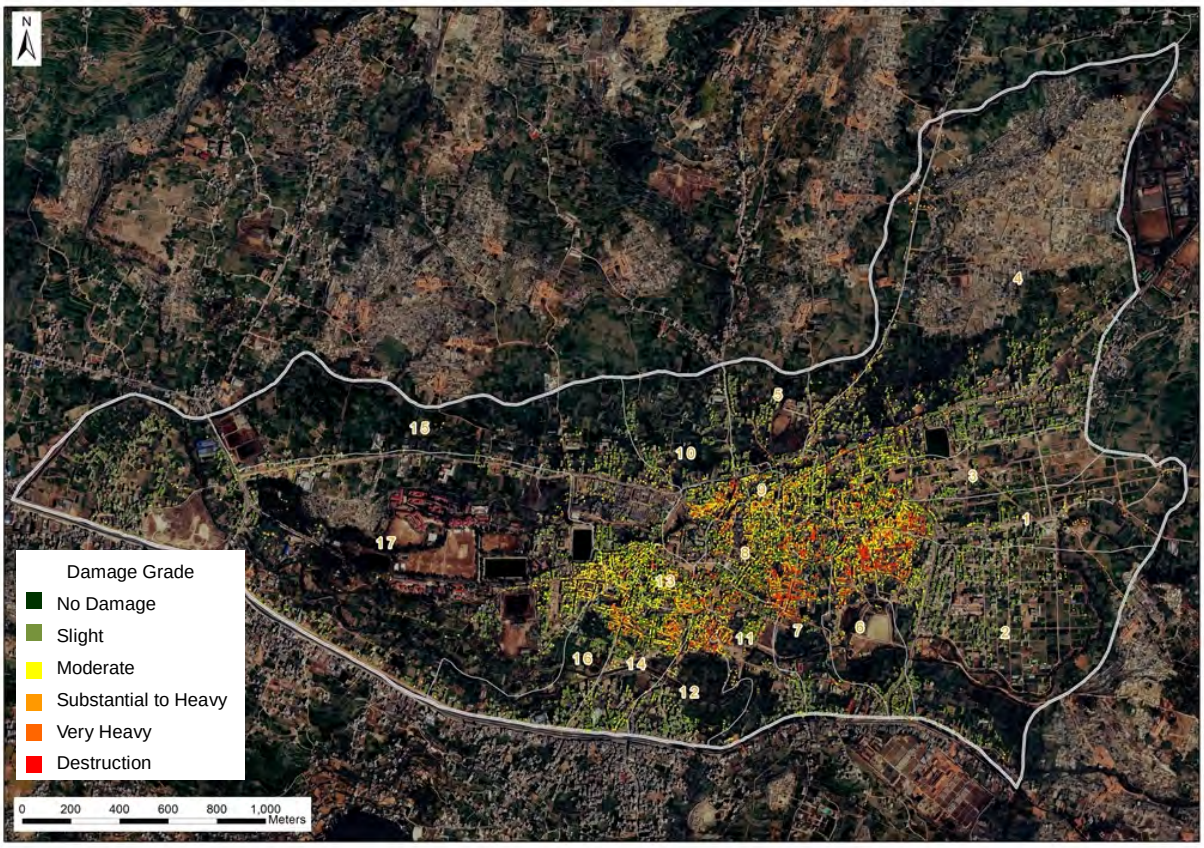


Figure 1-11 Map of distributions of buildings by damage grade

Table 1-13 Ward wise distributions of buildings by damage grade

Ward Number	Damage Grade					
	Grade 1 (Negligible to slight damage)	**Grade 2** (Moderate damage)	**Grade 3** (Substantial to heavy damage)	**Grade 4** (Very heavy damage)	**Grade 5** (Destruction)	**Grand Total**
1	409	138	220	98	108	973
2	721	76	65	103	87	1052
3	228	115	123	49	66	581
4	1529	292	135	79	76	2111
5	469	159	97	136	56	917
6	236	82	58	58	83	517
7	332	45	59	188	147	771
8	248	78	61	86	56	529
9	104	62	86	47	17	316
10	400	78	123	83	45	729
11	297	66	76	58	65	562
12	225	72	75	70	55	497
13	157	63	71	31	14	336
14	450	101	100	84	32	767
15	641	184	81	45	15	966
16	243	110	72	86	12	523
17	1015	157	115	37	14	1338
Total	7704	1878	1617	1338	948	13485

1-3. Objective

Objectives for formulation of RRP of Bhaktapur Municipality are shown as follows; RRP is necessary the setting and sharing of goals and direction, effective coordination of reconstruction projects, and effective implementation of reconstruction actions.

(1) Setting and sharing of goals and direction

- To clarify the goals and direction of the reconstruction.
- To promote more effective reconstruction actions
- To share the vision among all stakeholders such as government, private sectors and residents.
- To public relations of reconstruction measures/actions

(2) Synchronized coordination of reconstruction projects

- To clarify the role and responsibility of each reconstruction action among all stakeholders
- To coordinate the reconstruction actions among all stakeholders

(3) Effective implementation of reconstruction actions

- To implement reconstruction actions for not only urban development but also industry development, welfare, education, and widely various fields
- To clarify the priority of reconstruction actions
- To implement the reconstruction projects efficiently and comprehensively by monitoring consistency and coordinating such widely various reconstruction projects

1-4. Position

National Reconstruction and Rehabilitation Policy

The Nepal Government together with the international community carried out the Post Disaster Needs Assessment, just after the earthquake to identify the damage cost estimation. The report pointed out that the estimation value of disaster effects (damages and losses) caused by the earthquake is NRP 706 billion or its equivalent US$ 7 billion and 76 percent of the total effects represents the value of destroyed physical assets.

The Nepal Government initiated the concept of Build Back Better towards the resilience of the society with emphasis on the improvement of the Disaster Risk Reduction system in Nepal.

The government of Nepal proposed the bill to establish the National Reconstruction Authority (NRA) as the leading agency of the reconstruction from an earthquake. The bill prescribes the establishment of the National Reconstruction Committee (NRC) and Steering Committee both of which are chaired by the Prime Minister. The bill was approved by the

National Congress in January, 2016.

NRA has prepared the National Reconstruction and Rehabilitation Policy to envisage a guideline for reconstruction and recovery. The rehabilitation and recovery plan on the municipal level is expected to fulfil important roles as the basis for appropriately reflecting the national reconstruction policies to local community people.

Table 1-14 Objectives of National Reconstruction and Rehabilitation Policy

1.	To reconstruct, retrofit and restore the partial and completely damaged residential, community and government buildings and heritage sites to make them disaster resistant using local technology according to the need.
2.	To revive (reestablishment) the damaged cities and ancient settlements by maintaining the original shape with improved structure.
3.	To protect and promote the vulnerable individual and community of the quake affected areas.
4.	To develop new alternatives by reestablishing productive sector for economic opportunity and livelihood.
5.	To study and research on earthquake, its damages and effects, reconstruction, resettlement, rehabilitation and disaster risk reduction.
6.	To develop integrated and planned settlements.

Source: National Reconstruction and Rehabilitation Policy, 2072, NRA

Position of BBB Recovery and Reconstruction Plan Bhaktapur Municipality

RRP of Bhaktapur Municipality is the Master plan compiled of the necessary measures and actions in order to implement reconstruction smoothly and quickly for the victims.

RRP of Bhaktapur Municipality is a municipal document that is owned by Bhaktapur Municipality. The contents of RRP are related with the Post-Earthquake Recovery and Reconstruction Policy of the Government of Nepal. RRP is indicated the Role and Responsibilities of all sections of Bhaktapur Municipality, agencies and institutions related to the implementation of recovery and reconstruction of Bhaktapur Municipality from the Gorkha EQ. According to the concept of BBB and Mainstreaming Disaster Risk Reduction into Development, RRP will be processed to be the integration to the Regional Disaster Management Plan (RDMP).

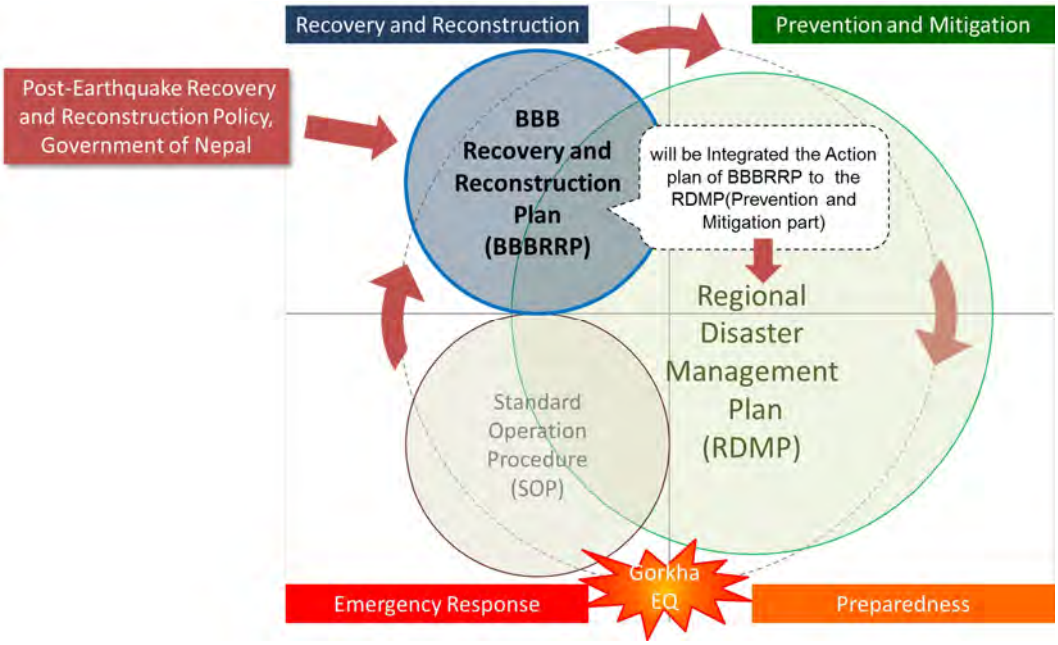


Figure 1-12 Position of BBB Recovery and Reconstruction Plan

The affected area in Bhaktapur Municipality by the Gorkha EQ is not whole area, in order to move toward a more resilient society than before, the scope area of RRP is the whole area and all residents of Bhaktapur Municipality.

1-5. Period

The target period of RRP of Bhaktapur Municipality is basically five years and if divided into three phases; Recovery, Revitalization, Development (2073/2074 – 2077/2078). Particularly, in the recovery period, the recovery and reconstruction efforts from the damage of the Gorkha EQ will be conducted intensively. In the revitalization and development period, with the concept of BBB, the efforts leading to the positive reconstruction, restoration and future development will be conducted for the resilient society. The activities of the Revitalization and Development phases are to be integrated into the prevention and mitigation part of the Regional Disaster Management Plan.

Figure 1-13 Period of BBB Recovery and Reconstruction Plan

1-6. System

Structure of BBB Recovery and Reconstruction Plan

The RRP consists of the basic policy and action plan based on the vision of Bhaktapur Municipality as shown in 2-2. The basic plan shows the entire image of the reconstruction such as vision and grand design based on the damage status and direction for the future. Each vision is divided into several policies, and in each policy the list of necessary countermeasures and actions for detail action plans is included. In order to achieve the policies, the action plan includes the responsible organizations in the municipality in consideration with the coordination with the national or district organizations. By considering budget, importance, urgency and time needed, each action plan is sorted into three phases by priority. The structure of RRP is shown as follows.

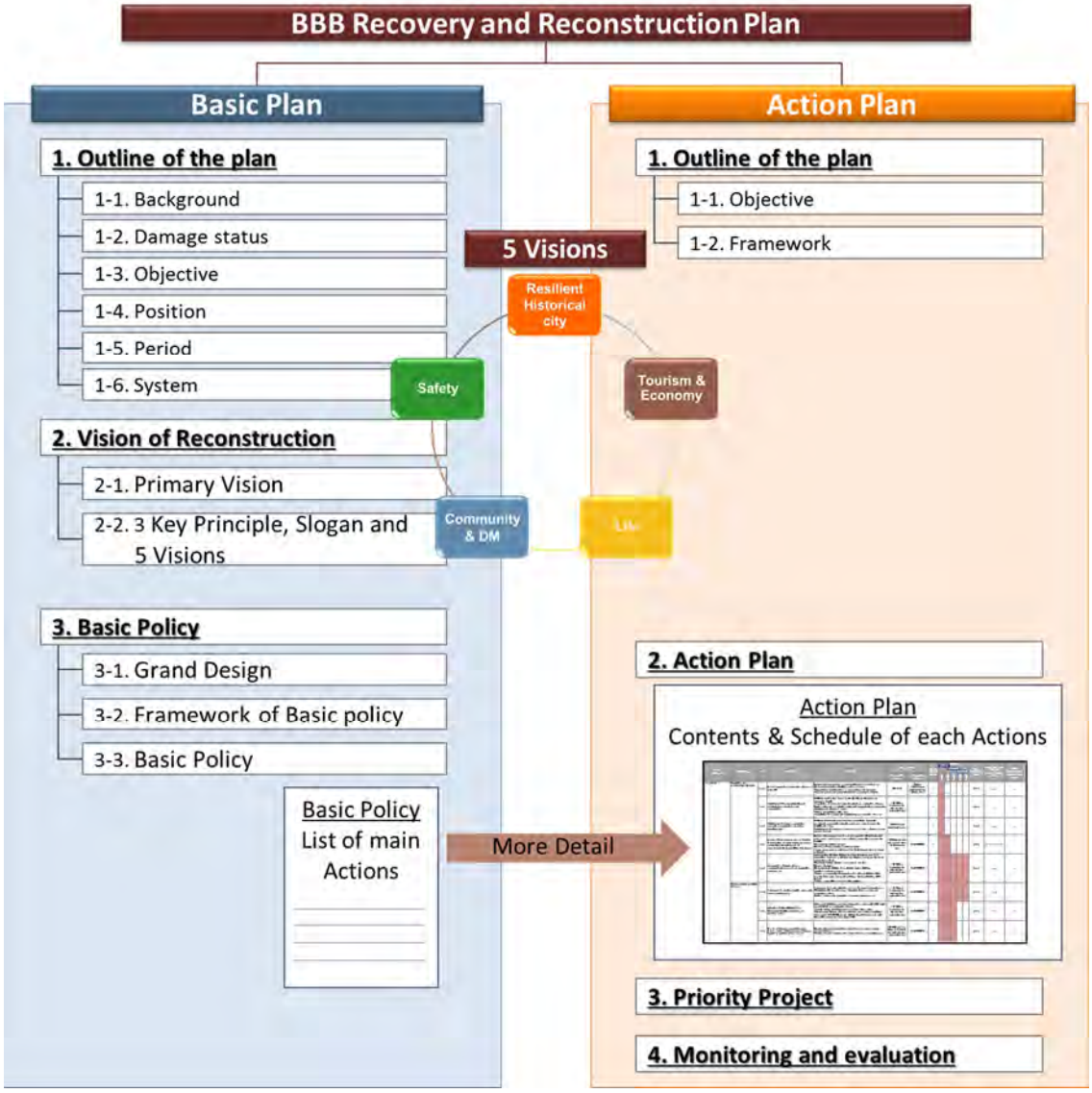


Figure 1-14 Structure of BBB Recovery and Reconstruction Plan

Reconstruction System of Bhaktapur Municipality

According to the National Reconstruction Policy by NRA, the reconstruction system of Bhaktapur Municipality shall be established as the following. Based on this system, the reconstruction project will be implemented systematically.

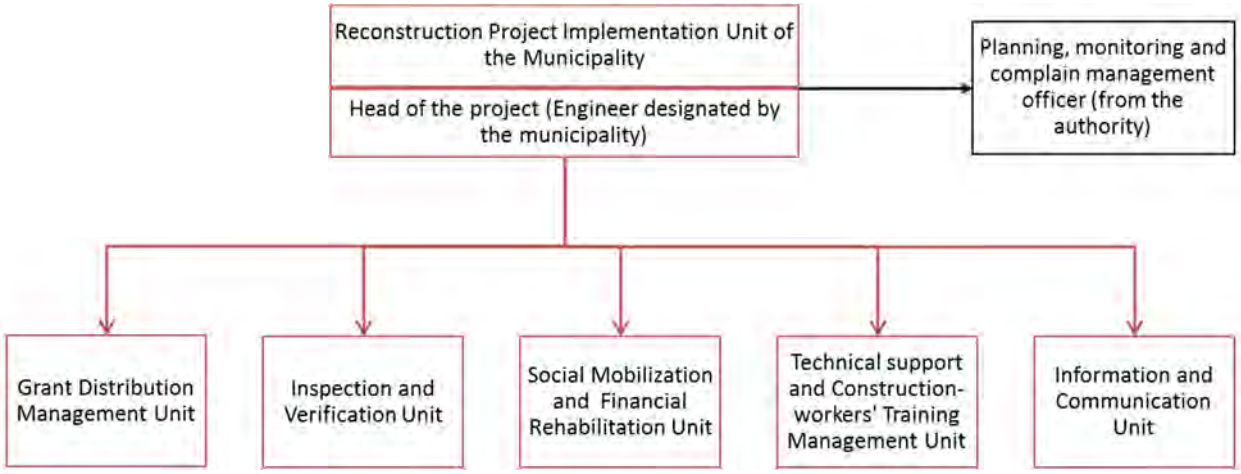


Figure 1-15 Reconstruction System of Bhaktapur Municipality

Source: National Reconstruction Policy, National Reconstruction Authority

CHAPTER 2.
VISION OF RECONSTRUCTION

2-1. Primary Vision

Primary Vision for BBB recovery and reconstruction plan of Bhaktapur Municipality is:

Build Back Better (BBB)

toward Seismically Safe and Secure Built Environment

According to the definition of UNISDR, "recovery" after a disaster is "the restoration, and improvement, where appropriate, of facilities, livelihood and living conditions of disaster-affected communities, including efforts to reduce disaster risk factors" (UNISDR, 2009)

The "Build Back Better" concept is an approach to build up a more resilient society during the reconstruction phase, including physical restoration of infrastructure, revitalization of livelihood and economy/industry, and the restoration of local culture and environment, after the disaster has struck. With lessons learned from the disaster experiences, this concept "BBB" has become one of the four priorities for action of the "Sendai Framework for Disaster Risk Reduction (2015-2030, SFDRR) ", adopted in Sendai, Japan 2015.

Priority for Action of SFDRR
Priority 1: Understanding disaster risk
Priority 2: Strengthening disaster risk governance to manage disaster risk
Priority 3: Investing in disaster risk reduction for resilience
Priority 4: Enhancing disaster preparedness for effective response and **"Build Back Better" in recovery, rehabilitation and reconstruction**

Reference: Sendai Framework for Disaster Risk Reduction 2015 - 2030

Chart of the Sendai Framework for Disaster Risk Reduction
2015-2030

Scope and purpose

The present framework will apply to the risk of small-scale and large-scale, frequent and infrequent, sudden and slow-onset disasters, caused by natural or manmade hazards as well as related environmental, technological and biological hazards and risks.
It aims to guide the multi-hazard management of disaster risk in development at all levels as well as within and across all sectors

Expected outcome

The substantial reduction of disaster risk and losses in lives, livelihoods and health and in the economic, physical, social, cultural and environmental assets of persons, businesses, communities and countries

Goal

Prevent new and reduce existing disaster risk through the implementation of integrated and inclusive economic, structural, legal, social, health, cultural, educational, environmental, technological, political and institutional measures that prevent and reduce hazard exposure and vulnerability to disaster, increase preparedness for response and recovery, and thus strengthen resilience

Targets

Substantially reduce global disaster mortality by 2030, aiming to lower average per 100,000 global mortality between 2020-2030 compared to 2005-2015	Substantially reduce the number of affected people globally by 2030, aiming to lower the average global figure per 100,000 between 2020-2030 compared to 2005-2015	Reduce direct disaster economic loss in relation to global gross domestic product (GDP) by 2030	Substantially reduce disaster damage to critical infrastructure and disruption of basic services, among them health and educational facilities, including through developing their resilience by 2030	Substantially increase the number of countries with national and local disaster risk reduction strategies by 2020	Substantially enhance international cooperation to developing countries through adequate and sustainable support to complement their national actions for implementation of this framework by 2030	Substantially increase the availability of and access to multi-hazard early warning systems and disaster risk information and assessments to people by 2030

Priorities for Action

There is a need for focused action within and across sectors by States at local, national, regional and global levels in the following four priority areas.

Priority 1	Priority 2	Priority 3	Priority 4
Understanding disaster risk	Strengthening disaster risk governance to manage disaster risk	Investing in disaster risk reduction for resilience	Enhancing disaster preparedness for effective response, and to «Build Back Better» in recovery, rehabilitation and reconstruction
Disaster risk management needs to be based on an understanding of disaster risk in all its dimensions of vulnerability, capacity, exposure of persons and assets, hazard characteristics and the environment	Disaster risk governance at the national, regional and global levels is vital to the management of disaster risk reduction in all sectors and ensuring the coherence of national and local frameworks of laws, regulations and public policies that, by defining roles and responsibilities, guide, encourage and incentivize the public and private sectors to take action and address disaster risk	Public and private investment in disaster risk prevention and reduction through structural and non-structural measures are essential to enhance the economic, social, health and cultural resilience of persons, communities, countries and their assets, as well as the environment. These can be drivers of innovation, growth and job creation. Such measures are cost-effective and instrumental to save lives, prevent and reduce losses and ensure effective recovery and rehabilitation	Experience indicates that disaster preparedness needs to be strengthened for more effective response and ensure capacities are in place for effective recovery. Disasters have also demonstrated that the recovery, rehabilitation and reconstruction phase, which needs to be prepared ahead of the disaster, is an opportunity to «Build Back Better» through integrating disaster risk reduction measures. Women and persons with disabilities should publicly lead and promote gender-equitable and universally accessible approaches during the response and reconstruction phases

Guiding Principles

Primary responsibility of States to prevent and reduce disaster risk, including through cooperation	Shared responsibility between central Government and national authorities, sectors and stakeholders as appropriate to national circumstances	Protection of persons and their assets while promoting and protecting all human rights including the right to development	Engagement from all of society	Full engagement of all State institutions of an executive and legislative nature at national and local levels	Empowerment of local authorities and communities through resources, incentives and decision-making responsibilities as appropriate	Decision-making to be inclusive and risk-informed while using a multi-hazard approach

Coherence of disaster risk reduction and sustainable development policies, plans, practices and mechanisms, across different sectors	Accounting of local and specific characteristics of disaster risks when determining measures to reduce risk	Addressing underlying risk factors cost-effectively through investment versus relying primarily on post-disaster response and recovery	«Build Back Better» for preventing the creation of, and reducing existing, disaster risk	The quality of global partnership and international cooperation to be effective, meaningful and strong	Support from developed countries and partners to developing countries to be tailored according to needs and priorities as identified by them

www.preventionweb.net/go/sfdrr
www.unisdr.org
isdr@un.org

UNISDR
The United Nations Office for Disaster Risk Reduction

In order to reduce the potential risk of disaster damage, it is necessary to construct houses in the area of lower disaster risk, and to build the urban structure resilient to such disaster. Disasters have demonstrated that the recovery, rehabilitation and reconstruction phase, which needs to be prepared ahead of a disaster, is a critical opportunity to "Build Back Better", including through integrating disaster risk reduction into development measures, making nations and communities resilient to disasters.

Once a serious disaster has occurred in Japan, on each occasion, Japan has revised its building code, design criteria, land use plan, government institutional structure and so on. This is really the sense of "Build Back Better". Therefore, the concept of "Build Back Better (BBB)" is necessary for the policies of recovery, rehabilitation and reconstruction, and BBB was set as the primary vision of RRP.

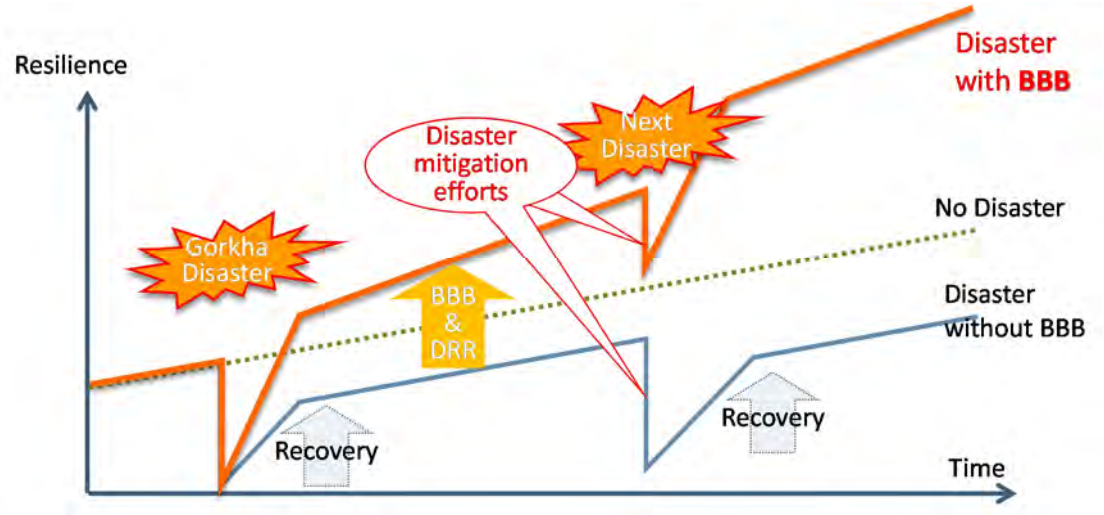


Figure 2-1 Time-sequence concept diagram of Build Back Better

Figure 2-2 Image of Build Back Better (The safety of the town was improved after rebuilding roads as wider ones (Same location in Kobe city))

Left: Before the Great Hanshin-Awaji Earthquake, Right: After the reconstruction from the Great Hanshin-Awaji Earthquake

Source: Disaster Management in Japan, Cabinet Office, Government of Japan

2-2. Three Key Principles, Slogan and Five Visions

2-2-1. Three Key Principles

Based on the primary vision "Build Back Better", in order to move forward with reconstruction, first safety must be ensured. On top of that, it is important to clarify the steps towards reconstruction for life and economy so that residents can continue to live with hope.

Therefore, the three key principles for reconstruction are: safety [Building Resilient Urban Structure, Life [Recovery of Affected People back to Normal] and Economy [Recovery of Regional Economy]. These Key Principles are common principles for recovery and reconstruction of all municipalities.

Figure 2-3 Key Principles for Recovery and Reconstruction

Life

The important subject is to help the affected people by the Gorkha EQ to get back their ordinary life by ensuring housing, educational environment and systems that protect lives and safety, such as health, medical and welfare services. Furthermore, from the BBB's point of view, the recovery and reconstruction plan should be a guide towards a better life with a stable livelihood for the future.

Safety

Ensuring the safety of residents is most important in order to move forward with reconstruction. Early recovery and seismic resistant measures for urban planning, such as public buildings, infrastructures and land use planning, shall be promoted for the safety and security of the people's life.

Economy

Economic activities which have been hampered by an earthquake have to be recovered at an early stage and they would be the vital issue for the city. In addition, the recovery of basic infrastructures, such as road networks, is also necessary to support economic activities. Thus, the recovery and reconstruction plan should aim at the vital regional economy and further development.

2-2-2. Slogan

Under the BBB concept, slogans showing the direction for the recovery and reconstruction of Bhaktapur Municipality were set as follows. Damage caused by the Gorkha EQ of Bhaktapur Municipality was severe and many historical and cultural important heritages were collapsed. Cultural heritages and tourism are the most important resources in Bhaktapur Municipality. Recovery and reconstruction of their cultural values directly connect the revitalization of vitality in the Bhaktapur Municipality, and, in order to recover the tourism, it is essential to be more resilient and safety for tourists. Therefore, Bhaktapur Municipality goes toward the city to be a resilient historical city as symbol of BBB.

TOWARD RESILIENT HISTORICAL CITY

AS SYMBOL OF BBB

2-2-3. Five Visions

To achieve the objective of the plan, the BBB concept, key principles and slogan, and the visions for the recovery and reconstruction of Bhaktapur Municipality were set. Three Visions "Life" "Safety" "Economy" consist of the key principles. In addition, the Gorkha EQ revealed the importance and usefulness of community as the following figure shows. The community helped a large number of victims of the Gorkha EQ because the community volunteer is the first executor for the SAR and Initial response activities. This means that the strengthening of community for disaster management will lead to the reduction of damages against future earthquakes. Therefore, the enhancement of community based disaster management (CBDRM) is set as the one of visions for BBB.

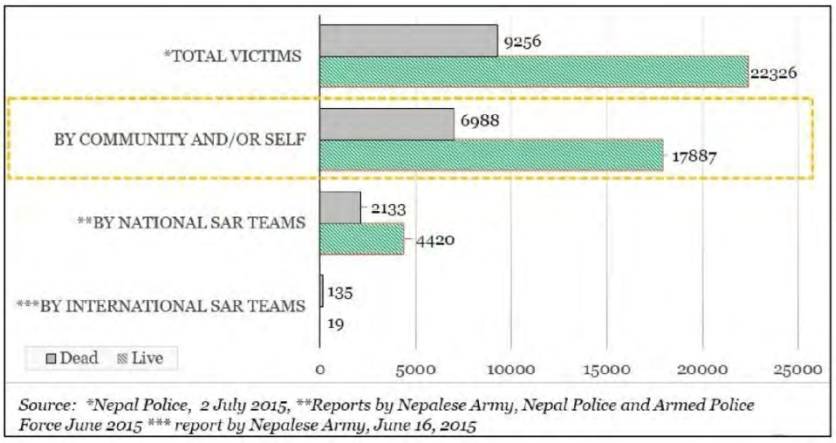


Figure 2-4 Extricated Victims and Recovered Dead Bodies by Different SAR Teams of Gorkha EQ

Source: NSET, Two decades of earthquake risk management actions judged against Gorkha earthquake of Nepal April 2015, New Technologies for Urban Safety of Mega Cities in Asia (USMCA 2015), Kathmandu, October 2015, http://www.nset.org.np/usmca2015/keynote/2_KN2_fullpaper_AmodmaniDixit.pdf

Furthermore, Bhaktapur Municipality is an historical city and cultural heritages are the most important resources. As the characteristics of the damage of Gorkha EQ, the damage to cultural area was heavy as indicated in 2-2-2 Slogan. To recover the vital cultural society, since the resilience of historical city is required, it is set as the one of the visions.

The detailed contents of the five visions set up are as follows. Under these visions, the necessary actions will be implemented.

Figure 2-5 Five Visions of BBB RRP

Table 2-1 Contents of Five Visions of BBB RRP

Vision		Contents
RESILIENT HISTORICAL CITY	Development of Resilient Disaster Historical City	Resilient historical city shall be built for future disasters through the reconstruction of the cultural heritages and integration of cultural society and disaster management with the concept of BBB.
LIFE	Revitalization and Improvement of Livelihood	From Key Principles (Refer to 2-2-1)
SAFETY	Urban Planning with for a Safer and Secure City	From Key Principles (Refer to 2-2-1)
TOURISM & ECONOMY	Promotion of Tourism and Ensuring the Safety of Tourists	From Key Principles (Refer to 2-2-1) In particular, since tourism is the most important industry in municipality, Early recovery and disaster management measures for tourists shall be implemented.
COMMUNITY &DM	Strengthening of Community Disaster Risk Management & Resilient Disaster Management System of Municipality	Public awareness on disaster risk reduction/ management (DRR/DRM) and community based disaster risk management (CBDRM) shall be enhanced for the mitigation of future earthquakes. Resilient society shall be built for future disasters through the enhancement of the disaster management systems, facilities and infrastructure for disaster management with the concept of BBB.

CHAPTER 3.
BASIC POLICY

3-1. Grand Design

The grand design of BBB RRP Bhaktapur Municipality as the indicated direction for reconstruction is shown in Figure 3-2 (p.26).

3-2. Framework of Basic policy

The overall framework of the basic policy is shown in Figure 3-3 (p.27). For each sub sector, the basic policy and main actions are indicated.

3-3. Basic Policy

The basic policy of each vision of BBB RRP is shown as follows. Each policy is indicated in the main list of actions.

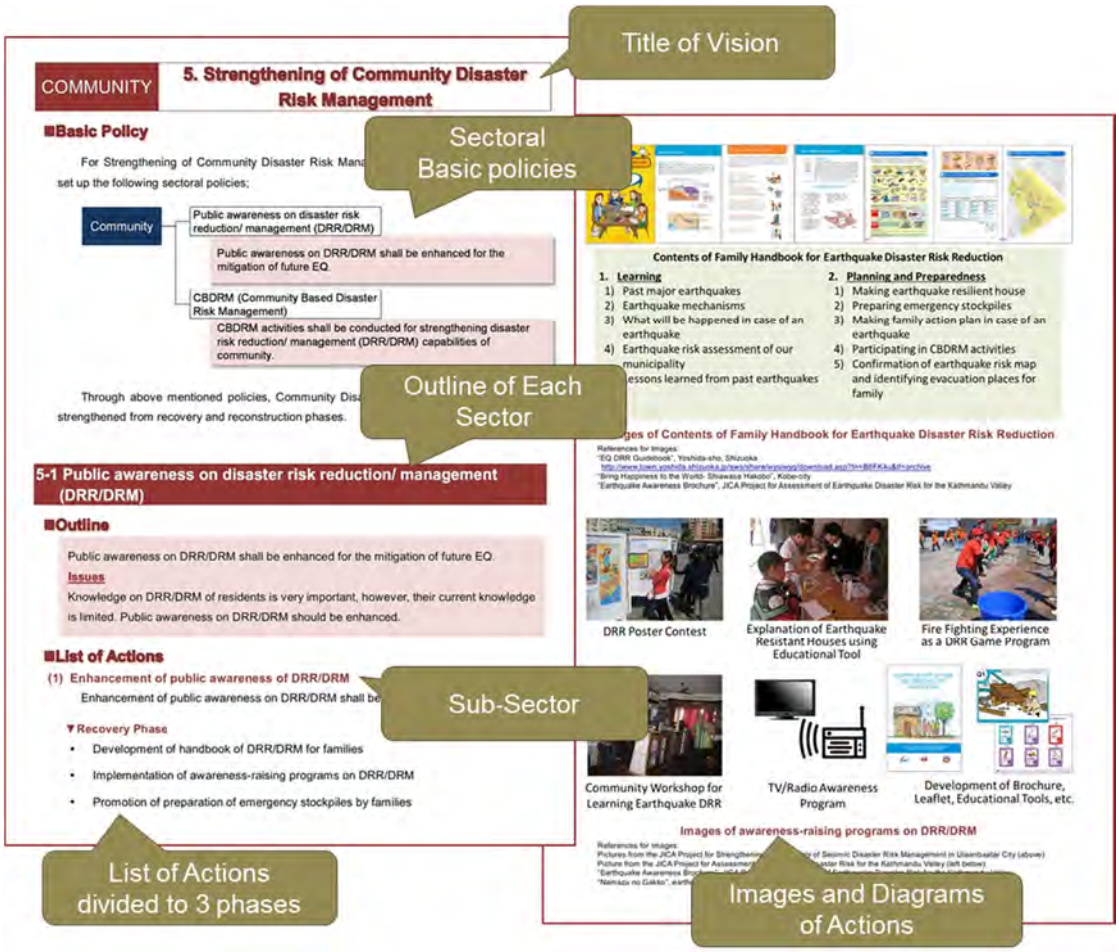


Figure 3-1 Structure of Basic Policy of BBB RRP

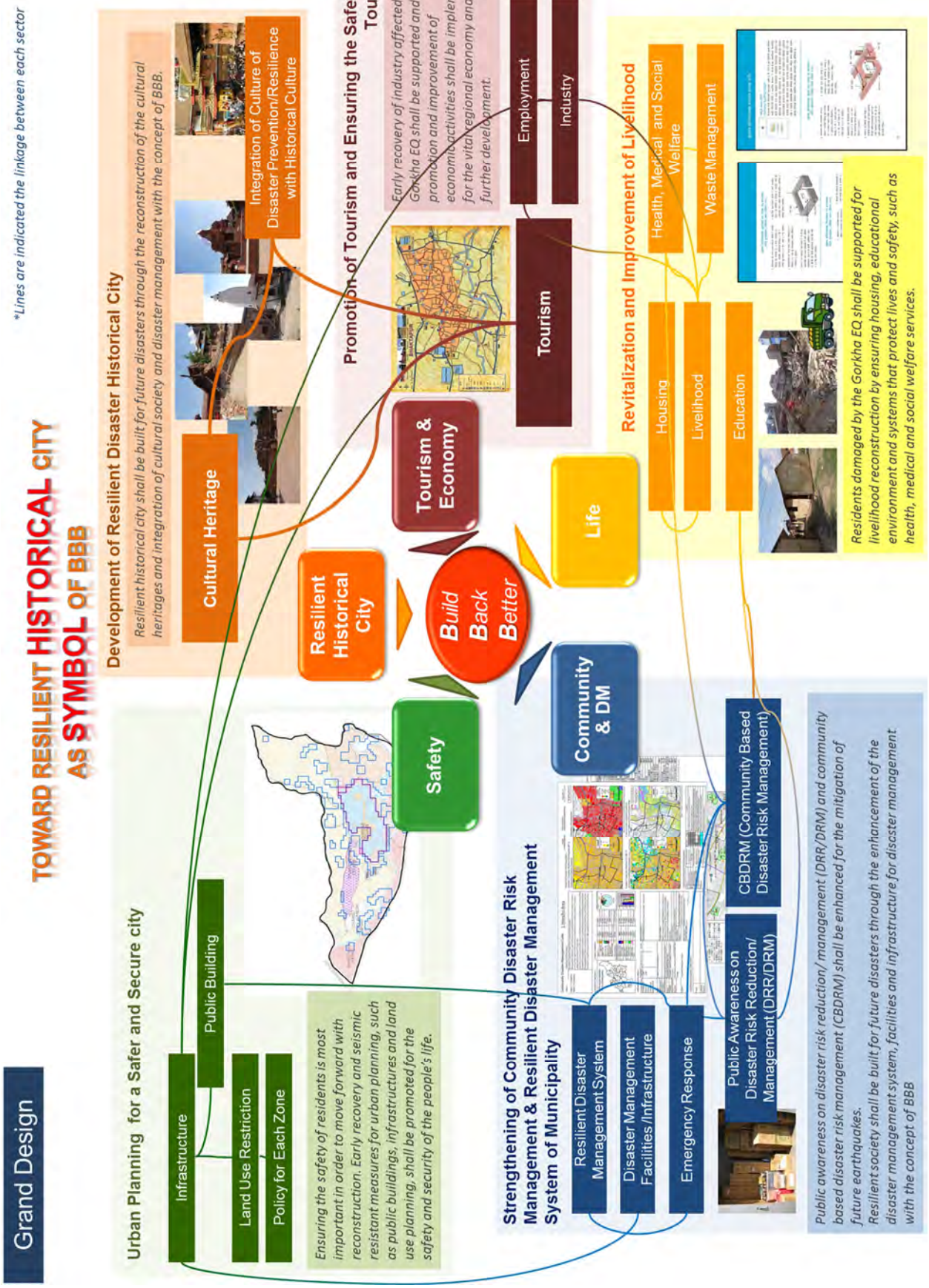


Figure 3-2 Grand Design of BBB RRP Bhaktapur Municipality

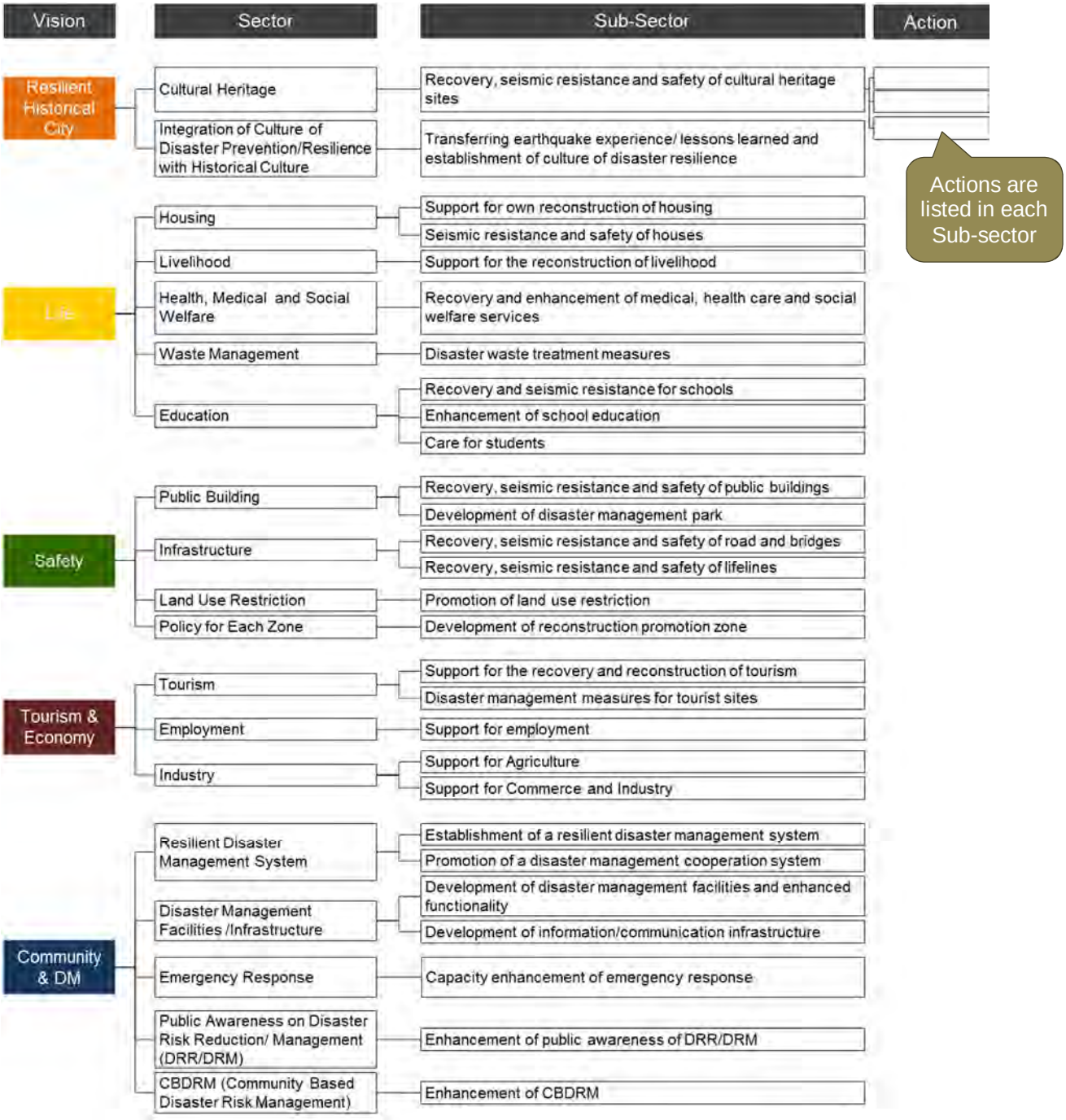
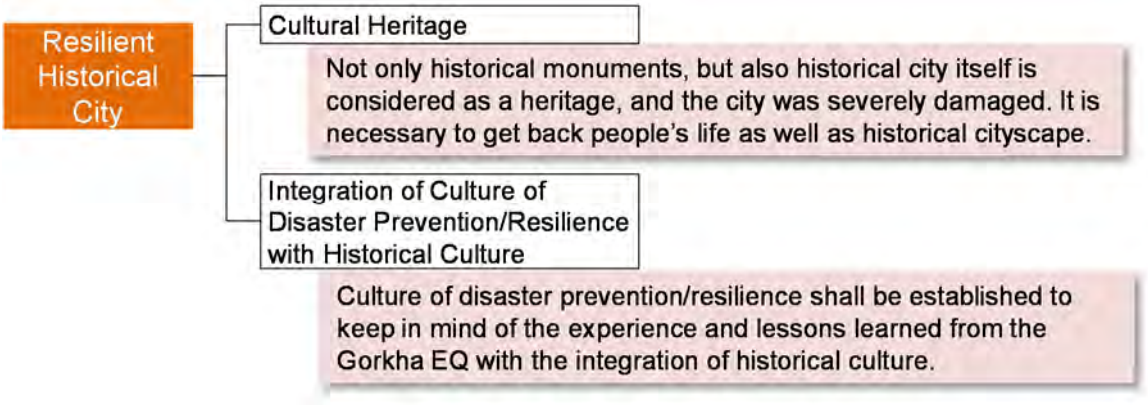


Figure 3-3 Framework of Basic Policy of BBB RRP Bhaktapur Municipality

RESILIENT HISTORICAL CITY	1. Development of Resilient Disaster Historical City

■Basic Policy

For the development of resilient disaster historical city, the BBB recovery and reconstruction plan set up the following sectoral policies:



Through the above mentioned policies, the resilient historical city shall be built for future disasters through the reconstruction of the cultural heritages and integration of cultural society and disaster management with the concept of BBB

1-1 Cultural Heritage

■ Outline

Cultural Heritage, which is an important resource of a municipality, shall be restored to reduce the spreading damages, and recovered to regain the attraction.

Issues

Many cultural heritages were damaged in the Gorkha EQ and tourism was damaged. It is necessary to recover or reconstruct immediately and necessary to conduct the seismic resistant measures since the cultural heritages are the important facilities for tourism in a municipality.

■List of Actions

City Center itself has high value of the history and culture and many historically and culturally buildings and monuments were damaged. 1) Temporary restoration is required to reduce spreading damage in the recovery phase. 2) Full restoration is required to get back to the original values and attract tourists. 3) Seismic resistance is required to prepare for another disaster in future. The prioritization of restoration is recommended as full recovery requires a long-term process.

Recovery Phase

- Debris removal and temporary restoration of the cultural heritage sites while not increase the disaster damages
- Restriction to enter areas where severe damages in the historical residential area and temporary reinforcement of residential buildings which have a risk of secondary disaster

Revitalization Phase

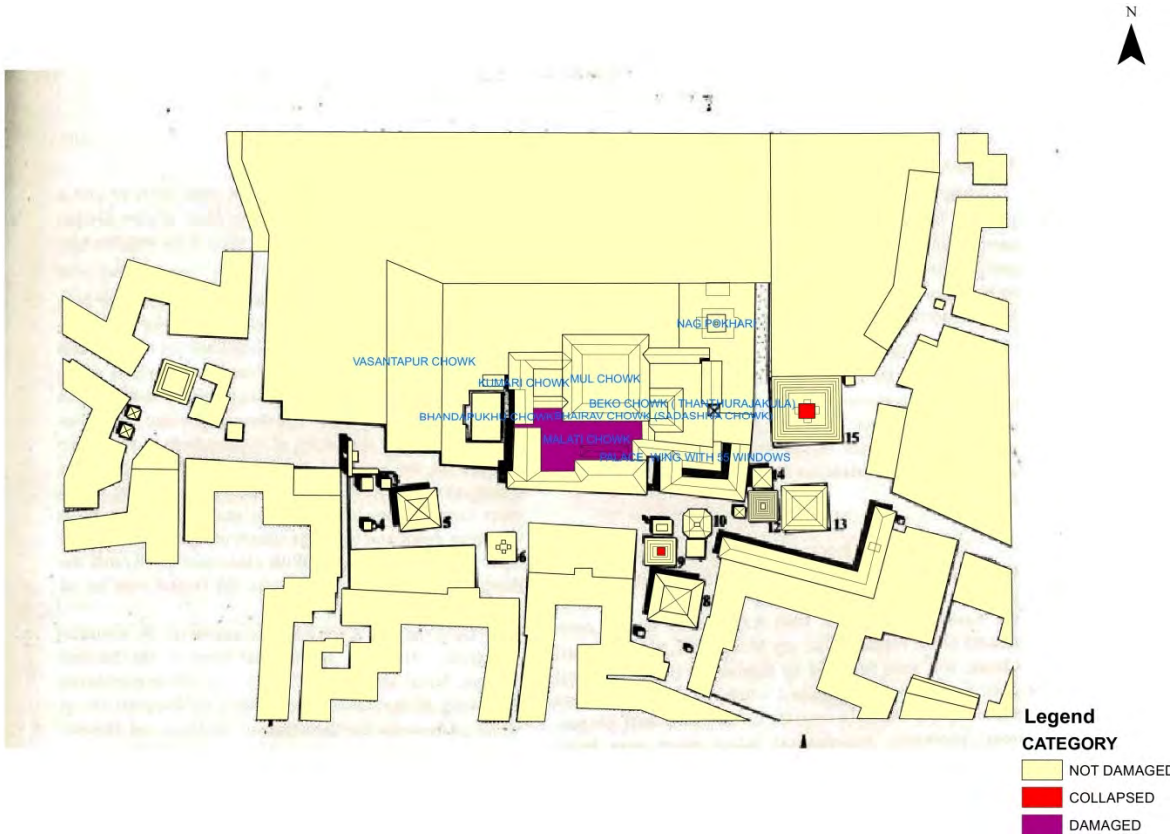
- Prioritizing recovery through the judgement of urgency from seismic diagnosis and historical importance
- Recovery of the prioritized cultural heritage sites in consideration of seismic resistance, their original value and people's life

Development Phase

- Long-term vision for reinforcement: (Re)evaluation of the value and vulnerability of historical area with heritage monuments
- Promotion of the restoration of the important cultural heritage sites to improve seismic resistance, keep their historical value and making resilient historical district

Damages by Ghrka Earthquake in Bhaktapur Municipality

LEFT: Heavy Damage in the historical area of Bhaktapur
RIGHT: Historical building supported by props nearby Durbar Square
Source: JICA Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley



Damage of Bhaktapur Durbar Square

List of Damaged Heritage site in Bhaktapur Municipality

Condition	Heritage Name	Condition	Heritage Name
Completely Damaged	Bramhayani Temple		
Fully Damaged	Bholachhe Pukhu Northern Pati	Fully Damaged	Byashi Bhajan Pati
Fully Damaged	Pati adjoining Degaina Temple	Fully Damaged	Macho Bhairab Pati 1
Fully Damaged	Degaina Temple	Fully Damaged	Macho Bhairab Pati 2
Fully Damaged	Yatache Nasal Pati (Uttarabhimukh, Pachimabhimukh)	Fully Damaged	Peacock Window House
Fully Damaged	Bhramayani Temple	Fully Damaged	Swet Bhairab Temple
Fully Damaged	Bhramayani Deep Pati	Fully Damaged	Prasaanasil Aagmache
Fully Damaged	Chyamasingha Gate	Fully Damaged	Kwathandau Stone Tap
Fully Damaged	Bhuju Pati	Fully Damaged	Siddhi Gadesh Bhajan Pati
Fully Damaged	Sri Mahakali Pith Premises	Fully Damaged	Siddhi Gadesh Temple
Fully Damaged	Namo Buddha Temple	Fully Damaged	Inacho Chaitya
Fully Damaged	Hanumanghat Area Temple 1	Fully Damaged	Nitya Nath Temple
Fully Damaged	Hanumanghat Area Temple 2	Fully Damaged	Maheshwori Sattal
Fully Damaged	Hanumanghat Area Temple 3	Fully Damaged	Vatsala/Batsala Temple
Fully Damaged	Hanumanghat Area Temple 4	Fully Damaged	Pujari Math (With Peacock Window)
Fully Damaged	Layaku Entrance Gate	Fully Damaged	Chyasing Mandap
Fully Damaged	Issue Section Office Building	Fully Damaged	Yoshi Party Conservation
Fully Damaged	Taba Pati (Jangi Pala)	Fully Damaged	Jangam Academy
Fully Damaged	Narayan Temple (Balakhu)	Fully Damaged	Mahalxmi Bhajan Pati
Fully Damaged	Bhaktapur Municipality Office	Fully Damaged	Damodhar Sharma Mahadev Priest House

Condition	Heritage Name	Condition	Heritage Name
Fully Damaged	Fasi Dega	Fully Damaged	Madhab Narayan Sattal
Fully Damaged	Betal Dhoche	Fully Damaged	Krishna Temple Bhajan Sattal
Fully Damaged	Narayan Temple	Fully Damaged	Ramayan Mythology Sattal
Fully Damaged	Kayastha Sattal	Fully Damaged	Kriyaputri Pati
Fully Damaged	Bhimsen Temple	Fully Damaged	Kriyaputri House Sattal
Fully Damaged	Nitya Nath Dhoche		
Partly Damaged	Om Bahal	Partly Damaged	Bhimsen Temple
Partly Damaged	Balkumari Temple	Partly Damaged	Salan Pati
Partly Damaged	Wakupati Narayan Temple	Partly Damaged	Swet Bhairab Dhochhe
Partly Damaged	Wakupati Narayan's Southern Sattal	Partly Damaged	Maheshwori Dhochi
Partly Damaged	Suryamadi Pati	Partly Damaged	Nyatapola Temple
Partly Damaged	Acha Pond Premises	Partly Damaged	Rameshwor Temple
Partly Damaged	Hanumanghat Krishna Temple	Partly Damaged	Siddhi Laxmi Temple
Partly Damaged	Hanumanghat Ram Janaki Temple	Partly Damaged	Mahakali Dhochhe
Partly Damaged	Hanumanghat Area Temple 5	Partly Damaged	Narayan Temple
Partly Damaged	Hanumanghat Area Temple 6	Partly Damaged	Narayan Temple
Partly Damaged	Hanumanghat Area Temple 7	Partly Damaged	Bhairabnath Dhoche
Partly Damaged	Hanumanghat Area Temple 8	Partly Damaged	Thathu Bahi
Partly Damaged	Hanumanghat Area Temple 9	Partly Damaged	Bishwarupa Temple
Partly Damaged	Hanumanghat Area Temple 10	Partly Damaged	Garud Kunda Mahadev Temple
Partly Damaged	Hanumanghat Social Building	Partly Damaged	Bhadrakali Dhochhe
Partly Damaged	Bhadrakali Pith Premises	Partly Damaged	Mahalaxmi Birajman Pati
Partly Damaged	Galashi Bhajan Pati	Partly Damaged	Chturbhramha Mahabihar
Partly Damaged	Golmadhi Ganesh Temple Palikhel	Partly Damaged	Bhandar House's Northern Wing
Partly Damaged	Bhaktapur Art Museum	Partly Damaged	Lancha Pali
Partly Damaged	Taleju Main Chowk Area	Partly Damaged	Dewali Aagmache
Partly Damaged	Tripura Sundari Dhochhe	Partly Damaged	Bhagawati Dhochhe
Partly Damaged	Kwachhe Ganesh Pati	Partly Damaged	Jaganath Temple
Partly Damaged	Kwachhe Pati	Partly Damaged	Chuma Gadesh Bhajan Pati
Partly Damaged	Lakulachhe Pati	Partly Damaged	Meta Pati

1-2 Culture of Disaster Prevention/Resilience

■Outline

Culture of disaster prevention/resilience shall be established to keep in mind of the experience and lessons learned from the Gorkha EQ with the integration of historical culture.

Issues

It is necessary to take over the experiences and lessons for prevention/mitigation of damages from next earthquake.

List of Actions

(1) Transferring earthquake experiences/ lessons learned and establishment of culture of disaster resilience

Education based on the EQ experiences shall be promoted. Culture of disaster prevention/resilience shall be established for mitigating damages from future disasters

Recovery Phase

- Development of bases for culture of disaster prevention/ resilience in collaboration with cultural heritage sites as the symbol of BBB
- Implementation of events for promoting the establishment of culture of disaster prevention/ resilience

Photo: www.bhaktapur.com

Revitalization Phase

- Enhancement of disaster risk reduction education (education based on the earthquake experiences, learning for disaster risk reduction)

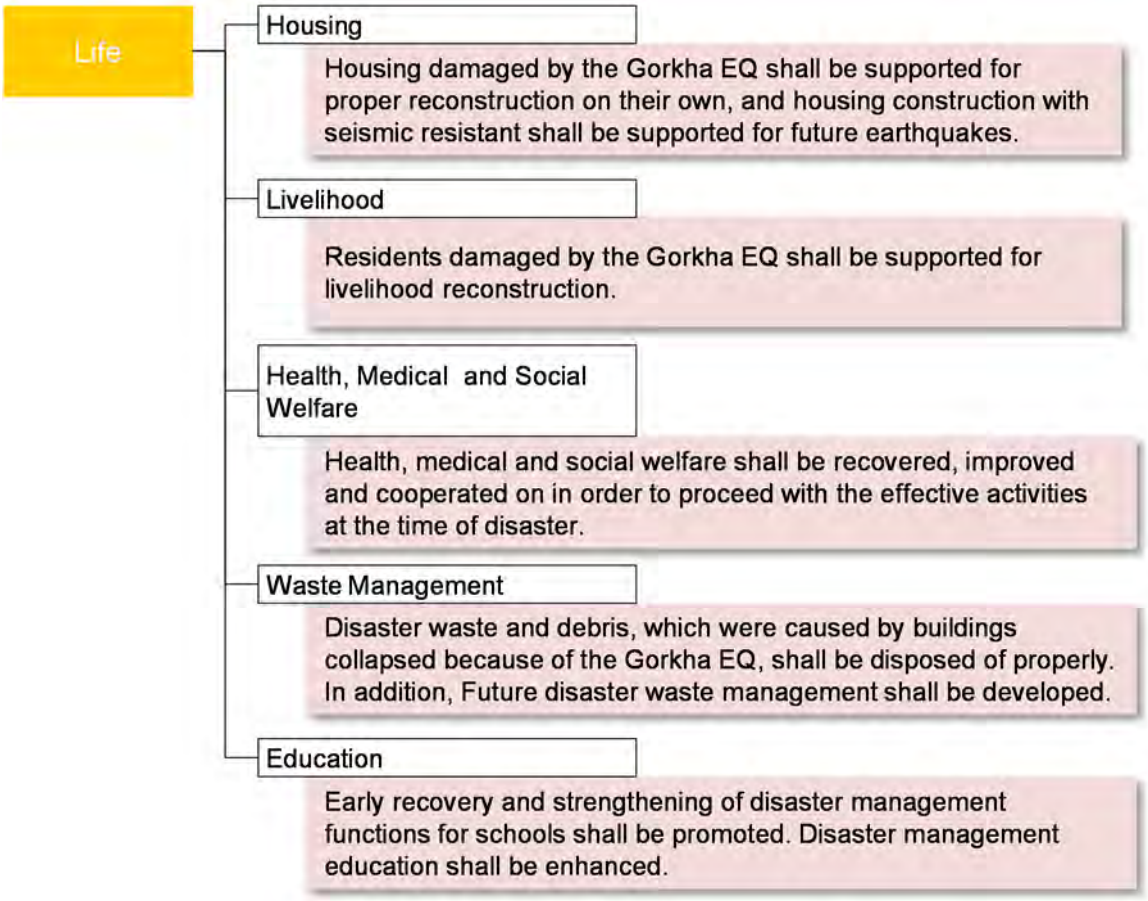
Images of monument of disaster

Left: Tsunami warning stone tablet in Aneyoshi, Miyako city, Japan, Right: Pier with the bared steel frame by the Great Hanshin-Awaji EQ
Source: Left photo; Disaster Management in Japan, Cabinet Office, Government of Japan, Right photo; JICA Study Team

LIFE	2. Revitalization and Improvement of Livelihood

Basic Policy

For the revitalization and improvement of livelihood, the BBB recovery and reconstruction plan set up the following sectoral policies for life:



Through the above mentioned policies, the livelihoods of residents should be revitalized and improved from the recovery and reconstruction phases.

2-1 Housing

■Outline

Housing damaged by the Gorkha EQ shall be supported for proper reconstruction on their own, and housing construction with seismic resistant shall be supported for future earthquakes.

Issues

Many houses collapsed in the Gorkha EQ. Proper reconstruction and seismic resistant measures are essential and important for the mitigation of human damages from future earthquakes.

■List of Actions

(1) Support for own reconstruction of housing

Housing damaged by the Gorkha EQ shall be supported for proper reconstruction by the owner with information provision and financial support.

Recovery Phase

- Financial support for the reconstruction of houses damaged by the Gorkha EQ
- Establishment of housing information and consultation bases for the housing reconstruction
- Establishment of housing reconstruction communities, reconstruction support for vulnerable people
- Provision of temporary houses in consideration of social welfare (provision of temporary houses separately for vulnerable people and deprived/marginalized people (Pichadiyeko barga))
- Implementation of training of house reconstruction for masons, local communities, technicians, etc.

Images of Seismic resistant and safety of houses

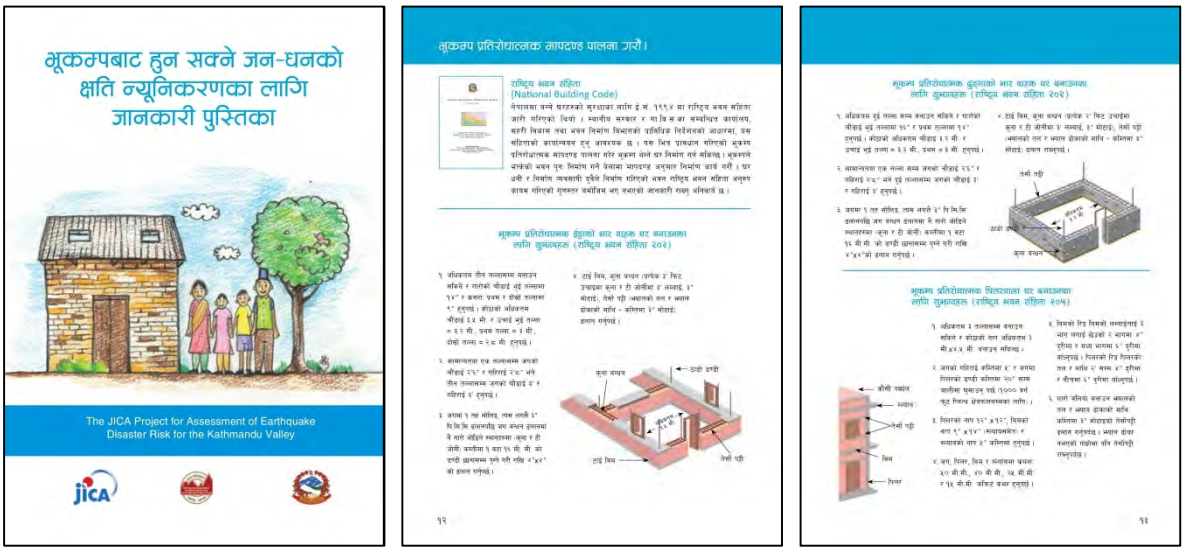
Source: JICA Project for the Transitional Project Implementation Support for Emergency Reconstruction Projects

(2) Seismic resistance and safety of houses

Housing construction with seismic resistance shall be supported for future earthquakes.

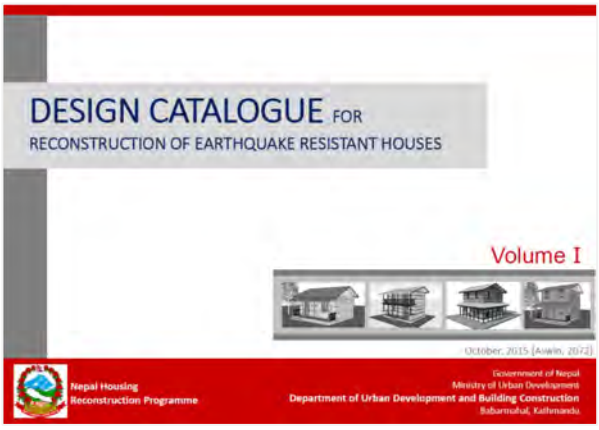
Recovery Phase

- Development of capacity and public awareness for seismic resistant houses
- Application of National Building Codes(NBC), enforcement of the building permission and inspection system
- Financial and technical support for seismic diagnosis, seismic resistant measures of houses, and the dispatch of experts for seismic diagnosis



Images of Brochure for construction of seismic resistant houses

Source: JICA Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley



Structural Type	No. of Floor	Model No.	Designed by
Stone masonry in cement mortar, P5- SMC	1	SMC-1.1	JICA
	1	SMC-1.2	JICA
	2	SMC-2.1	JICA
	2	SMC-2.2	DUDBC
	2	SMC-2.3	DUDBC
	2	SMC-2.4	DUDBC
	2+ATTIC	SMC-2.5	DUDBC
	2+TERRACE	SMC-2.6	DUDBC
		Technical details	
		Flexible design	
Brick masonry in cement mortar P71- BMC	1	BMC-1.1	JICA
	1	BMC-1.2	JICA
	2	BMC-2.1	JICA
	2	BMC-2.2	DUDBC
	2	BMC-2.3	DUDBC
	2+ATTIC	BMC-2.4	DUDBC
	2+TERRACE	BMC-2.5	DUDBC
		Technical details	
		Flexible design	
Stone masonry in mud mortar, P129- SMM	1	SMM-1.1	DUDBC
		Technical details	
		Flexible design	
Brick masonry in mud mortar, P147- BMM	1	BMM-1.1	DUDBC
		Technical details	
		Flexible design	

Design Catalogue for reconstruction of earthquake resistant houses

Source: DUDBC

2-2 Livelihood

■Outline

Residents damaged by the Gorkha EQ shall be supported for livelihood reconstruction.

Issues

Many people were affected and have difficulty in daily life because of the Gorkha EQ. Support for livelihood reconstruction is required.

■List of Actions

(1) Support for the reconstruction of livelihood

Residents damaged by Gorkha EQ shall be supported for livelihood reconstruction.

Recovery Phase

- Financial support for the livelihood reconstruction of victims
- Establishment of a livelihood help desk
- Dissemination of reconstruction information

Help desk(Consultation service) for;	
1. Housing	6. Management and Labor
2. Nuclear radiation	7. Health, Child rearing and mother's milk
3. Nuclear Damage Compensation	8. Volunteer
4. Living expenses	9. Missing
5. Agricultural forestry industries and fishers	10. Prefectural administration

Examples of various help desk (Example of Fukushima prefecture (Damaged area of the Great East Japan EQ), Japan)

Source: Website on Fukushima prefecture, http://www.pref.fukushima.lg.jp/sec/01010d/shinsai-sodanmadoguchi.html#08 (Edited by JICA Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley)

2-3 Health, Medical and Social Welfare

■Outline

Health, medical and social welfare shall be recovered, improved and cooperated on in order to proceed with the effective activities at the time of disaster.

Issues

Several facilities, for health, medical and social welfare, were damaged by the Gorkha EQ. In particular, for vulnerable people and deprived/marginalized people (Pichadiyeko barga), health, medical and social welfare should be improved and cooperated.

■List of Actions

(1) Recovery and enhancement of medical, health care and social welfare services

Safer medical, health care and social welfare services shall be promoted in order to improve the services including the disaster phase.

Recovery Phase

- Recovery for hospitals on the municipal level, health centres and health posts
- Seismic diagnosis and seismic resistant measures of hospitals on the municipal level, health centres and health posts
- Establishment of a mental health care help desk for victims

List of Damaged Hospitals

Hospital Name	Tole	Damage
Bhaktapur Cancer Hospital	Dudhpati	Partial
Bhaktapur Human Organ Transplant Centre	Dudhpati	Partial
Nepal Red Cross Society	Dudhpati	Partial

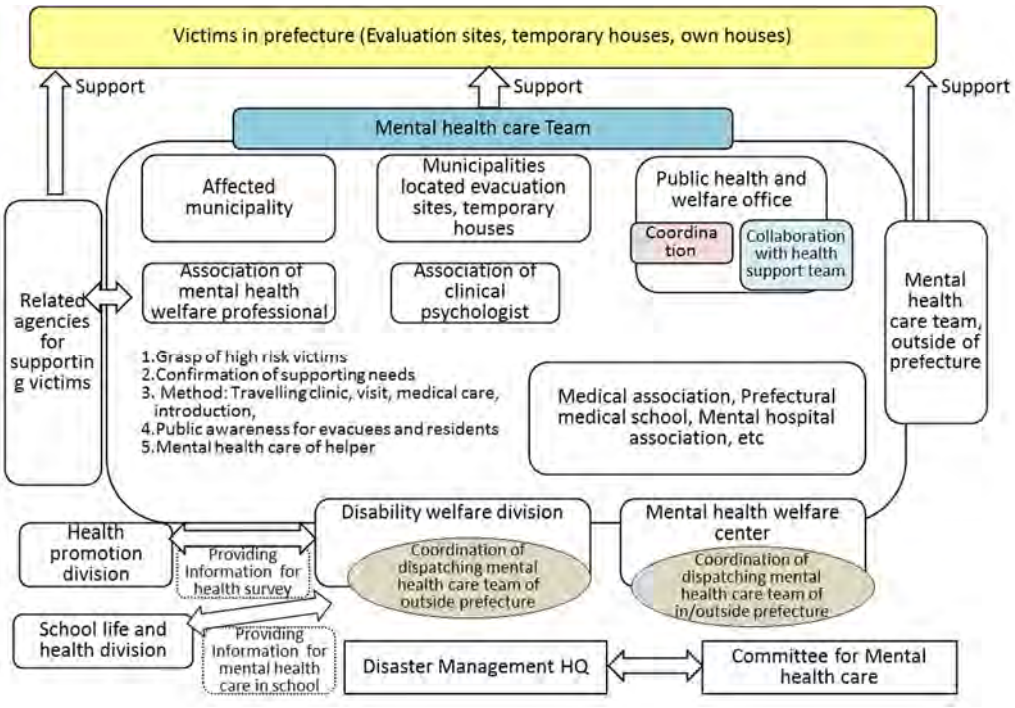


Image of countermeasures for mental health care (Example of Japan, Measures of Fukushima prefecture after the Great East Japan EQ 2011)

Source: Whitepaper on suicide prevention in Japan 2012, Cabinet office, government of Japan, http://www8.cao.go.jp/jisatsutaisaku/whitepaper/w-2012/html/honpen/column/clm6.html
(Edited by JICA Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley)

Revitalization Phase

- Formulation of a plan for vulnerable people

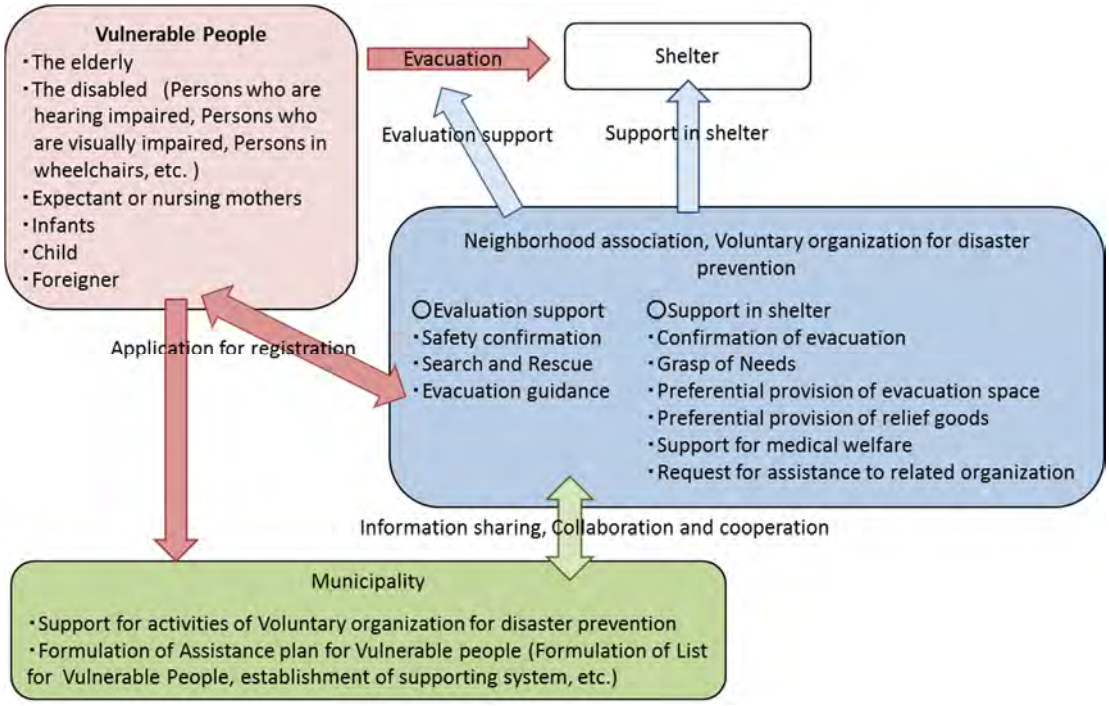


Image of Support for Vulnerable people (Example of Japan)

Source: General plan of evacuation support for vulnerable people in Ogori city, Japan
(Edited by JICA Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley)

2-4 Waste Management

■Outline

Disaster waste and debris, which were caused by buildings collapsed because of the Gorkha EQ, shall be disposed of properly. In addition, Future disaster waste management shall be developed.

Issues

Because of the Gorkha EQ, large amounts of disaster waste and debris from many collapsed buildings and it is necessary to dispose of the waste quickly for reconstruction.

■List of Actions

(1) Disaster waste treatment measures

Disaster waste and debris caused by the Gorkha EQ shall be disposed of properly and immediately. Disaster waste management plan indicated treatment policies and procedures shall be formulated for future earthquakes.

Recovery Phase

- Disposal of disaster waste and debris properly (implementation of collection and disposal)

Revitalization Phase

- Formulation of a disaster waste management plan
- Ensuring of temporary stock places for disaster waste

	PREPAREDNESS	Disaster EMERGENCY RESPONSE	RECOVERY/RECONSTRUCTION
PLAN	Formulation of Disaster waste management plan	Formulation of Disaster waste treatment implementation plan	Revision of Disaster waste treatment implementation plan
ORGANIZATION	(Normal phase) Implementation of exercises, Conclusion of agreement for Wide area support	(Emergency phase) Grasp of damage status, Establishment of Initial system Initial response	
DISPOSAL	Grasp of equipment for the collection and transportation of waste	Setting up the collection route for the waste and excretion of evacuation sites	
	Ensure the temporary stock places for disaster waste (formulation of candidate sites)	Setting up the temporary stock places for disaster waste and management	Return of temporary stock places
	Estimation of amount of disaster waste by Risk assessment	Estimation of amount of disaster waste Estimation of possible amount of treatment	Revision of amount of disaster waste
	Flow of treatment Method of recycling	Waste separation and keeping Ensure the disposal site	Recycling and Disposal
FACILITY	Preparedness for the facility	Damage investigation, and Emergency recovery	Repair, recovery and reconstruction

Image for contents of Disaster waste management plan (Example of Japan)

Source: Guideline for formulation of disaster waste management plan in municipal level in Mie prefecture, Platform of disaster waster information, National Institute for Environmental Studies, Japan, https://dwasteinfo.nies.go.jp/topic/project_man.html#listarea
(Edited by JICA Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley)

2-5 Education

■Outline

Early recovery and strengthening of disaster management functions for schools shall be promoted. Disaster management education shall be enhanced.

Issues

Several schools were damaged by the Gorkha EQ. it is necessary to recover damaged schools and implement disaster management education for students.

■List of Actions

(1) Recovery and seismic resistance for schools

Early recovery and strengthening of disaster management functions for Schools shall be promoted.

Recovery Phase

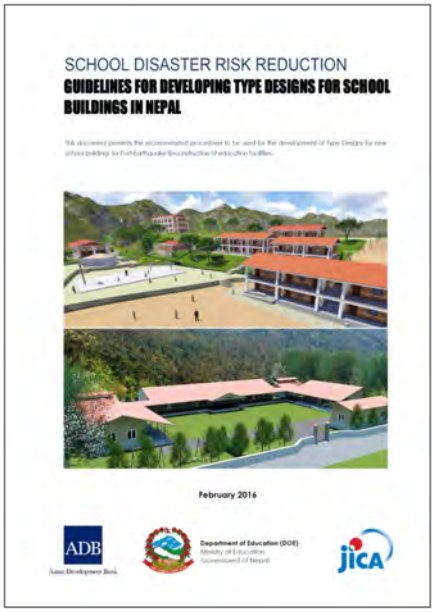
- Recovery and reconstruction of schools

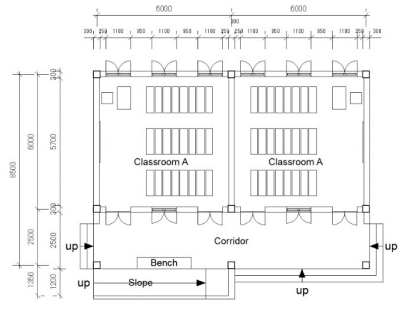
Revitalization Phase

- Seismic diagnosis and seismic resistant measures of schools

List of Damaged public schools

Name	Structure_	Stories	Block	Damage Grade
Shree Sarada Higher Secondary School	Load Bearing	3	1	4
	Load Bearing	3	2	1
	RC Frame	2	3	1
	RC Frame	3	4	1
Shree Bhim Adharsa Lower Secondary School	Load Bearing	3	1	3
Shree Siddhi Sarada Primary School	Load Bearing	2	1	3
Shree Bashu Higher Secondary School (Other Block)	Load Bearing	3	1	2
	Load Bearing	3	2	2
	RC Frame	3	3	2
	Load Bearing	1	4	2
Shree Nabina Lower Secondary School	Load Bearing	3	1	2
Shree Bashu Higher Secondary School	RC Frame	3	1	1
	RC Frame	3	2	1
	RC Frame	2	3	1
	Steel Frame	1	4	1
	Steel Frame	1	5	1
Shree Bharati Primary School	Load Bearing	2	1	1
Shree BramhaYeni Primary School	RC Frame	2	1	1





Ground Floor Plan 1:200

Seismic Resistant Building Guidelines of School

Source: Prepared by JICA and ADB for DOE
Left: GUIDELINES FOR DEVELOPING TYPE DESIGNS FOR SCHOOL BUILDINGS IN NEPAL
Center: INTERIM STRUCTURAL DESIGN CRITERIA FOR TYPE DESIGN OF SCHOOL BUILDINGS
Right: Design of New School Prototypes (Example of single story)

(2) Enhancement of school education

Disaster management education shall be enhanced based on the experiences and lessons from the Gorkha EQ.

Recovery Phase

- Education for disaster management

	Target	Examples of school curriculum		
		1st semester	2nd semester	3rd semester
11-12 years old	・To be able to understand the characteristics of the disaster in area and disaster management system ・To be able to estimate the risk caused by the disaster, to be able to take actions to avoid own risk in the event of a disaster ・To be able to take useful action in consideration of safety of family, friends and the surrounding people in the event of a disaster	◇Natural disasters in our region ◇Comfortable houses and clothes ◇What you can do ◇Evacuation drill(Earthquake)	◇Changes of weather ◇Let's know about the dangers of Flood ◇Our lives and the volcano ◇What would you do when you feel shaking in the town? ◇Evacuation drill(Tsunami)	◇Relevance between information industry and people's lives ◇Various activities in order to protect the safety of the people ◇To be able to prevent injury and simple medical care ◇Political effects of country ◇Preparation for emergency ◇Evacuation drill(Fire)
9-10 years old	・To be able to understand basic knowledge of disaster, to be able to think of contrivance to prevent disasters. ・To be able to have an interest about the dangers caused by the disaster, to be able to consider a way to avoid own risk ・To be able to avoid the risk in cooperation with family, friends and the surrounding people in the event of a disaster.	◇Live safely and town development ◇What would you do when heavy rain, strong wind, thunder happened? ◇Evacuation drill(Earthquake)	◇What would you do when the earthquake happened in the rest time? ◇Evacuation drill(Tsunami)	◇Let's make the original disaster management map ◇Specific examples of our predecessors who committed to the development of the region such as traditional tools, cultural assets and annual events, ◇Evacuation drill(Fire)
7-8 years old	・To be able to have an interest in disaster, to be able to think about safe behavior during disasters. ・To be able to feel danger caused by the disaster, to be able to take the appropriate action by following the adult instruction ・To be able to avoid the danger on own in the event of a disaster, to be able to contact with adults.	◇What would you do when fire happened? ◇Want to know your town more (Involvement of own, people and society) ◇Evacuation drill(Earthquake)	◇What to do when the earthquake happened? ◇Let's try to be able to do by your own ◇Let's go, let's use ◇Evacuation drill(Tsunami)	◇Town exploration ◇Evacuation drill(Fire)

Example of school curriculum for disaster management education in Japan

Source: Ministry of Education, Culture, Sports, Science and Technology, Deployment of disaster management education
(Edited by JICA Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley)

(3) Care for students

Health care and mental health care for students shall be enhanced.

Recovery Phase

- Training for teachers

(1)Training in school
a. Workshop by researchers and experts of the region b. Workshop on sharing experiences by those who have experienced a disaster c. Workshop on planning and practices of disaster management education d. Briefing of planning and manual formulation of the school disaster management education e. Training by the school disaster management committee f. Workshop of treatment method for injury (cardiopulmonary resuscitation, AED, etc.) by the fire department, etc. g. Comprehensive disaster management drills (including the context confirmation of stockpile warehouse, and training for using the disaster prevention equipment) h. Workshop to understand the importance of life and history of disaster in Japan i. Training on mental health care
(2) Training in external institutions (Expert)
a. Training on school safety performed by the Ministry of Education, Culture, Sports, Science and Technology , Teacher Training Center b. Training for leader by local governments c. Training in disaster prevention experience facilities, etc. d. Holding planning committee for disaster management manual e. Training on emergency life-saving (including AED) f. Participation of comprehensive disaster management drill in region g. Training for fire protection manager h. Experience learning session on disaster volunteer
(3) Joint training with students and parents
a. Handing over the students b. Setting up of shelter c. Creation of disaster management maps d. Facility tours to study the history of past disasters e. Session to listen to the experiences of people who have experienced a disaster f. Training on knowing the business content of the people to protect the safety in the area such as fire department, etc.

Examples of training for teachers in Japan

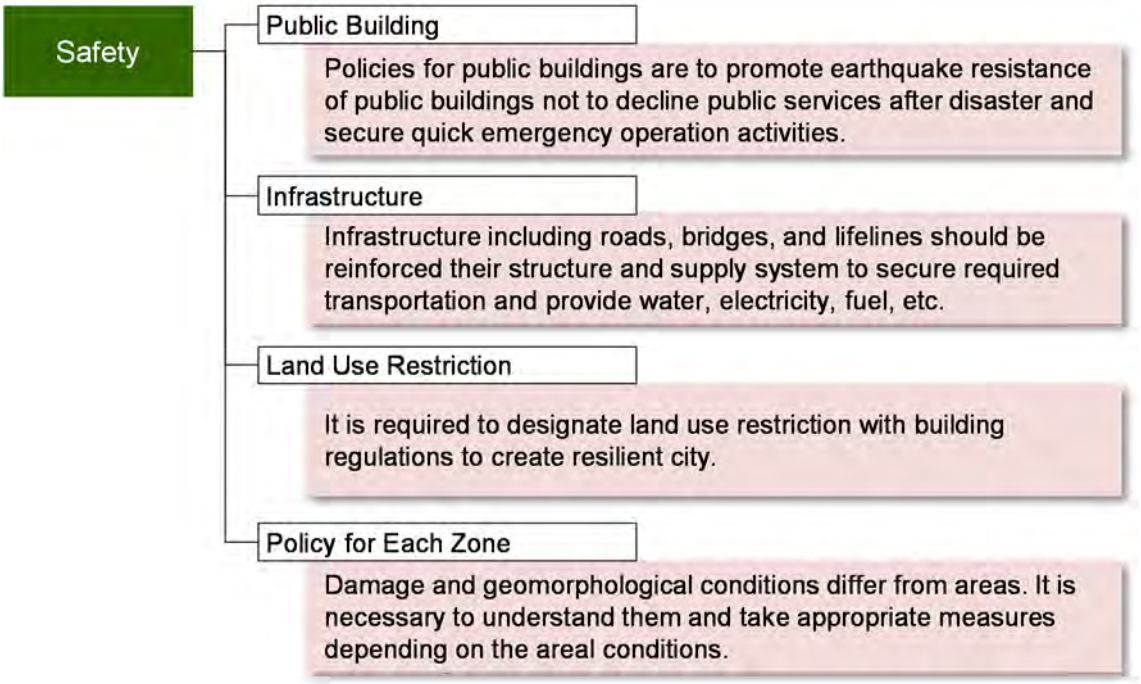
Source: Ministry of Education, Culture, Sports, Science and Technology, Deployment of disaster management education
(Edited by JICA Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley)

SAFETY

3. Urban Planning for a Safer and Secure City

■Basic Policy

For safe, secure and sustainable urban development, the BBB recovery and reconstruction plan set up the following sectoral policies for urban planning:



Through the above mentioned policies, a resilient and safe city should be built from the recovery and reconstruction phases.

3-1 Public Building

■Outline

Early recovery and seismic resistance measures for public buildings shall be prompt as to not cause the delay of public services.

Issues

In the Gorkha EQ, several public buildings were damaged. It is necessary to recover immediately and conduct the seismic resistance measures since public buildings are the most important facilities for disaster management and public services.

■List of Actions

(1) **Recovery, seismic resistance and safety of public buildings**

Damage Status of various public buildings, such as governmental offices and facilities, etc. (Especially actions for hospitals and schools are indicated in Livelihood), shall be clarified

in an early phase after a disaster. Recovery and reconstruction measures shall be taken as necessary to ensure public services. In addition, seismic resistant buildings shall be promoted to prepare another disaster.

Recovery Phase

- Immediate damage investigation of public buildings
- Emergency repair of damaged public buildings to secure safety and the construction of temporary public buildings for the operation of emergency relief, medical treatment, and evacuation of life under safe conditions

Images of Immediate Damage Investigation in Recovery Phase

Source: JICA Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley
Note: the Photos taken in Bhaktapur

Revitalization Phase

- Damage diagnosis of all public buildings and the reinforcement of public buildings (taking care of historical importance as main part of the municipality is designated as a world heritage site)
- Prioritization and examination of possible unification and rearrangement of public buildings to rebuild and repair public buildings
- Recovery and reconstruction of aseismic public buildings on the basis of the National Building Code (NBC)

Development Phase

- Capacity building and the establishment of a permit process for new public building construction in order to enforce the NBC and land use zoning, as well as confirmation of historical value

(2) Development of Disaster Management Park

Disaster management parks shall be developed for strengthening disaster management functions and providing public services; such as a "disaster management base" for the operation of recovery and reconstruction activities and "evacuation site" for securing people's lives. In Bhaktapur case, as the most of the city area is dense historical district, it is important to secure open spaces for recovery and reconstruction activities

Recovery Phase

- Using open spaces (parks) for the operation of emergency relief activities and providing public services

Revitalization Phase

- Designation of open spaces for reconstruction operation and long-term evacuation
- Development of open spaces as evacuation sites and disaster management bases

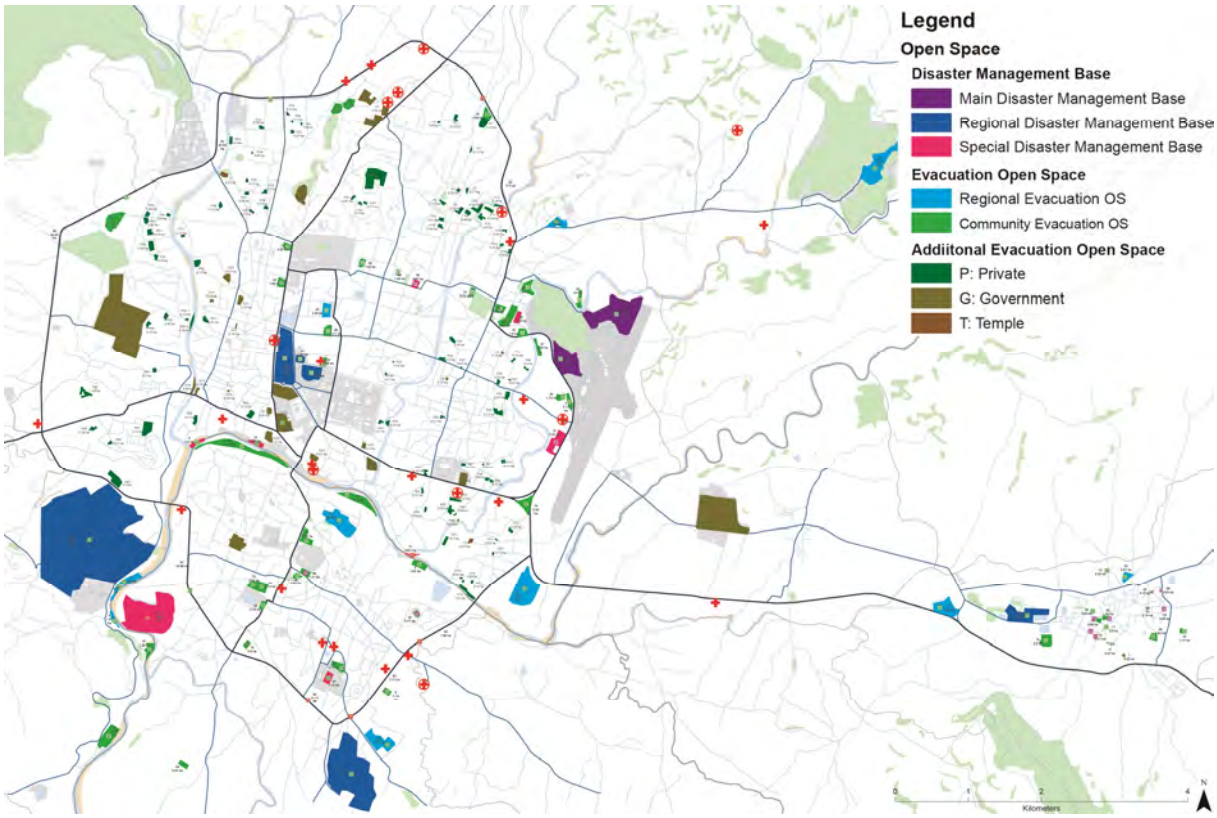
Development Phase

- Promotion of the construction of evacuation sites and disaster management bases, and the establishment of an institutional system for implementation, operation and management
- Establishment of a legal system to secure open spaces as evacuation sites and disaster management bases in newly developing areas (land pooling project, etc.)

	Classification	Description
Disaster Management Base	**Main Disaster Management Base**	Multiple Usage: Dealing with an extensive disaster required for smooth and accurate operation of recovery for Nation
	Regional Disaster Management Base	Multipole Usage for emergency responses and supporting evacuation life for Region
	Special Disaster Management Base	Single or multiple usage for specific functions (Not appropriate with camp/settlement) (Logistics, Debris Collection, Military Installation, Dead-body Management, etc.)
Evacuation Site	**Regional Evacuation Open Space**	Camp/Settlement" with some required facilities for evacuation life (Medical Care, Vulnerable Assistance, Storage and Distribution , etc.)
	Community Evacuation Open Space	Single Usage for "Camp/Settlement" (with originally suggested function or/and minimum required facilities (Rescue tools, First-aid kit, etc.)

Classification of Disaster Management Park

Source: JICA Project on Rehabilitation and Recovery from Nepal Earthquake



Location of Disaster Management Park

Source: JICA Project on Rehabilitation and Recovery from Nepal Earthquake

Example of Facilities Required for Disaster Management Park

Source: JICA Project on Rehabilitation and Recovery from Nepal Earthquake

3-2 Infrastructure

■Outline

Early recovery and seismic resistance of infrastructure shall be promoted for the development of safer infrastructure and lifelines.

Issues

Infrastructure was less damaged in the Gorkha EQ. However, because of the low development ratio from the time before the earthquake, problems occurred more for the livelihood at the time of the Gorkha EQ. In addition to early restoration, new development is required.

■List of Actions

(1) Recovery, seismic resistance and safety of road and bridges

Road recovery for accelerating the reconstruction process shall be implemented and new road and bridges shall be constructed for safe urban development. After an emergency situation, it is necessary to secure safe roads for transportation and evacuation. Therefore, continuous efforts are also required in the rehabilitation and development phase to prepare for the next disaster.

Recovery Phase

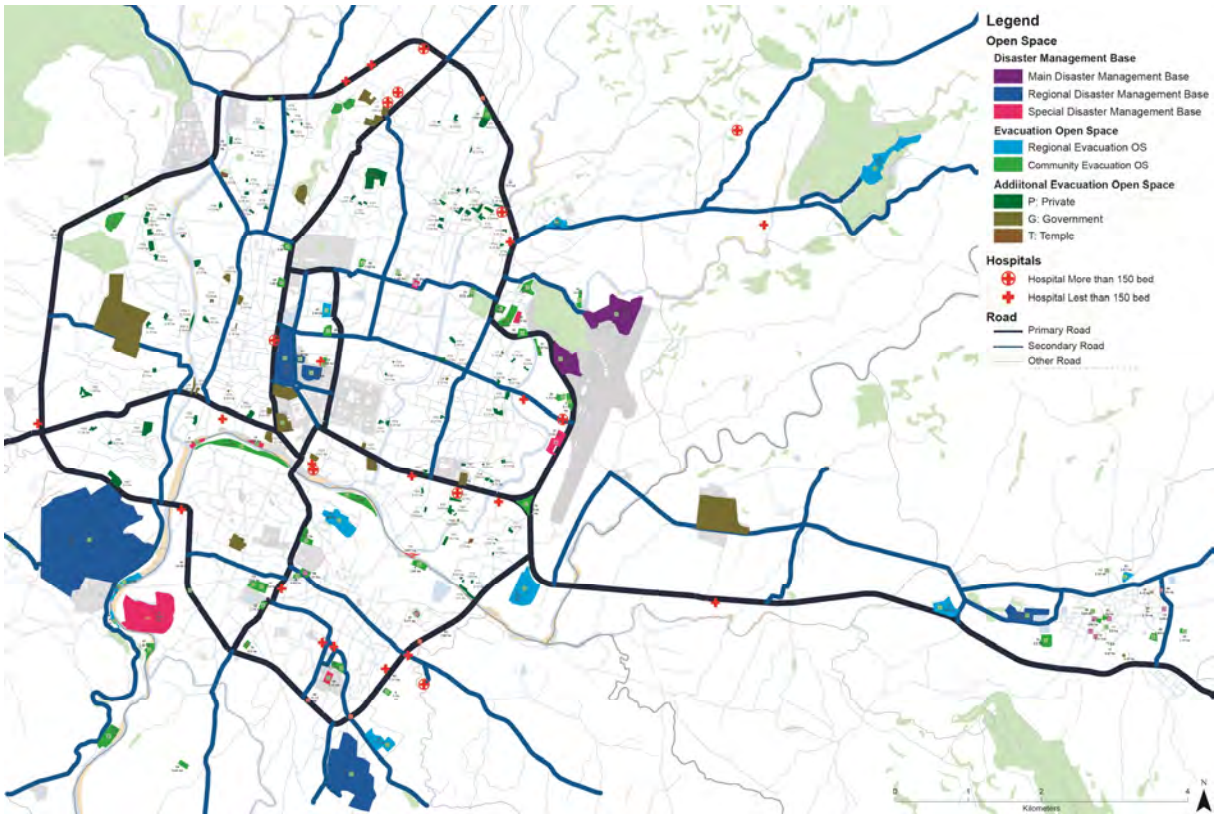
- Recovery of roads and bridges to accelerate the recovery process for regional and municipal areas

Revitalization Phase

- Improvement of earthquake resistant roads for smooth transportation and evacuation, especially for designated emergency transportation roads and evacuation routes

Development Phase

- Continues efforts for improvement and construction of roads, including cooperation with the nation, Kathmandu Valley, districts, and adjacent municipalities/VDCs
- Promotion of road construction together with urban development projects, such as land pooling
- Examination of road standards for municipal roads in consideration of the characteristics of the municipality



Proposed Emergency Transportation Roads (Draft)

Source: JICA Project on Rehabilitation and Recovery from Nepal Earthquake
Note: This road network will be finalized by JICA Project on Urban Transport Improvement for Kathmandu Valley

(2) Recovery, seismic resistance and safety of lifelines

Early recovery and seismic resistance of lifelines shall be implemented for safer infrastructure. After a disaster, to secure water is important for evacuees, and electricity is necessary for emergency response operation. For the revitalization and development phases, continuous efforts to make safe infrastructure are required.

Recovery Phase

- Early recovery of supply lines and other related facilities and sanitation management

Revitalization Phase

- Taking seismic resistant measures for supply lines and other related facilities, and improve their supply systems
- Development of sustainable stockpiling of water and fuel for emergency use stored in earthquake resistant and safe facilities, and consideration of their distribution and supply system
- Improvement of the sanitation management system

Development Phase

- Continuous development of the expansion of the supplying area and upgrading of

existing facilities to be aseismic resistance and with a stable water, sewage, and electricity supply system

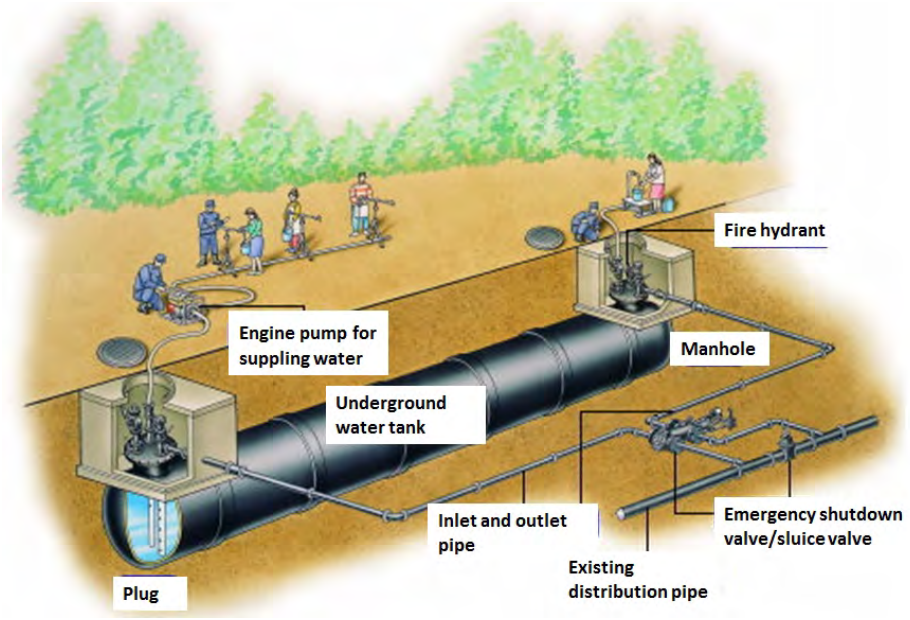
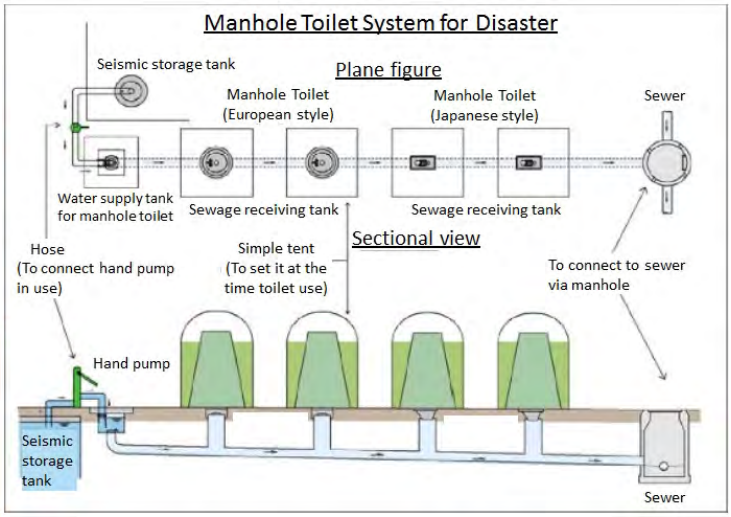


Image of Emergency Water Tank at Evacuation Site in Japan

Source: Saga City Waterworks and Sewerage Bureau (Edited by JICA Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley)



Manhole Toilet System for Disaster in Japan

Source: Ministry of Land, Infrastructure, Transportation and Tourism in Japan (Edited by JICA Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley)

3-3 Land Use Restriction

Outline

Land use restriction, in consideration of the disaster prone areas based on the classification of geomorphology and soil model, hazard analysis shall be considered for future development.

Issues

In the current situation, land use restriction is not considered as a part of the disaster vulnerability. For urban planning, multiple approaches are required to ensure the reconstruction process based on the land use policies in every stage of planning and implementation.

List of Actions

Overall urban planning measures are necessary towards the development of municipal areas. Land use planning is one of the major items for this purpose. From the recovery phase appropriate measures should be taken for a smooth reconstruction process. It is also important to restore the historical area to get back the tourist attraction.

Recovery Phase

- Designation of hazardous areas

Revitalization Phase

- Revision of the land use zoning and building regulations based on geomorphology map, hazard assessment, and actual building damage (risk sensitive land use)
- Considering the location of open spaces and public buildings (administrative facilities, schools, and hospitals), which can be utilized as emergency response bases, and emergency medical treatment facilities, and evacuation sites in safer and accessible areas

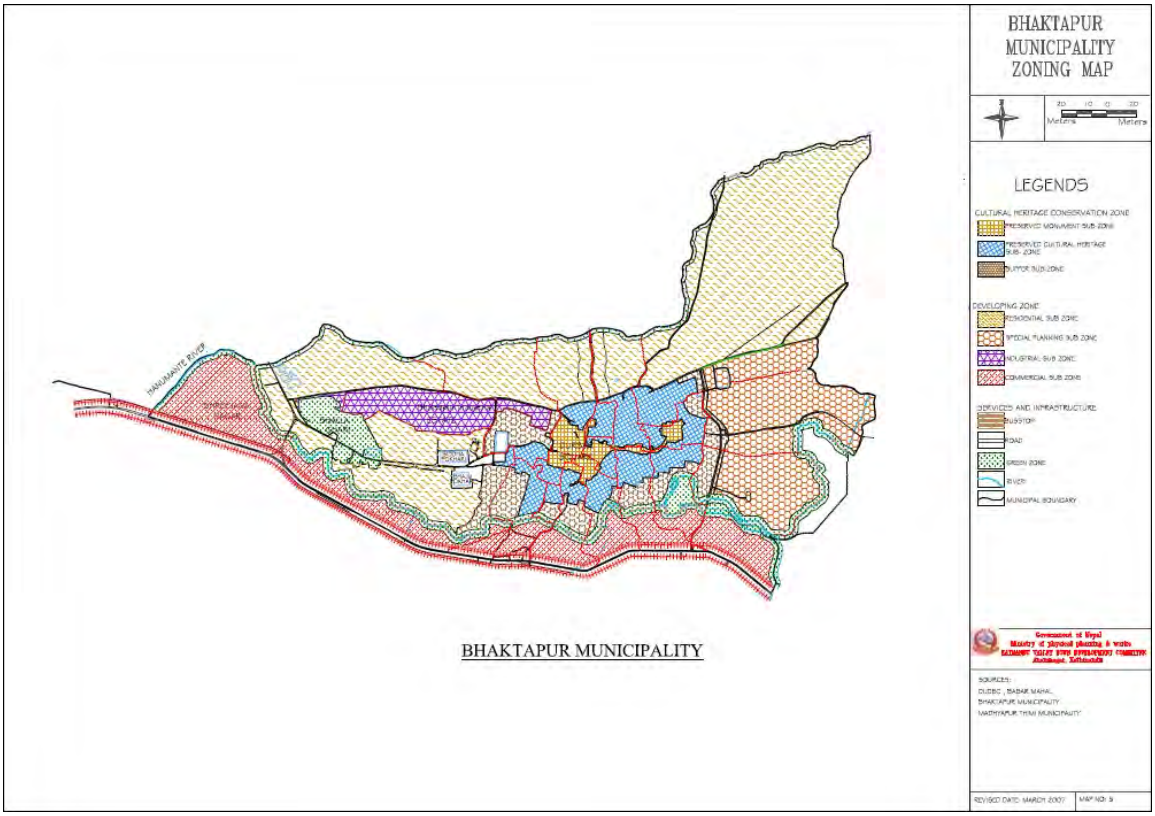
Development Phase

- Institutionalization of the land use zoning and building regulation and appropriate enforcement by municipality, with consideration of historical and cultural value
- Promotion of the land use zoning to secure the historical district and designate new developing areas

type	Description
Residential	Residential area should be designated after considering geomorphology and soil condition, and safety. It is also important to set evacuation open spaces and routes which should be carefully designed for safer evacuation. Catchment of hospital and public services, transportation convenience should be also considered. As many of the existing residential area is in the historical district, it is necessary to get back the original cityscape.
Commercial /Business	Securing safety is important due to the high density of commercial areas located in the historical area. In addition to confirming ground condition, building regulations should be enforced. The areas also attract people for commercial centres, public facilities, and events and festivals held on open spaces in this area. Evacuation routes are also necessary to secure safe evacuation from these dense areas.
Industry	Designation of industrial area aims to enhance regional industry which supports the economy of the area and reconstruction. Appropriate designation with disaster management and facilities are also required.
Agriculture	It can be a buffer zone in urbanized areas. Marsh or lower lands should be designated as agricultural use especially for paddy fields. Buildings should not be built on those lands due to soft ground conditions. However, rapid urbanization would require those lands. In this case, more severe building regulations should be applied.

Direction for zoning revision by type of exiting land use

Source: The Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley in Nepal



Land Use Zoning Map in Bhaktapur Municipality (2007)

Source: Building By-laws Related to Construction in Municipalities and Urbanizing VDCs of Kathmandu Valley, Government of Nepal, Ministry of Physical Planning and Construction, and Kathmandu Valley Municipal Development Committee

3-4 Policy for Each Zone

■Outline

Safety urban planning and development shall be promoted for disaster affected areas. Especially, disaster stricken areas, historical high-dense areas, and geomorphological vulnerable areas need an overall approach to overcome the weaknesses against disaster.

Issues

Historical buildings in the centre of the municipality were severe damaged. Building density in the centre is also very high. Therefore, intensive reconstruction measures should be taken. There are some cliffs in the municipality. It is necessary to take care of those topographic features for reconstruction.

■List of Actions

Recovery Phase

- Prior emergency relief operation for hazardous areas and areas which were severely damaged

Revitalization Phase

- Designation of disaster stricken areas where intensive measures should be focused on urban planning, and historical high-dense areas and vulnerable areas which need disaster management for second disasters and other possible disasters
- Revision of land use planning for those designated areas and taking actions as priority

Development Phase

- Overall approach of urban planning for the designated area in order to make the municipality resilient

Disaster Stricken Area	• Prior emergency restoration of damaged buildings and infrastructure • Understanding of the evacuation situation after the disaster • Promotion of earthquake resistant buildings and infrastructure • Revision of land use zoning and building regulations based on the soil condition • Designation of evacuation open spaces and routes to ensure safe evacuation • Areal redevelopment to upgrade the area which was severely damaged
Historical High-dense Area	• Building damage investigation and diagnosis not to spread damages • Understanding of the evacuation situation after the disaster • Designation of evacuation open spaces and routes to ensure safe evacuation • Promotion of earthquake resistant of buildings and infrastructure on non-suitable soil conditioned areas • Understanding of historical and cultural importance
Vulnerable Area (weak geomorphological condition)	[Areas which have already urbanized] • Conduct of building diagnosis and promotion of earthquake resistance of buildings • Designation of safe evacuation open spaces and routes • Careful designation and revision of land use to avoid more urbanization [Areas which have not urbanized yet] • Designation or revision of land use to avoid unnecessary urbanization • Establishment of approval process to enforce building regulations when urbanization is required on such vulnerable soil condition

Actions to be taken by Type of Zones (Draft)

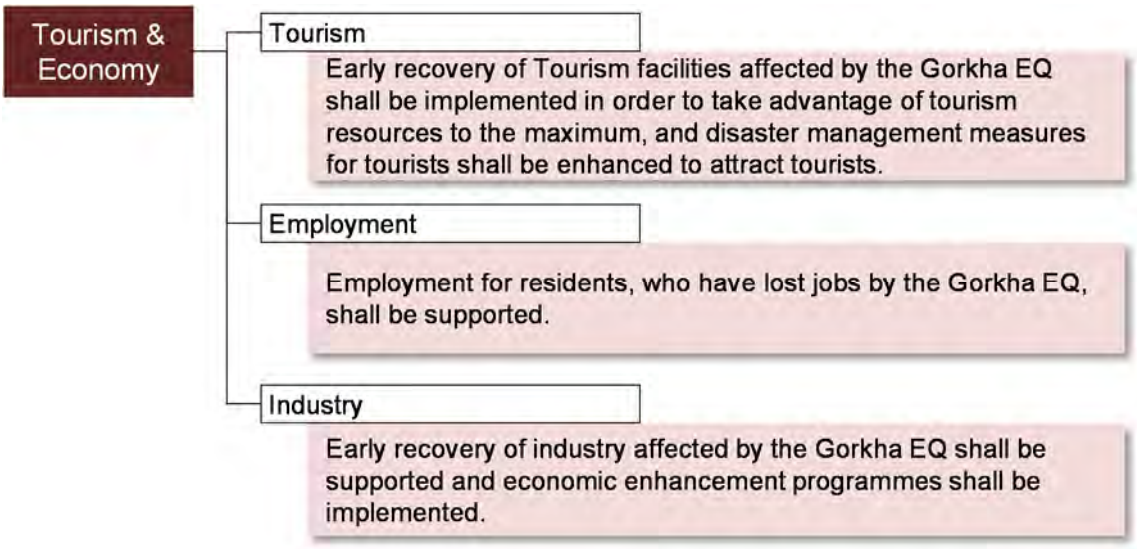
Source: The Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley in Nepal

TOURISM & ECONOMY

4. Promotion of Tourism and Ensuring the Safety of Tourists

■Basic Policy

For the promotion of tourism and ensuring the safety of tourists, the BBB recovery and reconstruction plan set up the following sectoral policies for tourism & economy:



Through the above mentioned policies, tourism, industry and economic activities should be promoted and improved from the recovery and reconstruction phases.

4-1 Tourism

■Outline

Early recovery of Tourism facilities affected by the Gorkha EQ shall be implemented in order to take advantage of tourism resources to the maximum, and disaster management measures for tourists shall be enhanced to attract tourists.

Issues

Tourism is an important resources in the municipality, but the number of tourists is decreasing after the Gorkha EQ. In order to recover the vitality of the municipality, tourism should be recovered and be safer.

■List of Actions

(1) **Support for the recovery and reconstruction of tourism**

Early recovery and reconstruction of tourism facilities damaged by the Gorkha EQ shall be promoted in order to t to attract tourists.

Recovery Phase

- Support for damaged hotels, commerce and tour guide companies related to tourism
- Recovery and development of tourism routes
- Dissemination of reconstruction information for tourism

(2) Disaster management measures for tourist sites

Disaster management measures for tourists shall be implemented so that tourists can be safe after a disaster.

Revitalization Phase

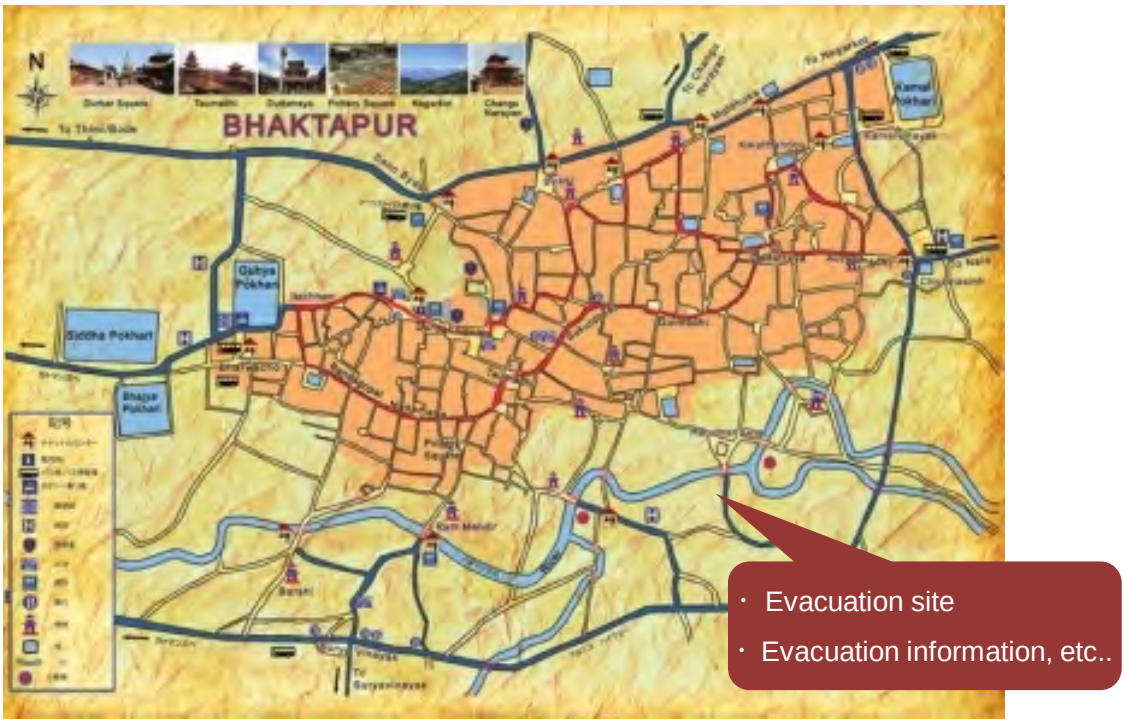
- Designation and development of evacuation sites adjacent to tourist sites
- Creation and distribution of guide maps and sign boards indicating emergency response actions and evacuation sites
- Establishment of a guidance system for tourists in the event of a disaster
- Enhancement of stockpiles for tourists

Example of Mobile application for providing disaster information for tourists

Source: Japan Tourism Agency, http://www.mlit.go.jp/kankocho/news03_000111.html

Image of Shelter Map for Tourist (Example of Japan, prepared in Japanese, English, Korean, Chinese)

Source: City of Nara, Japan, http://www.city.nara.lg.jp/www/contents/1334138826602/index.html



4-2 Employment

■Outline

Employment for residents, who have lost jobs by the Gorkha EQ, shall be supported.

Issues

Many people were affected by the Gorkha EQ including works.

■List of Actions

(1) Support for employment

Employment support shall be implemented such as cash for work, and arrangement of employment opportunities for reconstruction work.

Recovery Phase

- Support for the employment of victims who have lost work (financial support)
- Support for employment, employment training in consideration of vulnerable people and deprived/marginalized people (Pichadiyeko barga)
- Support and introduction of cash or food for work
- Human resource development for reconstruction and arrangement of employment opportunities for reconstruction work

4-3 Industry

■Outline

Early recovery of industry affected by the Gorkha EQ shall be supported and an economic enhancement programme shall be implemented.

Issues

Because of the Gorkha EQ, industry was damaged, thus should be recovered.

■List of Actions

(1) Support for Agriculture

Agricultural support shall be implemented such as the recovery and development of irrigation.

Recovery Phase

- Recovery support for agriculture
- Recovery and development of irrigation facilities

(2) Support for Commerce and Industry

The commerce and industry of residents shall be supported by the economic enhancement programmes.

Recovery Phase

- Recovery support for stores, shops and cottage industries

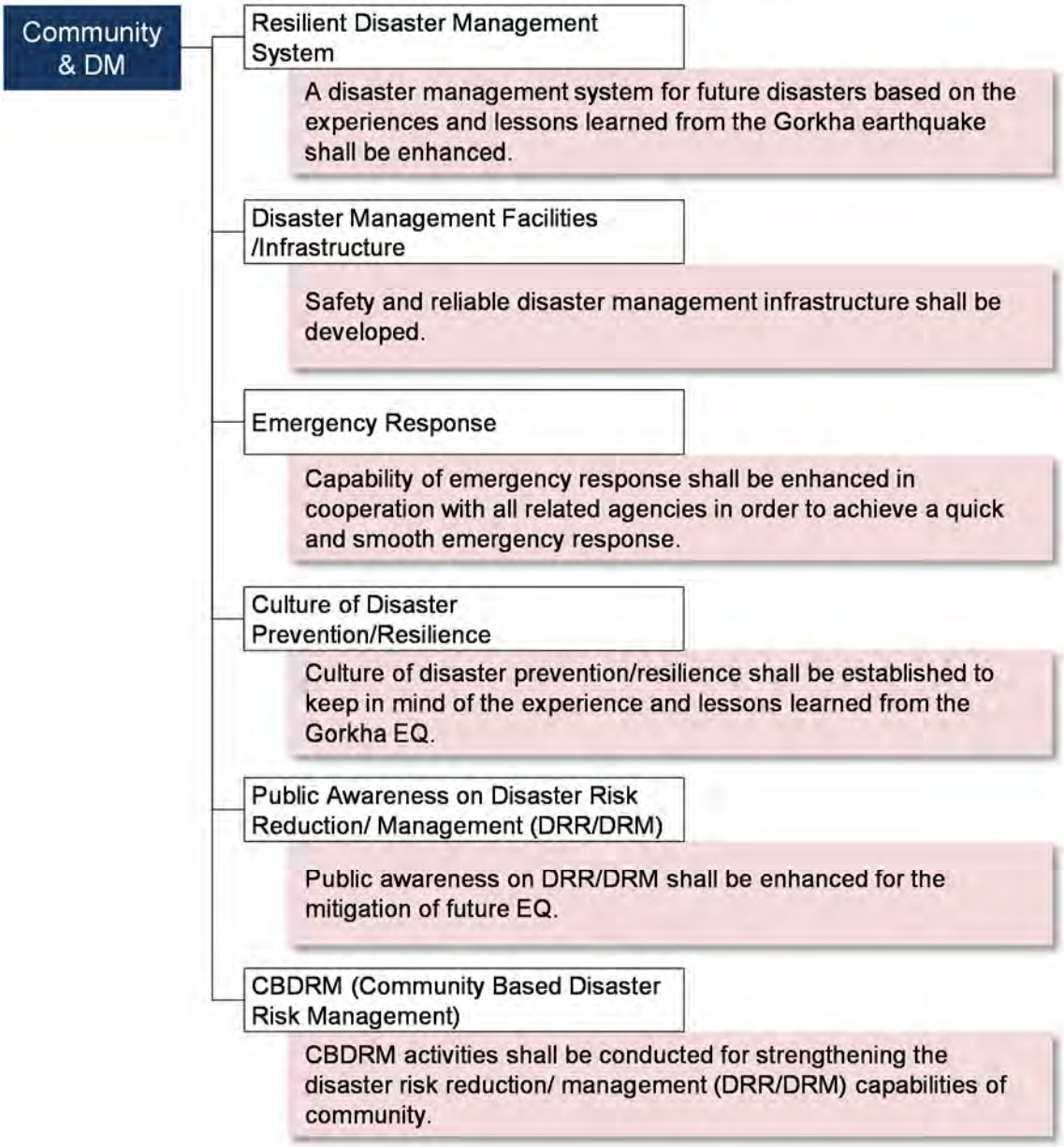
Revitalization Phase

- Support for expanding sales channels, trade

COMMUNITY & DM	5. Strengthening of Community Disaster Risk Management & Resilient Disaster Management System of Municipality

■Basic Policy

For the strengthening of community disaster risk management & resilient disaster management system of municipality, the BBB recovery and reconstruction plan set up the following sectoral policies:



Through the above mentioned policies, the resilient disaster management shall be built and community disaster risk management should be strengthened from the recovery and reconstruction phases.

5-1 Resilient Disaster Management System

■Outline

A disaster management system for future disasters based on the experiences and lessons learned from the Gorkha EQ shall be enhanced.

Issues

In the current situation, it is necessary to enhance the disaster management capabilities for future disasters, for resilience.

■List of Actions

(1) Establishment of a resilient disaster management system

A disaster management system shall be established for the enhancement of DRR for future disasters. A disaster management plan shall be formulated to implement projects aimed at DRR. In addition, disaster management administrative governance shall be enhanced.

Recovery Phase

- Accumulation of disaster data for the Gorkha EQ and historical disasters
- Establishment and Enhancement of disaster management organization
- Establishment and enhancement of ward level disaster management organization
- Human resource development for disaster management administration
- Understanding and dissemination of risk areas

Revitalization Phase

- Formulation of disaster management plan
- Formulation and dissemination of evacuation plan

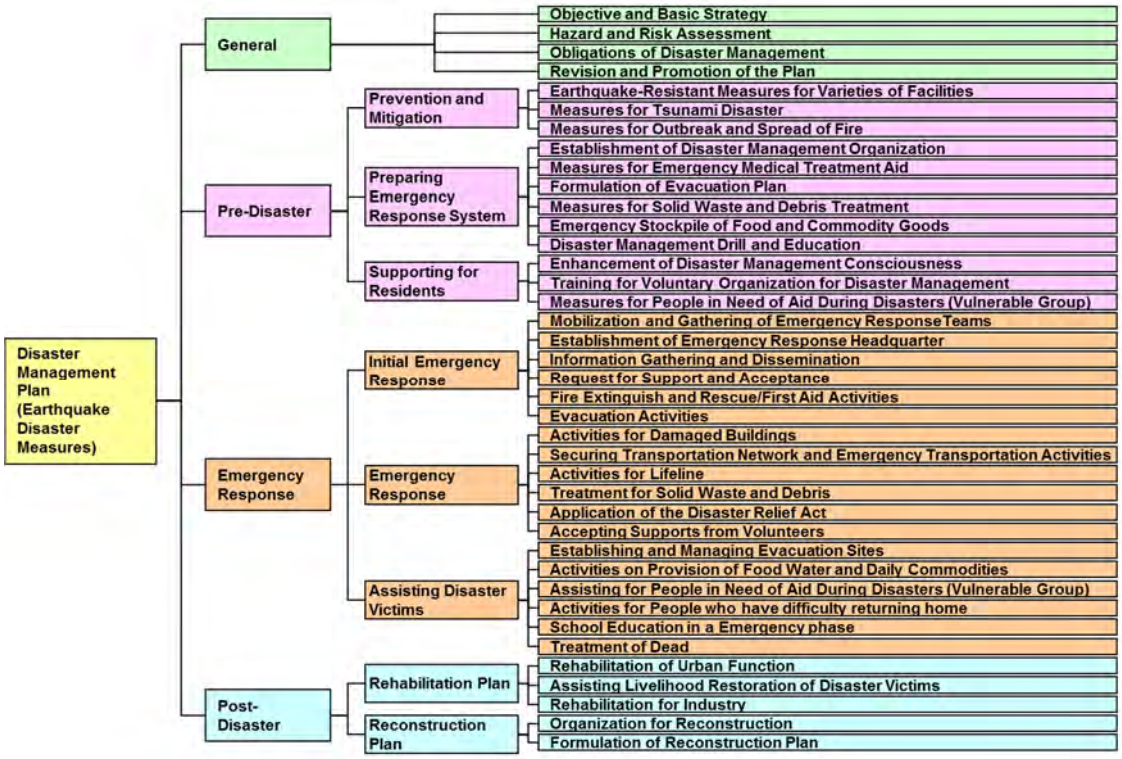


Image of Disaster Management Plan (Example of Japan)

(2) Promotion of disaster management cooperation system

A disaster management cooperation framework and support-acceptance system with other municipalities and institutions shall be enhanced in order to proceed emergency response and recovery smoothly.

Revitalization Phase

- Strengthening cooperation with other municipalities, the establishment of a support and acceptance system, and conclusion of agreements
- Strengthening cooperation with other agencies (Police, Army, Red Cross), the establishment of a support and acceptance system, and conclusion of agreements
- Development of an acceptance system for volunteers

Images of Agreement with related agencies (Example of Japan)

Title	Partner of Agreement
Agreement on Broadcast request	Several broadcasting companies
Agreement on News report request	Several newspaper publishing companies
Agreement on mutual support	1 metropolitan and 9 prefectures 16 large cities Nine-prefecture/city
Agreement on wide area support	Association of Prefectural Governors
Agreement on Post	Post bureau
Agreement on emergency response	Several Contractors Associations (Ex. Japan Road Contractors Association)
Agreement on support for stranded commuter	Oil business association Several convenient store company Several restaurant company
Agreement on procurement of drinking	Japan Soft Drink Association
Agreement on support for reconstruction of community development	Bar association, Engineering association
Agreement on information gathering by Amateur radio	Amateur radio association
Agreement on providing cars	Several rental car company
Agreement on providing emergency goods	Japan Life Co-operation League
Agreement on support by volunteer	Social welfare council
Agreement on using Facilities	Board of Education
Agreement on providing Privately-rented housing	Association of apartment house, etc.
Agreement on cooperation for housing reconstruction	The Housing Loan Corporation
Agreement on providing Foods	Instant food Association
Agreement on disaster relief and rescue	Red Cross
Agreement on medical activities	Tokyo medical association
Agreement on dental activities	Tokyo dental association
Agreement on medical relief activities	Tokyo Pharmacist Association
Agreement on emergency relief activities	Japan bonesetter association

Source: Disaster Management Plan, Tokyo Metropolitan Government (Edited by JICA Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley)

5-2 Disaster Management Facilities /Infrastructure

■Outline

Safety and reliable disaster management facilities and infrastructure shall be developed.

Issues

In the current situation, facilities and infrastructure specialized for disaster management are lacking.

■List of Actions

(1) Development of disaster management facilities and enhanced functionality

A disaster management base shall be developed and disaster management functions shall be enhanced.

Revitalization Phase

- Designation, development, improvement and enhancement of disaster management base facilities
- Development of stockpile warehouses, and ensuring disaster stockpiles

Development Phase

- Enhancement of the disaster management functions of schools

[Food]	[Daily necessities]	[Rescue equipment]
Hardtack	Feeding bottle	Water filter
Pregelatinized rice	Blanket	Assembled Water Tank
Modified milk powder	Carpet	Battery Floodlight
Mineral water	Plastic container	Cord reel
Canned rice porridge	Paper cup	Generator
Canned bread	Disposable diaper	Rice cooker
	Portable radio	Tent
[Medical equipment]	Med kit	Temporary toilet
Disaster medical kit	Sanitary goods	STRETCHER
	Underwear	Cot
[Fuel]	Blue plastic sheet	Trolley
Gasoline	Wet Towel (Wet Tissue)	Carpenter's tool
Kerosene		Rescue kit
		Partition panel

Images of stockpile warehouse and stockpile list (Example of Japan)

Source: Photo; Miyako city website http://www.city.miyako.iwate.jp/kikikanri/hinanjyobitiku_kateibitiku.html
List; Disaster Management Plan of Minato city
(Edited by JICA Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley)

(2) Development of information/communication infrastructure

Multiplexed disaster communication system and information sharing system shall be promoted in order to be able to execute the emergency response activities

Revitalization Phase

- Development of an information database for disaster management
- Establishment of an information sharing system
- Development of an information sharing system for vulnerable people and deprived/marginalized people (Pichadiyeko barga)

Development Phase

- Multiplexing means of communication
- Development of disaster management administrative radio

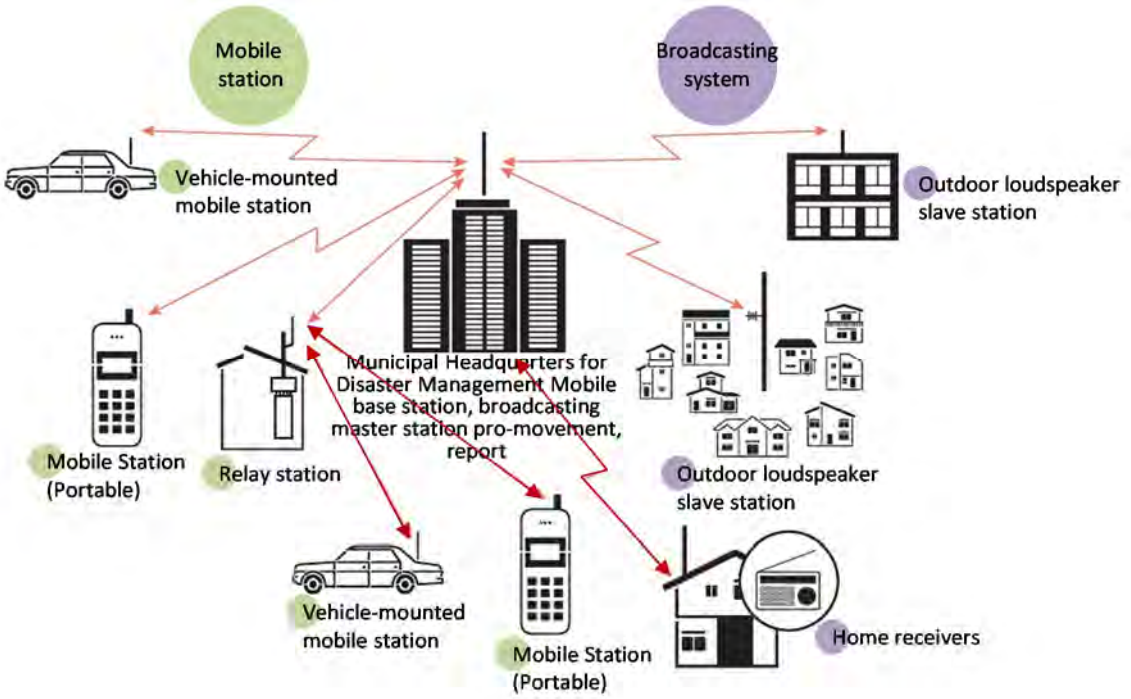


Image of disaster management administrative radio system (Example of Japan)

Source: Disaster Management in Japan, Cabinet Office, Government of Japan
(Edited by JICA Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley)

5-3 Emergency Response

■Outline

Capability of emergency response shall be enhanced in cooperation with all related agencies in order to achieve a quick and smooth emergency response.

Issues

In the current situation, it is necessary to enhance the disaster response capabilities for future disasters

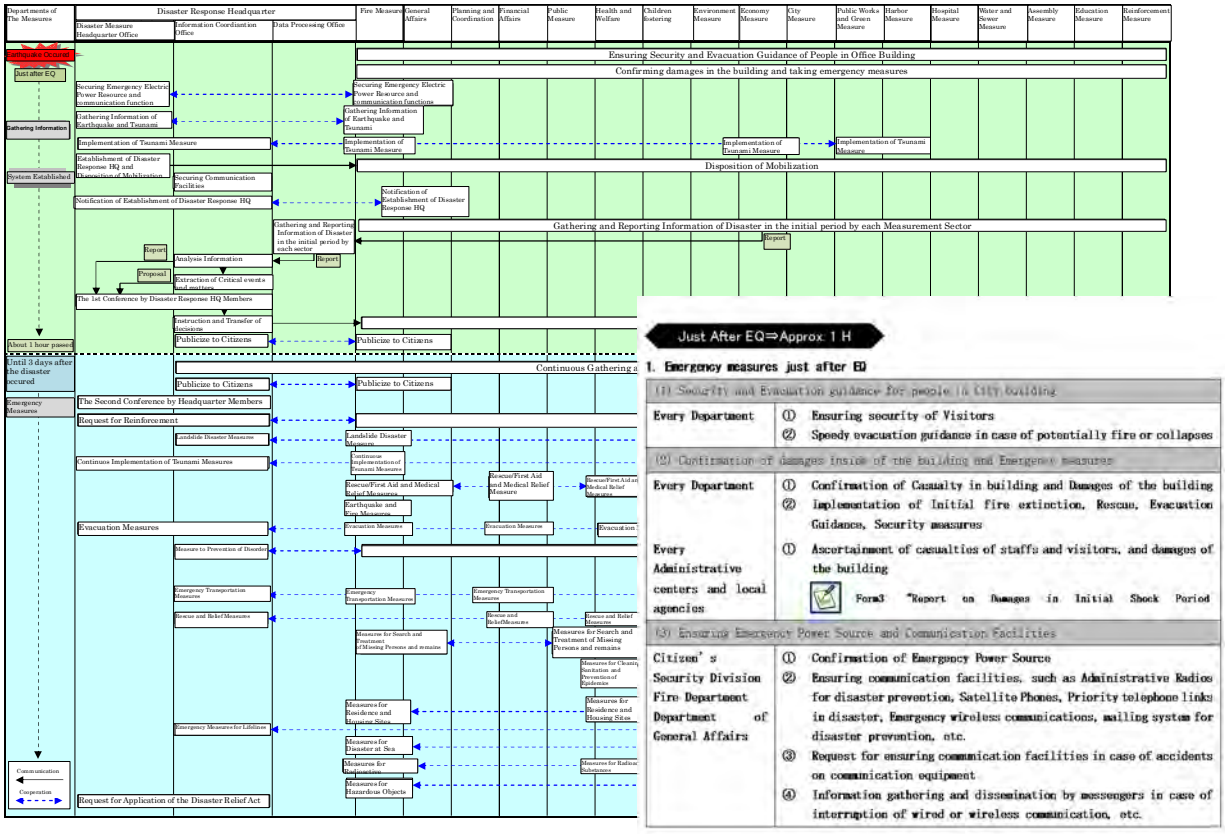
■List of Actions

(1) Capability enhancement of emergency response

The capability of a quick and smooth emergency response shall be enhanced such as the formulation of a manual for emergency response.

Revitalization Phase

- Establishment of an information collection and dissemination system
- Establishment of the initial system and mobilization system for emergency response
- Formulation of a disaster emergency response manual（SOP）
- Implementation of disaster management exercises for emergency response



Images of SOP (Flow chart and Checklist)

Source：SOP of Yokosuka city, Japan (Edited by JICA Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley)

Type		Contents (Example)
Classroom learning	Seminar Lecture	Basic knowledge of disaster, Hazard Mapping, Disaster management plan, Lessons learned from past disasters, etc.
	Self Learning	Basic learning from documents/books, e-learning, game etc.
Table Top Exercise (TTX)	Non-discussion style	Self Learning of story simulation, computer game, Training of situation estimated by Instructor-led (Image training)
	Discussion style	DIG, Workshop/Group work ,Discussion, Case method, etc.
CPX(Command Post Exercise)		Simulation of Emergency Response
Field Training Exercise (FTX)		Actual Exercise for emergency response in field such as Fire extinguish, Emergency medical, Traffic Control, Evacuation, Gathering to HQ, Establishment of Emergency Response HQ
Comprehensive Exercise		Full scale exercise (combined TTX & FTX), etc.

Types of Disaster management exercise

Images of Disaster management exercise (Example of Japan)

Source: Disaster Management in Japan, Cabinet Office, Government of Japan

5-4 Public Awareness on Disaster Risk Reduction/ Management (DRR/DRM)

■Outline

Public awareness on DRR/DRM shall be enhanced for the mitigation of future earthquakes.

Issues

Knowledge on DRR/DRM of residents is very important, however, their current knowledge is limited. Public awareness on DRR/DRM should be enhanced.

■List of Actions

(1) Enhancement of public awareness of DRR/DRM

Enhancement of public awareness on DRR/DRM shall be promoted.

Recovery Phase

- Development of a handbook on DRR/DRM for families
- Implementation of awareness-raising programmes on DRR/DRM
- Promotion of the preparation of emergency stockpiles by families

Contents of Family Handbook for Earthquake Disaster Risk Reduction

1. **Learning**
   1) Past major earthquakes
   2) Earthquake mechanisms
   3) What will be happened in case of an earthquake
   4) Earthquake risk assessment of our municipality
   5) Lessons learned from past earthquakes

2. **Planning and Preparedness**
   1) Making earthquake resilient house
   2) Preparing emergency stockpiles
   3) Making family action plan in case of an earthquake
   4) Participating in CBDRM activities
   5) Confirmation of earthquake risk map and identifying evacuation places for family

Images of Contents of Family Handbook for Earthquake Disaster Risk Reduction

References for Images:
"EQ DRR Guidebook", Yoshida-sho, Shizuoka
http://www.town.yoshida.shizuoka.jp/sws/share/wysiwyg/download.asp?fn=B8FK4u&tf=archive
"Bring Happiness to the World- Shiawase Hakobo", Kobe-city
"Earthquake Awareness Brochure", JICA Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley

DRR Poster Contest

Explanation of Earthquake Resistant Houses using Educational Tool

Fire Fighting Experience as a DRR Game Program

Community Workshop for Learning Earthquake DRR

TV/Radio Awareness Program

Development of Brochure, Leaflet, Educational Tools, etc.

Images of awareness-raising programs on DRR/DRM

References for Images:
Pictures from the JICA Project for Strengthening the Capacity of Seismic Disaster Risk Management in Ulaanbaatar City (above)
Picture from the JICA Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley (left below)
"Earthquake Awareness Brochure", JICA Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley
"Namazu no Gakko", earthquake DRR educational tool developed by PlusArts

DRR Goods Exhibition

Handkerchief printed how to use emergency stockpiles

Workshop on how to effectively use emergency stockpiles

Images of preparation of emergency stockpiles by families

References for Images:
"EQ DRR Guidebook", Yoshida-sho, Shizuoka
http://www.town.yoshida.shizuoka.jp/sws/share/wysiwyg/download.asp?fn=B8FK4u&tf=archive
Pictures from the JICA Project for Strengthening the Capacity of Seismic Disaster Risk Management in Ulaanbaatar City
"EQ Itsumo Handkerchief", developed by PlusArt

5-5 CBDRM (Community Based Disaster Risk Management)

Outline

CBDRM activities shall be conducted for strengthening the disaster risk reduction/ management (DRR/DRM) capabilities of community.

Issues

Importance of community roles for disaster risk management has been learned again from the Gorkha EQ. Community is the one of the most important elements for mitigation/prevention of disaster damages and initial emergency response to disasters, however, the community's DRR knowledge and capacity are limited. CBDRM should be enhanced for future disasters.

or the CBDRR/M, NRRC Flagship 4 has developed the nine minimum characteristics as the baseline components of a disaster resilient community in Nepal. Each action of the BBB RRP will be integrated to the following components:

9 Minimum Characteristics for a Disaster Resilient Community in Nepal

Source: Flagship 4 Handbook, NRRC

List of Actions

(1) Enhancement of CBDRM

CBDRM activities shall be conducted for strengthening the DRR/DRM capabilities of the community.

Recovery Phase

- Establishment of "Community Disaster Management Committees (CDMCs)" as organizations for disaster preparedness, response, and rehabilitation at the community level

Revitalization Phase

- Formulation of community DRR/DRM plans
- Formulation of "community carte" for summarized information of current conditions on disaster management at the community level
- Implementation of DRR/ DRM capacity development programmes for community leaders
- Carrying out of community disaster management exercises

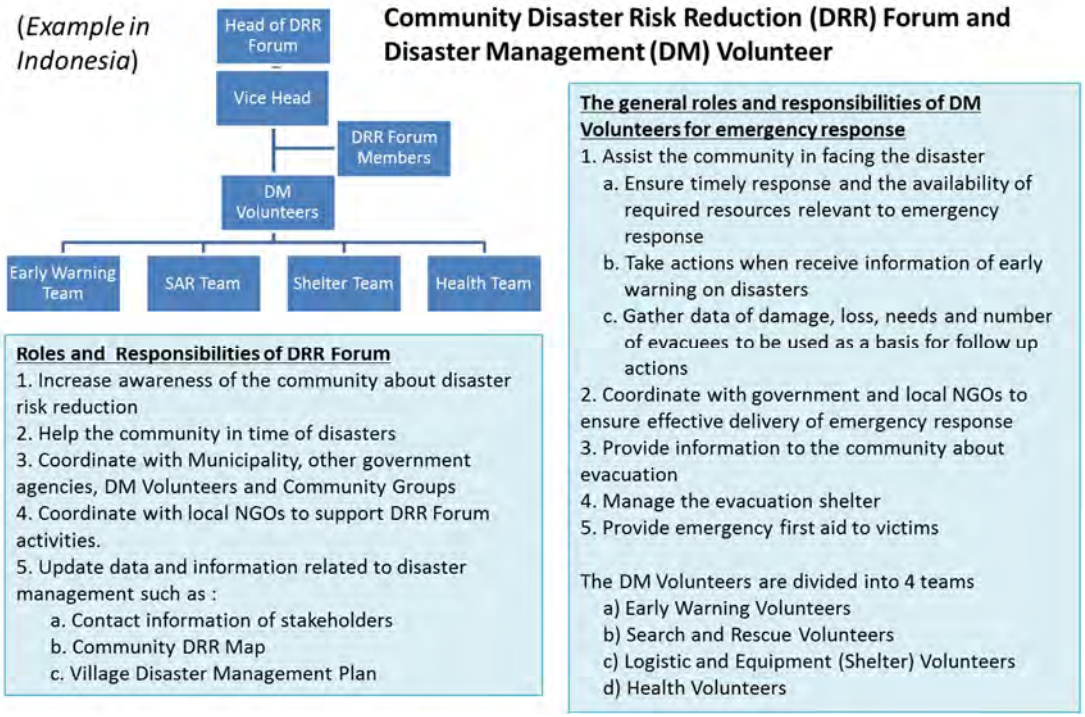
CHARACTERISTIC 1

Organisational base at Village Development Committee/ward and community level

1	A functional organisational base at VDC/ward and community level for the implementation and sustainability of DRR, which addresses the issues of protection, social inclusion (including gender balance), community ownership and participation and follows DRR initiatives.	
	KEY EXAMPLE INDICATORS	**VERIFICATION**
1.1*	VDC/municipality DM committee (LDMC) exists with roles and responsibilities in accordance with the LDRMP guidelines	Minutes of Meeting, ToR of the committee, VDC council minutes of meeting
1.2	Community DM committees(CDMC) or designated local level disaster management body, exists with roles and responsibilities	Minutes of Meeting, ToR of the committee
1.3	Decisions by the committees are fed back to all VDC/ municipality / community groups and who have rights to modify decisions	Social audit, Posting meeting minutes in public areas
1.4	33% Committee membership at VDC / community levels are represented by vulnerable groups, and discussion include issues specifically related to vulnerable groups	Minutes of Meeting
1.5	Coaching and support is given to vulnerable groups representatives in the committees, like community leadership training	Minutes of Meeting
1.6	% of other established community groups that have disaster risk management as regular agenda item	Minutes of meeting
	OTHER EXAMPLE INDICATORS	
	Protection issues are discussed in committee meetings at all levels	Minutes of Meeting
	Community is aware of budget and expenditure of DRM/DRR projects	Public audit, KAP

Indicators of Organizational base at ward and community level in Flagship4 of NRRC

Source: Flagship4 Handbook, NRRC



Images of Community Disaster Risk Reduction (DRR) Forum and Disaster Management (DM) Volunteer (Example in Indonesia)

Reference: JICA Project for Enhancement of the Disaster Management Capacity of BNPB and BPBD in Indonesia

Images of DRR/ DRM capacity development programmes

Reference: JICA Project for Enhancement of the Disaster Management Capacity of BNPB and BPBD in Indonesia

Example in Indonesia

Contents of DM Plan

Chapter 1: General
1.1 Concept and Mechanism of Village DM Plan
1.2 Background
1.3 Purpose and Objectives
1.4 Target
1.5 Scope
1.6 Position, Time Frame and Accountability
1.7 Legal Foundation
1.8 Definition
1.9 Structure of DM Plan

Chapter 2: General Description of Disaster
2.1 General Description of Village
2.2 General Description of Disaster
2.3 Tendency Analysis

Chapter 3: Disaster Risk Assessment
3.1 Hazards in the Area
3.2 Vulnerability
3.3 Capacity in the Area
3.4 Risk Assessment
3.5 Disaster Priority

Chapter 4: Disaster Management Policy
4.1 Vision and Mission
4.2 Disaster Management Policy
4.3 Disaster Management Institutions
4.4 Strategy of Disaster Management

Chapter 5: Disaster Management Activities
5.1 Focus, Programs, Activities for Disaster Management
5.2 Allocation of Tasks and Resources

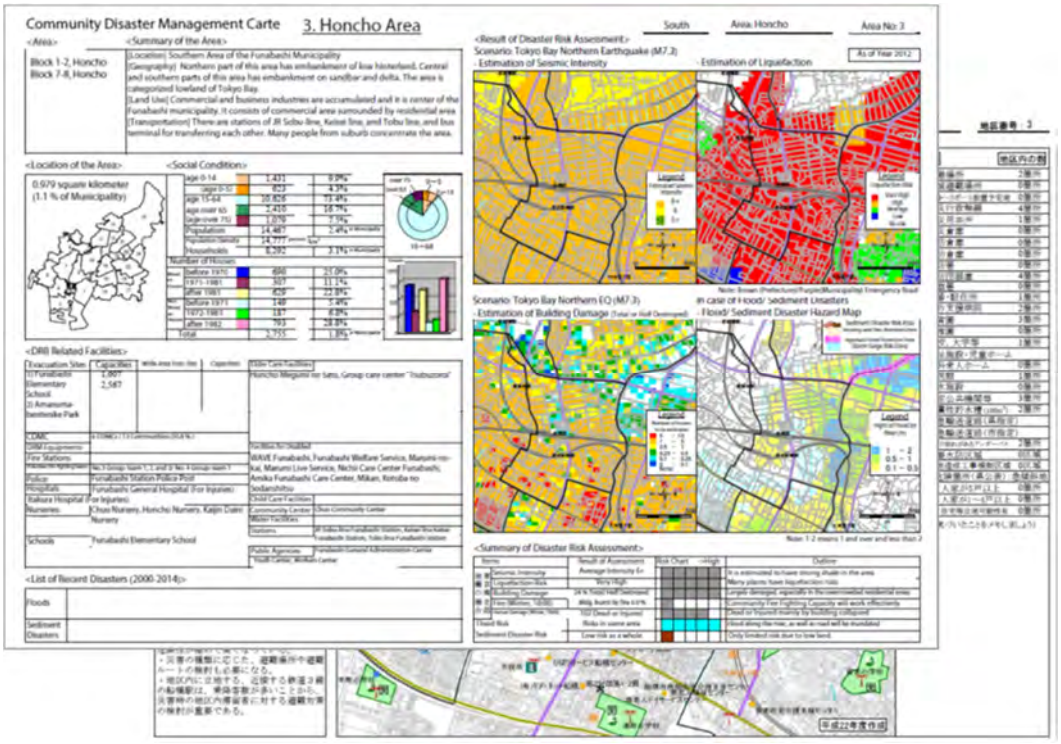
Chapter 6: Community Action Plan for Disaster Risk Reduction
6.1 Action Plan Identified for Village
6.2 Mainstreaming Strategy
6.3 Roles and Function of institution in village

Chapter 7: Monitoring, Evaluation, and Reporting
7.1 Monitoring
7.2 Evaluation
7.3 Reporting (Annual Report)

Chapter 8: Closing

Images of Community DRR/DRM plans (Example in Indonesia)

Reference: JICA Project for Enhancement of the Disaster Management Capacity of BNPB and BPBD in Indonesia



[Contents]

- Community Profiles (Population, Geography, Location)
- DRR related information (Status of preparedness, Vulnerable people, Evacuation places, etc.)
- Disaster Risk Assessment (maps and outlines)
- Community DRR Map, etc.

Images of Community carte (Example in Japan)

Reference: "Bosai Carte", Funabashi-city, http://www.city.funabashi.chiba.jp/kurashi/bousai/0010/p015641.html

Images of Community disaster management exercise (Example in Indonesia)

Reference: JICA Project for Enhancement of the Disaster Management Capacity of BNPB and BPBD in Indonesia

ACTION PLAN

CHAPTER 1.
OUTLINE OF PLAN

1-1. Objective

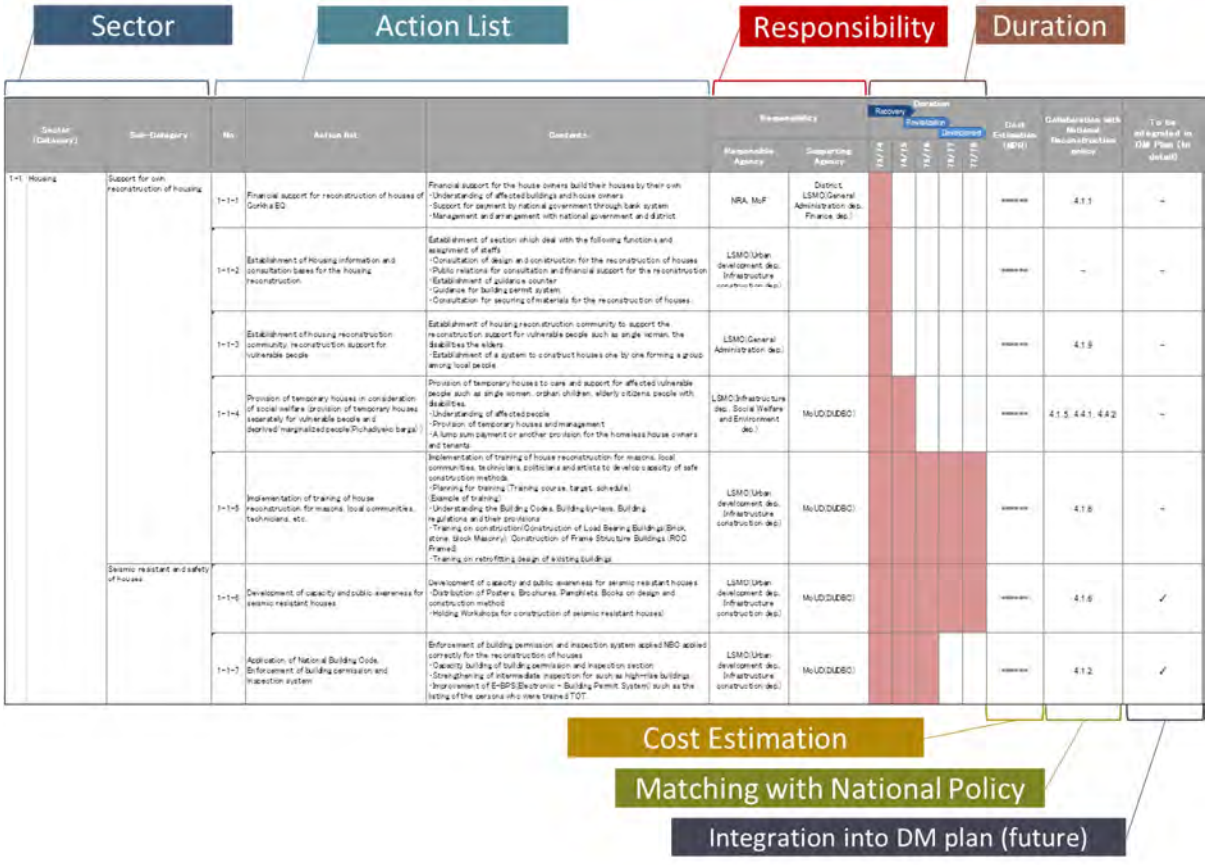
The action plan for BBB recovery and reconstruction of Bhaktapur Municipality is arranged in a programme framework that emphasizes the implementation.

The action plan is indicated in the programmes by all reconstruction related agencies, considering the sustainability aspect, participative and strong commitment to promote actions that needs to be prioritized.

The action plan is prepared in the form of tables to make it more concise and easily understood at the time of implementation, monitoring and evaluation. This plan is divided into each vision.

1-2. Framework

Framework of Action plan is shown as follows. The action plan is indicated in the detailed contents of actions, duration (schedule), responsibilities, cost estimation, etc.



Framework of Action plan

CHAPTER 2.
ACTION PLAN

Sector (Category)	Sub-Category	No	Action list	Contents	Responsibility		Duration (Recovery / Revitalization / Development)					Cost Estimation (NPR (Million))	Collaboration with National Reconstruction policy (Strategy)	To be integrated in DM Plan (to detail)
					Responsible Agency	Supporting Agency	73/74	74/75	75/76	76/77	77/78			
1. Development of Resilient Disaster Historical City														
1-1 Cultural Heritage	Recovery, seismic resistance and safety of cultural heritage sites	1-1-1	Debris removal and temporary restoration of the cultural heritage sites while not increase the disaster damages	Cultural heritages and monuments which are found especially in the historical areas in the municipal area got heavily damaged. Debris removal should be done first for the smooth operation of emergency response. Emergency repair should be done not to increase the damages. ・Debris removal should be quickly done for building which were severely damaged. ・Emergency damage investigation for the all heritage buildings ・Emergency repair should be done for buildings which has high collapse risk not to spread the damages, and a measure for public to be away from the buildings should be taken	Muni(Planning section, Heritage section and Maintainance section)	DOA						150	–	–
		1-1-2	Restriction to enter areas where severe damages in the historical residential area and temporary reinforcement of residential buildings which have a risk of secondary disaster	As the historical city area is composed by culturally and historically important buildings including residences, safety measure should be taken to secure people's lives. ・No entering measures should be taken as historical buildings are concentrated including residences, which were severely damaged. ・Securing evacuation spaces in a safe condition. ・For areas which did not get damaged severely, safe evacuation should be secured to prevent secondary damages.	Muni(Planning section, Heritage section and Maintainance section)	MoTCA (DOA)						20	–	–
		1-1-3	Prioritizing recovery through the judgement of urgency from seismic diagnosis and historical importance	Bhaktapur Municipality has kept their historical value of the historical city area as a cultural heritage, and reconstruction of the heritage sites and people's life are directly related. With keeping the historical city scape, repairing to prevent secondary disaster should be done. At the same time, normal life which has been done in the historical area should be recovered. For this purpose, detailed damage survey, seismic diagnosis, historical and cultural importance of the heritage, and relationship with people's life should be clarified and prioritization should be done for reconstruction with long-term perspective. ・Detailed damage survey and confirming condition of emergency repair ・Seismic diagnosis ・Survey for cultural and historical importance ・Survey for relationship with people's life ・Prioritizing for reconstruction and making reconstruction plan for heritage in long-term perspective.	Muni(Heritage section)	MoTCA (DOA), CBS, NRA						10	6.2.2	–
		1-1-4	Recovery of the prioritized cultural heritage sites in consideration of seismic resistance, their original value and people's life	Based on the priority set by the surveys, a reconstruction plan should be conducted. The reconstruction should improve seismic resistance and not spoil the historical and cultural values. Then, people's safe lives should be secured. ・Reconstruction of heritage based on the priority and people's life ・Examination of the method of reconstruction to secure seismic resistance not to spoil the original value. ・In areas where many historical buildings are concentrated, losses of the cultural cityscape are concerned as urbanization is rapidly seen. It is also necessary to examine in order to set priority areas to preserve the historical monuments with land use restriction and other measures to keep the cultural city scape.	Muni(Heritage section)	MoTCA						3000	6.2.4, 6.2.5	–
		1-1-5	Long-term vision for reinforcement: (Re)evaluation of the value and vulnerability of historical area with heritage monuments	In the development phase, afresh evaluation would be recommended to be done. The evaluation should contain the importance of the heritage sites and structural vulnerability for both of each heritage and historical areas as the city itself has highly important value. In a long-term vision, inventory should be prepared for a sustainable plan to preserve heritage and a continuous effort is required. ・Evaluation of historical value and structural vulnerability of heritage sites ・Evaluation of historical context and vulnerability against disaster of historical area of the city. ・Preparation of inventory of the heritage sites for basic documents for long-term restoration and preservation measure.	Muni(Heritage section)	MoTCA						10	6.2.5	✓
		1-1-6	Promotion of the restoration of the important cultural heritage sites to improve seismic resistance, keep their historical value and making resilient historical district	Based on the evaluation, restoration and preservation should be conducted. Seismic resistance should be improved with keeping the original value of the heritage sites. It is also necessary to improve safety of the historical areas ・Restoration of the monuments based on the evaluation ・Evaluation of technical measures to improve seismic resistance with keeping the historical value. ・Areal development should keep the heritage sites and not spoil the historical cityscape and improve seismic resistance of the historical area including housings ・Land use restriction should be also considered the importance of the heritage sites and the historical areas.	Muni(Heritage section)	MoTCA						6000	6.2.5	✓
1-2 Culture of Disaster Prevention/Resilience with Historical Culture	Transferring earthquake experiences/ lessons learned and establishment of culture of disaster resilience	1-2-1	Development of bases for culture of disaster prevention/ resilience in collaboration with cultural heritage sites as the symbol of BBB	In order to keep the memory of the Gorkha EQ, development as a base for culture of disaster prevention/resilience ・Consideration of the bases for culture of disaster prevention/resilience ・Damaged and remaining heritages such as temples to keep the memory of the Gorkha EQ in collaboration with the reconstruction of cultural heritage sites	Muni(Administration dep., Physical Planning and Construction dep.)	MoFALD						50	6.5.4	✓
		1-2-2	Implementation of events for promoting the establishment of culture of disaster prevention/ resilience	Implementation of events for promoting the establishment of culture of disaster prevention/resilience ・Disaster management exercises every April 25(the day of Gorkha EQ) to keep the memory of the Gorkha EQ	Muni(Administration dep., Physical Planning and Construction dep.)	MoFALD						10	6.5.4	✓

Sector (Category)	Sub-Category	No	Action list	Contents	Responsibility		Duration (Recovery / Revitalization / Development)					Cost Estimation (NPR (Million))	Collaboration with National Reconstruction policy (Strategy)	To be integrated in DM Plan (to detail)
					Responsible Agency	Supporting Agency	73/74	74/75	75/76	76/77	77/78			
		1-2-3	Enhancement of disaster risk reduction education (education based on the earthquake experiences, learning for disaster risk reduction)	Implementation of activities for the establishment of a culture of disaster prevention/resilience through the following activities. (Examples of activities) ・Education and learning for DRR/DRM based on the earthquake experience by such as story teller ・Collaboration with the DRR/DRM events and existing events ・Implementation of education and learning tour at the cultural heritage sites and DRR/DRM based on the earthquake experience by such as story teller	Muni(Administration dep., Physical Planning and Construction dep.)	MoFALD, MoE						10	6.5.4	✓
2. Revitalization and Improvement of Livelihood														
2-1 Housing	Support for own reconstruction of housing	2-1-1	Financial support for the reconstruction of houses damaged by the Gorkha EQ	Financial support for the house owners building their houses by their own power ・Understanding of affected buildings and house owners ・Support for payment by the national government through the bank system ・Management and arrangement with national government and districts	NRA, MoF	District, Muni(Administration dep., Financial dep.)						7000	6.1.1	–
		2-1-2	Establishment of housing information and consultation bases for the housing reconstruction	Establishment of a section which deals with the following functions and assignment of staff ・Consultation of design and construction for the reconstruction of houses ・Public relations for consultation and financial support for the reconstruction ・Establishment of guidance counter ・Guidance for the building permit system ・Consultation for the securing of materials for the reconstruction of houses	Muni(Physical Planning and Construction dep.)	Engineering College						10	6.1.4	–
		2-1-3	Establishment of housing reconstruction communities, reconstruction support for vulnerable people	Establishment of housing reconstruction communities to support the reconstruction support for vulnerable people such as single women, those with disabilities and the elderly. ・Establishment of a system to construct houses one by one by forming a group among local people.	Muni(Administration dep.)							10	6.1.1	–
		2-1-4	Provision of temporary houses in consideration of social welfare (provision of temporary houses separately for vulnerable people and deprived/marginalized people(Pichadiyeko barga))	Provision of temporary houses to care for and support affected vulnerable people such as single women, orphaned children, elderly. citizens, and people with disabilities. ・Understanding the affected people ・Provision of temporary houses and management. ・A lump sum payment or other provisions for the homeless house owners and tenants.	Muni(Physical Planning and Construction dep., Social Welfare dep.)	MoUD(DUDBC)						100	6.1.7	–
		2-1-5	Implementation of training of house reconstruction for masons, local communities, technicians, etc.	Implementation of training of house reconstruction for masons, local communities, technicians, politicians and artists to develop the capacity of safe construction methods. ・Planning for training (training course, target, schedule). (Example of training) ・Understanding the building codes, building by-laws, building regulations and their provisions. ・Training on construction (construction of load bearing buildings (brick, stone, block masonry)), construction of frame structure buildings (RCC Framed). ・Training on the retrofitting design of existing buildings.	Muni(Physical Planning and Construction dep.)	MoUD(DUDBC), Engineering College						10	6.1.4	–
	Seismic resistance and safety of houses	2-1-6	Development of capacity and public awareness for seismic resistant houses	Development of capacity and public awareness for seismic resistant houses. ・Distribution of posters, brochures, pamphlets, books on design and construction methods. ・Holding workshops for the construction of seismic resistant houses.	Muni(Physical Planning and Construction dep.)	MoUD(DUDBC), Engineering College						10	6.1.4	✓
		2-1-7	Application of National Building Codes(NBC), enforcement of the building permission and inspection system	Enforcement of the building permission and inspection system applied to NBC correctly for the reconstruction of houses. ・Capacity development of the building permission and inspection section. ・Strengthening of intermediate inspection for such as high-rise buildings. ・Establishment of E-BPS(Electronic – Building Permit System)	Muni(Physical Planning and Construction dep.)	MoUD(DUDBC)						10	6.1.2	✓
		2-1-8	Financial and technical support for seismic diagnosis, seismic resistant measures of houses, and the dispatch of experts for seismic diagnosis	Financial and technical support for seismic diagnosis, and seismic resistant measures of houses. ・Dispatch of experts, technicians for seismic diagnosis and checking houses.	Muni(Financial dep., Physical Planning and Construction dep.)	MoUD(DUDBC)						10	6.1.2, 6.1.3	✓

Sector (Category)	Sub-Category	No	Action list	Contents	Responsibility		Duration (Recovery / Revitalization / Development)					Cost Estimation (NPR (Million))	Collaboration with National Reconstruction policy (Strategy)	To be integrated in DM Plan (to detail)
					Responsible Agency	Supporting Agency	73/74	74/75	75/76	76/77	77/78			
2-2 Livelihood	Support for the reconstruction of livelihood	2-2-1	Financial support for the livelihood reconstruction of victims	Financial support for the affected families, such as there is a death in the family, except the residential homes damaged by the earthquake.・Understanding of affected families ・Support for payment by the national government through the bank system ・Management and arrangement with the national government and district.	NRA, MoF	District, Muni(Administration dep., Financial dep.)						–	6.1.3	–
		2-2-2	Establishment of a livelihood help desk	Establishment of a livelihood help desk (consultation service) for livelihood reconstruction. ・Assignment of staff in charge (examples of services:) Support for Housing, Living Expenses, Agriculture, Industry, Labour, Health, Child Rearing and Mother's Milk, Volunteer, Administration	Muni(Administration dep.)							10	–	–
		2-2-3	Dissemination of reconstruction information	Dissemination of reconstruction information ・Gathering and summarizing of reconstruction information. ・Dissemination of reconstruction information periodically by utilizing public information papers, websites, etc.	Muni(Administration dep.)							10	–	✓
2-3 Health, Medical and Social Welfare	Recovery and enhancement of medical, health care and social welfare services	2-3-1	Recovery for hospitals on the municipal level, health centres and health posts	Recovery for hospitals at the municipal level, health centres and health posts ・Damage investigation at each hospital, health centre and health post ・Consideration of priority for reconstruction ・Reconstruction of each hospital, health centre and health post ・Provision and ensuring of medicines, equipment and health professionals.	MoHP, MoUD(DUDBC)	Muni(Social Welfare dep.)						100	6.1.7	✓
		2-3-2	Seismic diagnosis and seismic resistant measures of hospitals on the municipal level, health centres and health posts	Seismic diagnosis and seismic resistant measures of hospitals on the municipal level, health centres and health posts ・Dispatch of experts, or technicians for seismic diagnosis and checking hospitals. ・(If necessary) Seismic resistant measures and retrofitting or reconstruction shall be implemented. ・Fund assistance to promote the reconstruction of private hospitals. ・Establishment of a legal system in order to ensure seismic resistance of private hospitals.	MoHP, MoUD(DUDBC)	Muni(Social Welfare dep.)						50	6.1.7	✓
		2-3-3	Establishment of a mental health care help desk for victims	Establishment of a mental health care help desk for victims. ・ Establishment of mental health care system/group by health technician. (Assignment of staff in charge, support/visit and care for victims)	Muni(Social Welfare dep.)							50	–	–
		2-3-4	Formulation of a plan for vulnerable people	Formulation of the plan for vulnerable people. ・Information collection of vulnerable people such as single women, orphaned children, elderly citizens, people with disabilities (Name, Address, Condition) ・Establishment of a support system (establishment of assistant group, etc.). ・ Consideration of support for evacuation (evacuation guidance, safety confirmation) and support in shelter (preferential provision of goods).	Muni(Social Welfare dep.)	MoHP						10	6.3.1, 6.3.3	–
2-4 Waste Management	Disaster waste treatment measures	2-4-1	Disposal of disaster waste and debris properly (implementation of collection and disposal)	Disposal of disaster waste and debris: ・Investigation of amount and location of disaster waste and debris ・Contract with the providers for waste and debris management ・Disposal of disaster waste and debris ・Establishment of community groups for the support of building demolition especially for vulnerable people such as single women, those with disabilities and the elderly.	Muni(Environment dep.)	MoHP						100	–	–
		2-4-2	Formulation of a disaster waste management plan	Formulation of a disaster waste management plan for future earthquakes. (Example of contents) ・Establishment of a disaster waste management system. ・Estimation of the amount of debris. ・Promotion of recycling (development of recycle centres, etc.) ・Ensuring of temporary stock place for disaster waste.	Muni(Environment dep.)	MoHP						5	–	✓
		2-4-3	Ensuring of temporary stock places for disaster waste	Ensuring of temporary stock places for disaster waste in advance so that the space can be effectively utilized. ・Investigation of open spaces and consideration of candidates for temporary stock place for disaster waste ・Development of the spaces can be effectively utilized for temporary stock place	Muni(Environment dep.)	MoHP						2.5	–	✓
2-5 Education	Recovery and seismic resistance for schools	2-5-1	Recovery and reconstruction of schools	Recovery and reconstruction of schools ・Damage investigation of each school ・Consideration of priority for reconstruction ・Reconstruction of schools	MoE, MoUD(DUDBC)	Muni(Physical Planning and Construction dep., Social Welfare dep.)						1000	6.1.7	–
		2-5-2	Seismic diagnosis and seismic resistant measures of schools	Seismic diagnosis and seismic resistant measures of schools ・Dispatch of experts or technicians for seismic diagnosis and checking schools ・(If necessary) Seismic resistant measures, retrofitting and reconstruction shall be implemented. ・Fund assistance to promote the reconstruction for private schools. ・Establishment of a legal system in order to ensure the seismic resistance of private schools.	MoE, MoUD(DUDBC)	Muni(Physical Planning and Construction dep., Social Welfare dep.)						1000	6.1.7	✓

Sector (Category)	Sub-Category	No	Action list	Contents	Responsibility		Duration (Recovery / Revitalization / Development)					Cost Estimation (NPR (Million))	Collaboration with National Reconstruction policy (Strategy)	To be integrated in DM Plan (to detail)
					Responsible Agency	Supporting Agency	73/74	74/75	75/76	76/77	77/78			
	Enhancement of school education	2-5-3	Education for disaster management	Education for disaster management in the school curriculum. ・Consideration of school curriculum for the disaster management and the experience of the Gorkha EQ. (Example contents of curriculum) ・Learning about the disaster, mechanisms, disaster management. ・Learning about ensuring safety when a disaster happens. ・Sharing the experience of the Gorkha EQ. ・Implementation of evacuation drills.	MoE	Muni(Social Welfare dep.)						10	6.1.4	✓
	Care for students	2-5-4	Training for teachers	Training for teachers regarding disaster management in order to teach students and ensure the safety of students. ・Establishment of a school disaster management committee. ・Consideration of training for teachers (Example contents of training). ・Workshop on the planning and practices of disaster management education. ・Workshop on sharing experiences of the Gorkha EQ. ・Training on mental health care, treatment method for injury, etc.	MoE	Muni(Social Welfare dep.)						10	-	-
3. Urban Planning for the Safer and Secure City														
3-1 Public Building	Recovery, seismic resistance and safety of public buildings	3-1-1	Immediate damage investigation of public buildings	Public buildings should be kept to their function as much as possible even after a disaster in order to conduct recovery and reconstruction activities smoothly, receive evacuees, and provide public services continuously. ・Conduct building damage investigation of public buildings. ・Classify the damage level: No-damage, Safe, Usable with temporary repair, Unusable (danger)	MoUD(DUDBC)	Muni(Financial dep., Physical Planning and Construction dep.)						5	6.1.6	✓
		3-1-2	Emergency repair of damaged public buildings to secure safety and the construction of temporary public buildings for the operation of emergency relief, medical treatment, and evacuation of life under safe conditions	In order to conduct precise recovery and reconstruction activities, emergency repair should be done for public buildings to ensure safety and/or temporary facilities should be prepared. ・Based on the building investigation, usable buildings should be used as much as possible. ・Temporary repair should be done for buildings which received moderate damage. ・In the case of a massive disaster, temporary facilities to provide public services should be prepared (tent or any temporary structure). ・For this purpose, open spaces with disaster management functions should be distributed in urbanized areas.	MoUD(DUDBC)	Muni(Physical Planning and Construction dep.)						20	6.2.1	-
		3-1-3	Damage diagnosis of all public buildings and the reinforcement of public buildings (taking care of historical importance as main part of the municipality is designated as a world heritage site)	Towards the revitalization of the affected area, a detailed damage diagnosis should be done and it will be the basis of rebuilding of public buildings. ・Conduct detailed building diagnosis for public buildings. ・Consider methods for rebuilding and reinforcement. ・In case a public building has cultural importance, reinforce method should be carefully considered. ・Consider the historical and cultural importance of the building or area where a public building is located.	MoUD(DUDBC)	Muni(Physical Planning and Construction dep.)						10	-	✓
		3-1-4	Prioritization and examination of possible unification and rearrangement of public buildings to rebuild and repair public buildings	Before starting construction work, the public buildings should be prioritized. It is also necessary to consider the unification and rearrangement of functions in order to conduct efficient public services. ・Prioritization of public building for reconstruction. ・Examination of Unification and rearrangement of public buildings. ・Consideration of the historical/cultural importance of the area.	Muni(Physical Planning and Construction dep.)	MoUD(DUDBC)						10	6.1.6	✓
		3-1-5	Recovery and reconstruction of aseismic public buildings on the basis of the National Building Code (NBC)	Based on the prioritization, reconstruction work should be accelerated and new buildings should follow the NBC to secure seismic resistance. ・Prioritized public building should be rebuilt or repaired based on the NBC. ・Consideration of the historical/cultural importance of the area for new building construction.	MoUD(DUDBC)	Muni(Physical Planning and Construction dep.)						1000	6.1.6	✓
		3-1-6	Capacity building and the establishment of a permit process for new public building construction in order to enforce the NBC and land use zoning, as well as confirmation of historical value	Building permission process should be done properly in the municipality, then secure NBC and zoning regulation to make the municipal area resilient. ・Establishment of clear procedure for building permission based on NBC and land use zoning. ・Capacity building: Education to municipal officers who take responsible for building permission ・As Bhaktapur has many historical important buildings, the permission should have additional process to confirm historical and cultural value.	Muni(Physical Planning and Construction dep.)	MoUD(DUDBC)						10	-	✓

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					Responsible Agency	Supporting Agency	73/74	74/75	75/76	76/77	77/78			
		3-1-7	Using open spaces (parks) for the operation of emergency relief activities and providing public services	After a huge disaster, public buildings might be damaged and be in danger. Open spaces can be places where public services are provided and emergency relief activities are operated. ・Designation of open spaces for emergency relief, medical treatment, evacuation, etc. ・Build temporary public facilities to provide public services. ・Suburban area still has many open land areas (farms, forest, etc.). Effective usage of such land should be considered.	Muni(Physical Planning and Construction dep.)	MoUD(KVDA)						5	6.1.7	✓
	Development of Disaster Management Park	3-1-8	Designation of open spaces for reconstruction operation and long-term evacuation	Based on the open space policies by KVDA, distribution and usage of open spaces are examined and designated in the municipal area. ・Examination of the location and usage of open spaces, which have supplemental function of public services. ・Designation of open spaces in the unraised area ・As the historical urbanized areas are high-dense, evacuation route should be also considered.	Muni(Physical Planning and Construction dep.)	MoUD(KVDA)						2.5	6.1.7	–
		3-1-9	Development of open spaces as evacuation sites and disaster management bases	For the preparation of another disaster or second disaster, open spaces should be developed as disaster management bases and evacuation sites. ・Examination of the function of each open space and prioritization for development ・Obtain consensus from neighbours ・Develop open spaces (including space for stockpiling, evacuation routes, etc.) ・Understanding of parks and open spaces to be utilized as temporary heliports. ・Designation of temporary heliports. ・Development of temporary heliports (securing enough spaces). ・Dissemination of evacuation sites to residents ・For future urbanized areas, new open spaces should be secured in the process of urbanization	Muni(Physical Planning and Construction dep.)	MoUD(KVDA)						10	6.1.7	✓
		3-1-10	Promotion of the construction of evacuation sites and disaster management bases, and the establishment of an institutional system for implementation, operation and management	For the development phase, continuous efforts are required to develop open spaces. At the same time, institutional, operation and management systems also need to be improved. ・Prioritization for the implementation of open spaces, and the implementation (construction or improvement of existing open spaces) ・Establishment of an institutional system on the national level as well asthe municipal level for implementation. ・Establishment of an operation and management system on the municipal level as well as the community level, as most of the open spaces are expected to be managed by community organizations. A supporting system for the community organization is also needed. ・Revision of the open space network following urban expansion	Muni(Physical Planning and Construction dep.)	MoUD(KVDA)						5	–	✓
		3-1-11	Establishment of a legal system to secure open spaces as evacuation sites and disaster management bases in newly developing areas (land pooling project, etc.)	Urbanized areas are expected to be enlarged. To prepare for the next disaster, it is necessary to secure open spaces in a newly developed urban area. ・Establishment of a legal system to secure open spaces when an urban area is planned, such as land pooling scheme, etc.	Muni(Physical Planning and Construction dep.)	MoUD(KVDA)						100	–	✓
3-2 Infrastructure	Recovery, seismic resistance and safety of road and bridges	3-2-1	Recovery of roads and bridges to accelerate the recovery process for regional and municipal areas	After a disaster, transportation is important for emergency relief activities and transport goods. Temporary recovery of major roads and bridges should be done if roads and bridges get damaged. ・Emergency damage investigation on major roads ・Temporary recovery measures should be taken for nationally and regionally important roads. (Such as Alaniko Highway) ・Minimum recovery, including debris removal, should be done for local roads to secure people's lives.	Muni(Physical Planning and Construction dep.)	MoPIT, MoUD, MoFALD						1000	6.1.7	–
		3-2-2	Improvement of earthquake resistant roads for smooth transportation and evacuation, especially for designated emergency transportation roads and evacuation routes	Towards reconstruction and even further development, repairing roads with seismic resistance is required. It is also necessary to prepare for a second and other disasters. Especially designated emergency transportation roads should be repaired as a priority. ・ Designation of a traffic control road network and emergency transportation road and improvement of designated roads and bridges. ・Detailed survey for the structure of bridges and reinforcement or reconstruction based on the survey result ・Promotion of road widening. ・Seismic resistance of buildings along designated evacuation routes.	Muni(Physical Planning and Construction dep.)	MoPIT, MoUD, MoFALD						2000	6.1.7	✓
		3-2-3	Continues efforts for improvement and construction of roads, including cooperation with the nation, Kathmandu Valley, districts, and adjacent municipalities/VDCs	Recovery and reconstruction of roads and bridges should be done continuously. As a road connects adjacent areas, the nation, Kathmandu Valley, district and municipality should collaborate and effective improvement is required. ・Review of an urban transport master plan and continuous promotion of improvement of roads and bridges. ・Cooperation with road and bridge development in different administrative levels. ・ Securing the connectivity of roads by sharing information between different administrative organizations. A committee should be held for this purpose as needed. ・ Construction of road and bridges on the municipal level for smooth emergency response, evacuation and transportation	Muni(Physical Planning and Construction dep.)	MoPIT, MoUD, MoFALD						1000	6.1.7	✓

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					Responsible Agency	Supporting Agency	73/74	74/75	75/76	76/77	77/78			
		3-2-4	Promotion of road construction together with urban development projects, such as land pooling	Road development should be done with urban development project in surrounding areas. It is expected that some land pooling scheme would be done following urban expansion. Roads construction should be done with the land pooling project by securing seismic resistance. ・Construction of seismic resistant road when land pooling or any other urban development project would be done. ・When a road is constructed with an urban development project, it is important to secure connectivity with the existing urbanized areas for regional reconstruction and preparation of future disaster.	Muni(Physical Planning and Construction dep.)	MoPIT, MoUD, MoFALD						1000	6.1.7	✓
		3-2-5	Examination of road standards for municipal roads in consideration of the characteristics of the municipality	In order to improve roads, the standards of road construction should be revised to secure seismic resistance and disaster prevention function. For the pilot municipality, the road standards should be based on the characteristic of the municipality. A long-term view is required and it should be done with the urban transport master plan of Kathmandu Valley. ・Review of the existing road standards and urban transport master plan ・Examination of the minimum requirements which should be suited for the municipality ・Arrangement of the nation and districts if a road is nationally or regionally important	Muni(Physical Planning and Construction dep.)	MoPIT, MoUD, MoFALD						10	-	✓
	Recovery, seismic resistance and safety of lifelines	3-2-6	Early recovery of supply lines and other related facilities and sanitation management	To accelerate the recovery and reconstruction process, it is required to repair supply lines and the related facilities of lifelines. ・Water and electricity: Recovery of supply lines and related facilities ・Sewage: recovery of the sewage treatment system and sanitation management	KUKL, NEA	Muni(Physical Planning and Construction dep.)						500	6.1.7	-
		3-2-7	Taking seismic resistant measures for supply lines and other related facilities, and improve their supply systems	After an emergency response from the disaster, upgrading of lifelines would be started. At that time, improvement of the supply system for the future should be considered. ・Seismic resistance of the supply system of water and electricity and improvement of the system ・Examination of the usage of solar energy, especially for public buildings and disaster management park ・Improvement of drainage, sewage, and sanitation systems	KUKL, NEA	Muni(Physical Planning and Construction dep.)						100	6.1.7	✓
		3-2-8	Development of sustainable stockpiling of water and fuel for emergency use stored in earthquake resistant and safe facilities, and consideration of their distribution and supply system	In order to for prepare second or other disasters, stockpiling is important for emergency situations. Water should be stored in a sanitary manner, and liquefied petroleum gas and petrol should be stored under safe conditions. Storage should be in a disaster management park. ・Examination of the quantity of drinkable water and fuels at a storage. Population covered by an emergency management park should be considered. ・Stockpiling of drinkable water in a sanitary manner ・Fuel (liquefied petroleum gas for cooking and petrol for generators and emergency transportation) should be stored in a safe condition.	KUKL, Muni(Physical Planning and Construction dep.)							500	6.1.7	✓
		3-2-9	Improvement of the sanitation management system	Introducing a clean sewage treatment system by considering sanitation which can be a problem in emergency situations. ・Promotion of a sewage treatment system. ・Temporary toilet (such as manhole toilet) should be installed in an emergency disaster management park for sanitation management.	KUKL	Muni(Financial dep., Physical Planning and Construction dep.)						5	-	✓
		3-2-10	Continuous development of the expansion of the supplying area and upgrading of existing facilities to be aseismic resistance and with a stable water, sewage, and electricity supply system	Expansion of the service area of lifelines with a seismic resistant system to secure a stable supply system even in emergency situations. ・Improvement of the supply system of lifelines and expansion of the service areas. ・When an urbanized area is enlarged, a stable supply system should be installed by considering future disasters.	Related lifeline organizations	Muni(Financial dep., Physical Planning and Construction dep.)						-	-	✓
3-3 Land Use Restriction	Promotion of land use restriction	3-3-1	Designation of hazardous areas	Areas where severe damage by the disaster occurred should be designated and necessary measures should be taken to prevent secondary disasters. In the municipal area, old buildings are concentrated in the historical areas of the city and they got huge damages. Those areas should be designated as hazardous areas and prior measure should be taken. In addition, liquefaction can be occurred as soil condition of surrounding areas is soft. It is necessary to pay a special attention to the areas. ・Designation of hazardous areas ・Prior emergency response should be done for those designated areas ・No-entry measures should be taken as needed	Muni(Physical Planning and Construction dep.)	MoUD(KVDA)						-	6.5.1	✓
		3-3-2	Revision of the land use zoning and building regulations based on geomorphology map, hazard assessment, and actual building damage (risk sensitive land use)	Based on geomorphological maps and hazard analysis (if available), land use and building regulation should be revised to make the city resilient. Actual damage situations can be used for the revision as well. It is aimed to make the city resilient by conducting smooth reconstruction and improving the seismic resistance of buildings and the city area. ・Analysis and comparison of geomorphological maps, hazard analysis and actual damage ・Revision of land use and building regulations ・Reconstruction based on the revision	Muni(Physical Planning and Construction dep.)	MoUD(KVDA)						5	6.5.1, 6.6.1	✓
		3-3-3	Considering the location of open spaces and public buildings (administrative facilities, schools, and hospitals), which can be utilized as emergency response bases, and emergency medical treatment facilities, and evacuation sites in safer and accessible areas	For the smooth reconstruction from a disaster, the distribution and location of public facilities should be reconsidered for providing effective public services. It is also useful to prevent secondary disasters. Open spaces, schools, hospitals and government buildings should be examined. ・Examination and designation of the location of open spaces for effective evacuation and emergency relief operation. ・Examination of the location of public buildings in order to provide public services under a disaster situation. ・A supplementary road network should be also examined to connect each public facility for the more effective usage of the facilities.	Muni(Physical Planning and Construction dep.)	MoUD(KVDA)						5	-	✓

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					Responsible Agency	Supporting Agency	73/74	74/75	75/76	76/77	77/78			
		3-3-4	Institutionalization of the land use zoning and building regulation and appropriate enforcement by municipality, with consideration of historical and cultural value	In order to make a resilient city, land use zoning and building regulations should be enforced. For this purpose, necessary measures should be taken. Bhaktapur has many historical areas, it is also necessary to pay attention to keep the historical value. ・Enforcement of building approval process in the municipality ・ In the process, land use and building regulations should be confirmed. Support by DUDBC should be considered if needed. ・Confirm the building design to fit to the historical city scape	Muni(Physical Planning and Construction dep.)	MoUD(KVDA, DUDBC)						-	6.6.1	✓
		3-3-5	Promotion of the land use zoning to secure the historical district and designate new developing areas	By land use zoning, historical area should be kept their original value and city scape and new urbanized areas should be properly designated. ・Designation of areas where keep the historical city scape and revision of building regulations. ・Designation of new urbanized area by considering development suitability (soil and geological condition) and historical value. ・Consistent with city planning ・Enforcement of building regulation by characteristics of the area	Muni(Physical Planning and Construction dep.)	MoUD(KVDA)						-	6.6.1	✓
3-4 Policy for Each Zone	Development of reconstruction promotion zone	3-4-1	Prior emergency relief operation for hazardous areas and areas which were severely damaged	Areas struck by huge damage and are vulnerable according to geomorphological maps and hazard analysis, prior recovery activities should be done to ensure the safety of the people. ・Identify areas with huge damage by conducting an emergency damage survey ・Identify areas which are vulnerable against a disaster by analysing geomorphological maps and hazard analysis ・Prior recovery and reconstruction measures should be taken to those identifying areas. ・Pay attention to the geological condition, especially the municipal area has soft soils surrounding the existing urbanized areas. ・Pay special attention to the areas where historical buildings are concentrated as those areas are vulnerable against disaster.	Muni(Physical Planning and Construction dep.)	MoUD(KVDA)						-	6.6.1	✓
		3-4-2	Designation of disaster stricken areas where intensive measures should be focused on urban planning, and historical high-dense areas and vulnerable areas which need disaster management for second disasters and other possible disasters	Hazardous area, high-dense area, vulnerable area should be designated for concentrated reconstruction measure. ・Designation of hazardous areas for prior recovery measures in order to prevent the spread of damage ・Designation of highly-dense areas for preventing secondary damage and to secure safe evacuation ・Designation of vulnerable areas such as steep slopes or soft soils for preventing secondary disasters. ・Pay attention of soil condition as the municipal area has some soft soil area ・Pay attention to the historical areas struck by huge damage. It is also important to keep historical value	Muni(Physical Planning and Construction dep.)	MoUD(KVDA)						-	6.6.1	✓
		3-4-3	Revision of land use planning for those designated areas and taking actions as priority	For those designated areas, special attention should be given and land use zoning and building regulation should consider the characteristics of the areas to create a resilient city. ・Designation and enforcement of land use zoning and building regulations fitting to the characteristics of the designated areas	Muni(Physical Planning and Construction dep.)	MoUD(KVDA)						-	6.6.1	✓
		3-4-4	Overall approach of urban planning for the designated area in order to make the municipality resilient	It is recommended to have a long-term perspective of urban planning approach, especially for the designated areas. ・ Comprehensive approaches are recommended with land use zoning, building regulations, infrastructure development, and so on. ・Restriction of construction in the case that an area is highly vulnerable for a disaster.	Muni(Physical Planning and Construction dep.)	MoUD(KVDA)						-	6.6.1	✓
4. Promotion of Tourism and Ensuring a Safety of Tourists														
4-1 Tourism	Support for the recovery and reconstruction of tourism	4-1-1	Support for damaged hotels, commerce and tour guide companies related to tourism	Support for the reconstruction of tourism services and businesses. ・Damage investigation of hotels, commerce and tour guide companies related to tourism. ・Financial support (loan) to the individuals or families in the enterprises associated with hotel and tourist guide business.	Muni(Culture and Tourism dep., Financial dep.)	MoTCA						-	6.4.3	-
		4-1-2	Recovery and development of tourism routes	Recovery and development of tourism routes. ・Damage investigation of tourism routes. ・ Recovery and development of the tourism routes to attract tourism and to enable a smooth evacuation of tourists.	Muni(Culture and Tourism dep., Physical Planning and Construction dep.)	MoTCA						100	6.4.3	-
		4-1-3	Dissemination of reconstruction information for tourism	Dissemination of reconstruction information ・ Gathering and summarizing of reconstruction information for tourism facilities such as the reconstruction of heritage sites ・Dissemination of reconstruction information periodically by utilizing websites, etc.	Muni(Culture and Tourism dep.)	MoTCA						1	6.4.3	-

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					Responsible Agency	Supporting Agency	73/74	74/75	75/76	76/77	77/78			
	Disaster management measures for tourist sites	4-1-4	Designation and development of evacuation sites adjacent to tourist sites	Designation and development of evacuation sites to ensure the safety of tourists ・Investigation of open spaces and facilities available to be utilized as evacuation sites adjacent to tourist sites ・Designation and development of evacuation sites such as the development of stockpile warehouses	Muni(Culture and Tourism dep., Physical Planning and Construction dep.)	MoTCA						-	6.4.3	✓
		4-1-5	Creation and distribution of guide maps and sign boards indicating emergency response actions and evacuation sites	Creation and distribution of guide maps and sign boards ・Consideration of the contents of the guide maps and sign boards (evacuation sites, what tourists should do when disasters occur) ・Creation and installation of multilingual guide maps and sign boards indicating evacuation sites ・Distribution of guide maps	Muni(Culture and Tourism dep.)	MoTCA						1	6.4.3	✓
		4-1-6	Establishment of a guidance system for tourists in the event of a disaster	Establishment of a guidance system for tourists in the event of a disaster. ・Establishment of a guidance system (section in charge) to evacuate tourists to evacuation sites safely ・Consideration of safety confirmation of tourists (creation of format for gathering tourist information) ・Implementation of exercises for the evacuation of tourists periodically	Muni(Culture and Tourism dep.)	MoTCA						1	6.4.3	✓
		4-1-7	Enhancement of stockpiles for tourists	Enhancement of stockpiles not only for residents but also including tourists. ・Estimation of number of tourists and estimation of the necessary amount of stockpiles for tourists ・Development of stockpile warehouses for tourists ・Procurement of stockpiles for tourists	Muni(Culture and Tourism dep.)	MoTCA						5	6.4.3	✓
4-2 Employment	Support for employment	4-2-1	Support for the employment of victims who have lost work (financial support)	Financial support for the victims who have lost work ・Understanding of the victims who have lost work ・Support for payment by national government through the bank system ・Management and arrangement with national government and district	NRA, MoF	District, Muni(Administration dep., Financial dep.)						By NRA	6.4.2	-
		4-2-2	Support for employment, employment training in consideration of vulnerable people and deprived/marginalized people (Pichadiyeko barga)	Support for employment, employment training in consideration of vulnerable people and deprived/marginalized people (Pichadiyeko barga) ・Special allowance for social security to such as the single women, poor, those with disabilities and elderly citizens ・Implementation of skill training programmes for employment	NRA	District, Muni(Administration dep.)						By NRA	6.3.1, 6.3.2	-
		4-2-3	Support and introduction of cash or food for work	Support and introduction of cash or food for work for livelihood reconstruction ・Operation of cash or food for work programme ・Work for reconstruction such as debris disposal and reconstruction of buildings, etc.	NRA	District, Muni(Administration dep.)						By NRA	6.4.1	-
		4-2-4	Human resource development for reconstruction and arrangement of employment opportunities for reconstruction work	Human resource development for reconstruction ・Establishment of a training centre ・Implementation of skill training programmes for employment ・Establishment of an employment centre and introduction of employment opportunities for reconstruction work	NRA	District, Muni(Administration dep.)						(By NRA) 5	6.4.1, 6.4.2	-
4-3 Industry	Support for Agriculture	4-3-1	Recovery support for agriculture	Recovery support for agriculture ・Arrangement and provision of the seeds, fertilizers and other agricultural inputs to farmers at a cheaper price.	District							-	6.4.2	-
		4-3-2	Recovery and development of irrigation facilities	Recovery and development of irrigation facilities. ・Damage investigation of irrigation facilities. ・Recovery of damaged irrigation facilities. ・Maintenance, retrofitting and improvement of irrigation facilities .	District							-	6.1.7	-
	Support for Commerce and Industry	4-3-3	Recovery support for stores, shops and cottage industries	Recovery support for private enterprises ・Provision of financial support(loan) for private enterprises such as cottage industries to repair and reconstruct the stores, shops and warehouses and to reopen their industries and businesses.	NRA, MoF	District, Muni(Administration dep., Financial dep.)						-	6.4.2	-
		4-3-4	Support for expanding sales channels, trade	Support for expanding sales channels, trade ・Consultation and Promotion of cottage, small and medium industries in the municipality area.	District, Muni(Administration dep.)							-	6.4.2, 6.5.2	-

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					Responsible Agency	Supporting Agency	73/74	74/75	75/76	76/77	77/78			
5. Strengthening of Community Disaster Risk Management & Resilient Disaster Management System of Municipality														
5-1 Resilient Disaster Management System	Establishment of a resilient disaster management system	5-1-1	Formulation of disaster management plan	Formulation of a disaster management plan ・Policy making based on the risk assessment ・ Consideration of countermeasures for mitigation/preparedness, emergency response and recovery/reconstruction phases ・Legalization and budget allocation for implementation	Muni(Physical Planning and Construction dep.)	MoFALD						-	6.5.4	✓
		5-1-2	Accumulation of disaster data for the Gorkha EQ and historical disasters	Accumulation of disaster data ・Accumulation and database compilation of historical disaster data including the Gorkha EQ ・Studying the Gorkha EQ, the past disasters and disaster trends.	Muni(Physical Planning and Construction dep.)	MoFALD						1	6.5.4	✓
		5-1-3	Establishment and enhancement of disaster management organization	Establishment and enhancement of the disaster management section on the municipal level. ・Organizational restructuring and establishment of the disaster management section. ・Assignment of staffs and the employment of experts for disaster management	Muni(Administration dep., Physical Planning and Construction dep.)	MoFALD						50	6.5.4	✓
		5-1-4	Establishment and enhancement of ward level disaster management organization	Establishment of disaster management section on the ward level ・Organizational restructuring including the establishment of a disaster management section on the ward level ・Determination of roles and responsibilities	Muni(Administration dep., Physical Planning and Construction dep.)	MoFALD						50	6.5.4	✓
		5-1-5	Human resource development for disaster management administration	Implementation of training for municipal staff in order to develop the human resources needed for disaster management administration. ・Consideration of training programmes for each level. ・Conducting the workshops and training.	Muni(Administration dep., Physical Planning and Construction dep.)	MoFALD						10	6.5.4	✓
		5-1-6	Formulation and dissemination of evacuation plan	Formulation and dissemination of an evacuation plan. ・Designation of evacuation sites/routes and dissemination. ・How to lead others to the evacuation site. ・How to operate the evacuation site.	Muni(Administration dep., Physical Planning and Construction dep.)	MoFALD						1	6.5.4	✓
		5-1-7	Understanding and dissemination of risk areas	To understand the risk area of the municipality, and dissemination to the residents. ・Hazard and risk assessment and understanding the risk areas. ・Dissemination to the residents such as creation of risk maps and disaster management maps.	Muni(Physical Planning and Construction dep.)	MoFALD						0.5	6.5.4	✓
	Promotion of a disaster management cooperation system	5-1-8	Strengthening cooperation with other municipalities, the establishment of a support and acceptance system, and conclusion of agreements	Conclusion of agreements for strengthening cooperation with other municipalities and the establishment of a support and acceptance system. ・Coordination with MoFALD for the cooperation system among municipalities.	Muni(Administration dep.), MoFALD							-	6.5.4	✓
		5-1-9	Strengthening cooperation with other agencies (Police, Army, Red Cross), the establishment of a support and acceptance system, and conclusion of agreements	Conclusion of agreements for strengthening cooperation with other related agencies for emergency response and the establishment of a support and acceptance system. ・Coordination with Police, Army, Red Cross, etc.	Muni(Administration dep., Physical Planning and Construction dep.), MoFALD	MoFALD, MoHA, Nepal Army, Red Cross						-	6.5.4	✓
		5-1-10	Development of an acceptance system for volunteers	In order to manage the volunteers, a development of acceptance system should be created as follows. ・Establishment of section or assignment of staff in charge of volunteer activities. ・Establishment of a contact centre for volunteers.	Muni(Administration dep.,)	MoFALD						-	6.5.4	✓
5-2 Disaster Management Facilities / Infrastructure	Development of disaster management facilities and enhanced functionality	5-2-1	Designation, development, improvement and enhancement of disaster management base facilities	Designation, development, improvement and enhancement of disaster management base facilities. ・Designation of disaster management base facilities in a municipality (Municipal office, etc.). ・Improvement and enhancement of facilities as the disaster management base. (Seismic resistant measures, stockpile, communication facilities, etc.)	Muni(Physical Planning and Construction dep.)	MoFALD, MoUD(DUDBC)						10	6.5.4	✓
		5-2-2	Development of stockpile warehouses, and ensuring disaster stockpiles	Development of stockpile warehouses, and ensuring disaster stockpiles. ・Development of stockpile warehouses and installation. ・ Listing of necessary emergency goods (food, medical equipment, daily necessities, rescue equipment, fuel, etc.). ・Procurement of stockpiles.	Muni(Physical Planning and Construction dep.)	MoFALD						50	6.5.4	✓
		5-2-3	Enhancement of the disaster management functions of schools	Enhancement of the disaster management functions of schools in order to secure the children and promote the disaster management base. ・Seismic resistant measures ・Securing stockpiles ・Development of communication facilities, etc.	Muni(Physical Planning and Construction dep.)	MoFALD, MoUD(DUDBC), MoE						5	6.5.4	✓

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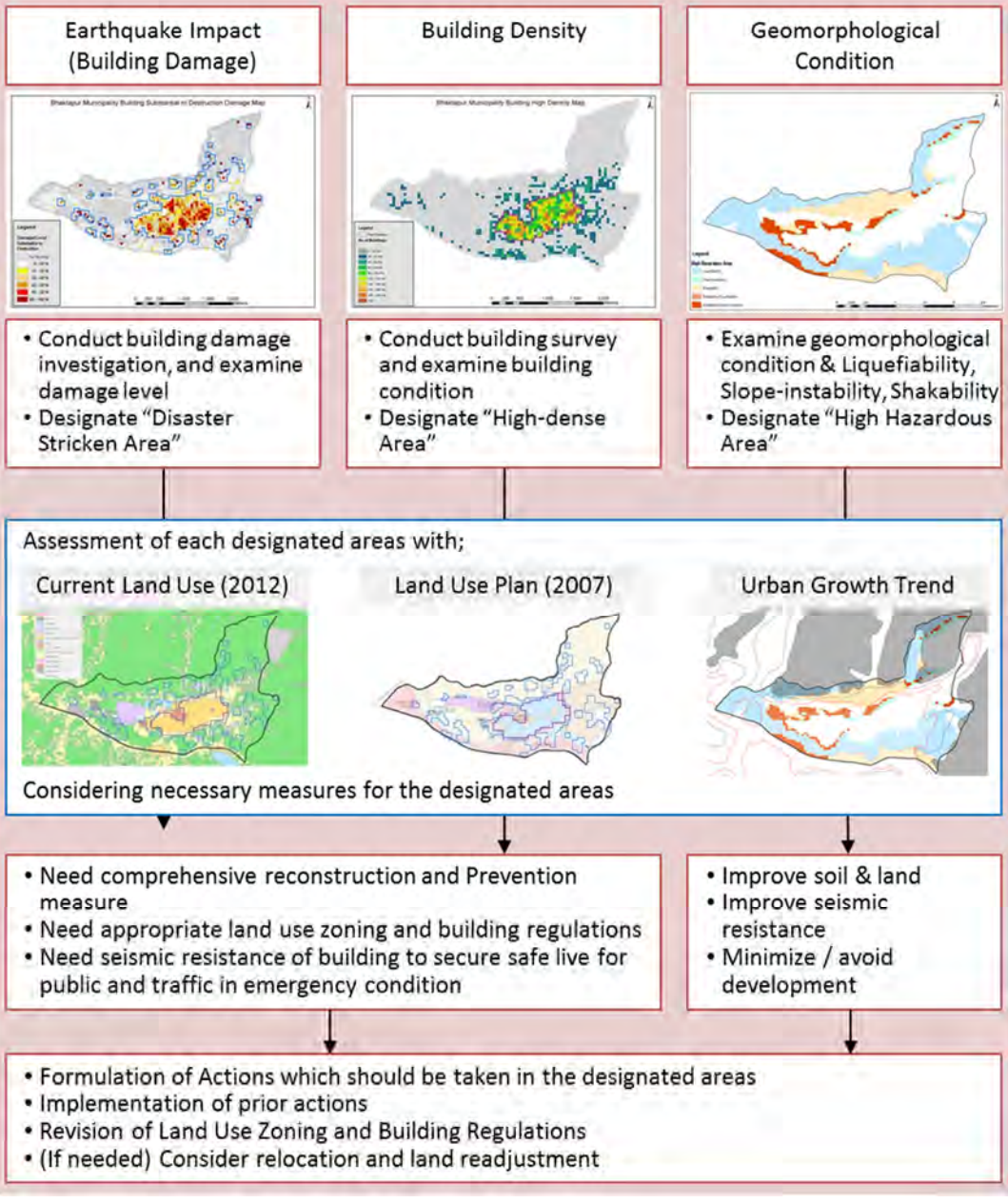
					Responsible Agency	Supporting Agency	73/74	74/75	75/76	76/77	77/78			
	Development of information/communication infrastructure	5-2-4	Development of an information database for disaster management	Development of a disaster information database ・Information of past disasters ・Information of people/section of related agencies (Name of contact person, contact number)	Muni(Physical Planning and Construction dep.)	MoFALD						1	6.5.4	✓
		5-2-5	Establishment of an information sharing system	Establishment of an information sharing system to cooperate and operate in an emergency smoothly and quickly ・ Development of a damage and recovery information sharing system with the rescue and health/medical institutions, road and bridges, lifelines, etc. (Radio system, dispatch the personnel from each agency to the municipal disaster response committee)	Muni(Physical Planning and Construction dep.)	MoFALD						1	6.5.4	✓
		5-2-6	Development of an information sharing system for vulnerable people and deprived/marginalized people (Pichadiyeko barga)	Development of an information sharing system for vulnerable people and deprived/marginalized people (Pichadiyeko barga) ・Collection and sharing of information for vulnerable people (Name, Address, Condition, etc.) ・Establishment of a support system. (establishment of assistant group, etc.)	Muni(Physical Planning and Construction dep.)	MoFALD						1	6.5.4	✓
		5-2-7	Multiplexing means of communication	In order to avoid disconnection of the communication line and the disruption of information due to congestion in the event of a disaster, development of the multiplexing of communication means should be carried out. (e.g. Installation of satellite line)	Muni(Physical Planning and Construction dep.)	MoFALD						1	6.5.4	✓
		5-2-8	Development of disaster management administrative radio	Development of a disaster management administrative radio to be able to disseminate the information to residents in the event of a disaster.	Muni(Physical Planning and Construction dep.)	MoFALD						1	6.5.4	✓
5-3 Emergency Response	Capacity enhancement of emergency response	5-3-1	Establishment of an information collection and dissemination system	Establishment of an information collection and dissemination system・Establishment of information collection from the ward level・Establishment of an information dissemination system (development of information flow (from municipality to residents), utilization of media)	Muni(Administration dep., Physical Planning and Construction dep.)	MoFALD, MoHA, District						-	6.5.4	✓(SOP)
		5-3-2	Establishment of the initial system and mobilization system for emergency response	Formulation of manuals including the following items in order to execute the initial emergency response activities smoothly: ・Establishment of a disaster response committee (how to inform, gather, etc.) ・Establishment of an initial system such as the mobilization of staff (how to inform, gather, etc.)	Muni(Administration dep., Physical Planning and Construction dep.)	MoFALD, MoHA, District						-	6.5.4	✓(SOP)
		5-3-3	Formulation of a disaster emergency response manual(SOP)	Formulation of a disaster emergency response manual(SOP) (Examples of contents) ・Flow chart and check list of each section and each response activity such as search and rescue, medical, food provision, etc. ・Several formats for information collection, etc.	Muni(Administration dep., Physical Planning and Construction dep.)	MoFALD, MoHA						0.5	6.5.4	✓(SOP)
		5-3-4	Implementation of disaster management exercises for emergency response	Implementation of disaster management exercises for capacity development of emergency response. ・ Formulation of step-by-step exercise programmes for capacity development (From seminars, table-top-exercises, to command post exercises) ・Exercise in collaboration with other agencies ・Verification of exercises and revision of SOP (Examples of contents) ・Information collection and dissemination, sharing ・Mobilization ・Coordination with other agencies	Muni(Administration dep., Physical Planning and Construction dep.)	MoFALD, MoHA, District, all related agencies						2.5	6.5.4	✓
5-4 Public Awareness on Disaster Risk Reduction/ Management (DRR/DRM)	Enhancement of public awareness of DRR/DRM	5-4-1	Development of a handbook on DRR/DRM for families	Development and Distribution of a handbook about DRR/DRM for families (Examples of contents) ・Learning about disasters (earthquake mechanisms, etc.) ・What to do in the event of disaster ・Preparedness (Making earthquake resilient houses, preparing emergency stockpiles)	Muni(Administration dep., Physical Planning and Construction dep.)	MoFALD						0.5	6.5.4	✓
		5-4-2	Implementation of awareness-raising programmes on DRR/DRM	Implementation of awareness-raising programmes on DRR/DRM (Examples of programmes) ・Community workshop for learning DRR/DRM ・Development/Utilization of educational tools ・TV/Radio awareness programme	Muni(Administration dep., Physical Planning and Construction dep.)	MoFALD						10	6.5.4	✓
		5-4-3	Promotion of the preparation of emergency stockpiles by families	Promotion of the preparation of emergency stockpiles by families. ・Preparation of list of emergency ・Promotion of preparation of emergency stockpiles by families (Development of brochure, leaflet for stockpiles)	Muni(Administration dep., Physical Planning and Construction dep.)	MoFALD						0.5	6.5.4	✓

Sector (Category)	Sub-Category	No	Action list	Contents	Responsibility		Duration (Recovery / Revitalization / Development)					Cost Estimation (NPR (Million))	Collaboration with National Reconstruction policy (Strategy)	To be integrated in DM Plan (to detail)
					Responsible Agency	Supporting Agency	73/74	74/75	75/76	76/77	77/78			
5-5 CBDRM (Community Based Disaster Risk Management)	Enhancement of CBDRM	5-5-1	Establishment of "Community Disaster Management Committees (CDMCs)" as organizations for disaster preparedness, response, and rehabilitation at the community level	Establishment of "Community Disaster Management Committees (CDMCs)" ・Determination of members of CDMC based on the Ward Citizen Forum ・Determination and allocation of roles and responsibilities of CDMC ・Determination of DRR/ DRM capacity development programmes	Muni(Administration dep., Physical Planning and Construction dep.)	MoFALD						10	6.5.4	✓
		5-5-2	Formulation of community DRR/DRM plans	Support for Formulation of Community DRR/DRM plans ・Hazard/Risk assessment of community level based on the risk assessment on the municipal level ・Establishment of planning committee ・Formulation of Community DRR/DRM plans (Example of contents：General overview, Community profile, Risk assessment, Disaster management policy, Action plan, etc.)	Muni(Administration dep., Physical Planning and Construction dep.)	MoFALD						******	6.5.4	✓
		5-5-3	Formulation of "community carte" for summarized information of current conditions on disaster management at the community level	Formulation of "community carte" (Examples of contents) ・Community Profiles(Population, Geography, Location) ・DRR related information (Status of preparedness, Vulnerable people, Evacuation places/routes, etc.) ・Disaster Risk Assessment (maps and outline) ・Community DRR Map, etc.	Muni(Administration dep., Physical Planning and Construction dep.)	MoFALD						******	6.5.4	✓
		5-5-4	Implementation of DRR/ DRM capacity development programmes for community leaders	Implementation of DRR/DRM capacity development programmes for community leaders ・Establishment of Task forces ・Determination and implementation of DRR/DRM capacity development programmes (Examples of programmes) ・Know risks of own community (Hazard/Risk assessment, Field survey, Risk Mapping) ・Consider disaster preparedness of community (Disaster management planning, Making action plans, etc.)	Muni(Administration dep., Physical Planning and Construction dep.)	MoFALD						******	6.5.4	✓
		5-5-5	Carrying out of community disaster management exercises	Carrying out of community disaster management exercises ・Formulation of annual plan for disaster management exercise ・Carrying out of community disaster management exercise (Examples of exercise) ・Evacuation exercise ・Fire-fighting exercise ・SAR, first-aid exercise	Muni(Administration dep., Physical Planning and Construction dep.)	MoFALD						******	6.5.4	✓

CHAPTER 3.
PRIORITY PROJECT

The priority projects are selected through the priority, necessity and importance of the projects in the Action Plan. The Priority projects are to prepare as a project sheet for each project, and are to describe further details of the contents. Based on this sheet, the Bhaktapur Municipality implements the actual project.

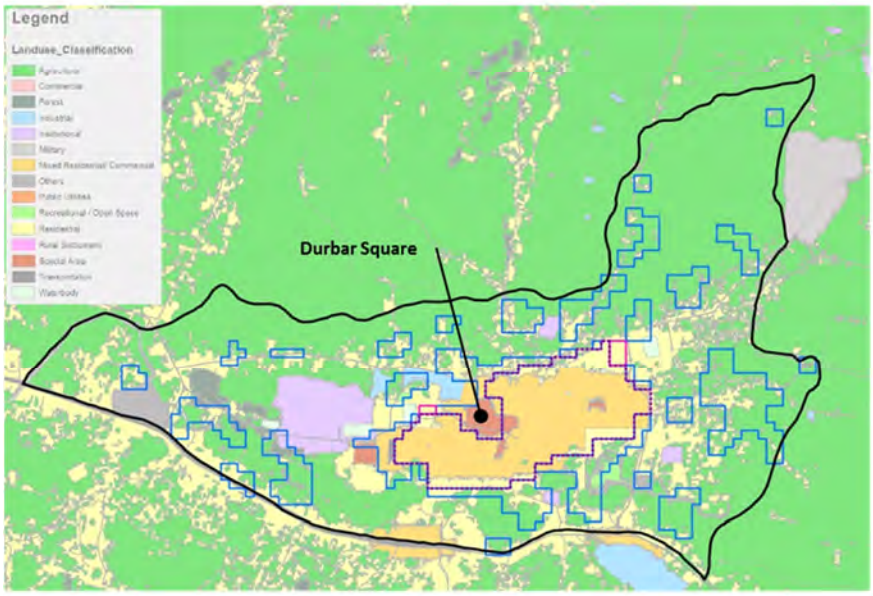
Title	Implementation of training of house reconstruction for masons, local communities, technicians, etc. (2-1-5)
Responsible Agency	Responsible Agency: Muni(Physical Planning and Construction dep.) Supporting Agency: MoUD(DUDBC)
Objectives	・To develop the capacity of safe construction methods.
Contents	・Planning for training (training course, target, schedule). (Example of training) ・Understanding the building codes, building by-laws, building regulations and their provisions. ・Training on construction (construction of load bearing buildings (brick, stone, block masonry)), construction of frame structure buildings (RCC Framed).
Schedule	2016.7 –
Workflow & Output Image	Planning for training ・Training course ・Target ・Implementation schedule Training for designers ・Understanding the building codes(NBC), building by-laws, building regulations ・Implementation of NBC, training on design ・Training on retrofitting design of existing buildings Training for masons Construction training of load bearing buildings (brick, stone, block masonry) ・Introduction for course, Lecture on NBC ・Construction of foundation ・Construction of walls ・Construction of floor and roof ・Quality control of construction materials ・Retrofitting of existing buildings Training for masons Construction training of frame structure buildings (RCC Framed) ・Introduction for course, Lecture on NBC ・Construction of foundation ・Construction of beams and columns ・Construction of floor and roof ・Quality control of construction materials ・Retrofitting of existing buildings Image of mason training  Source: JICA Project for the Transitional Project Implementation Support for Emergency Reconstruction Projects

Title	Designation of disaster stricken areas, high-dense areas, and vulnerable areas (3-4-2)
Responsible Agency	Responsible Agency: Muni(Physical Planning and Construction dep.) supported by the JICA Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley Supporting Agency: MoUD and KVDA
Objectives	・To conduct concentrated reconstruction measures in the designated areas and make the municipal area resilient.
Contents	・Designation of "Disaster Stricken Area" for prior recovery not to spreading damages ・Designation of "High-dense Area" for preventing secondary damages and to secure safe evacuation ・Designation of "High Hazardous Area" considering liquefaction, slope failure, and shakability for better reconstruction and future urbanization in safe condition.
Schedule	2016.7 – 2017.12
Workflow & Output Image	

High-dense Area X **Disaster Stricken Area** X **Current Land Use**

Disaster Stricken Area + High-dense Area

- "Residential Area", "Mixed Residential / Commercial" and "Special Area (Heritages)". Most of the historical centre of Bhaktapur.



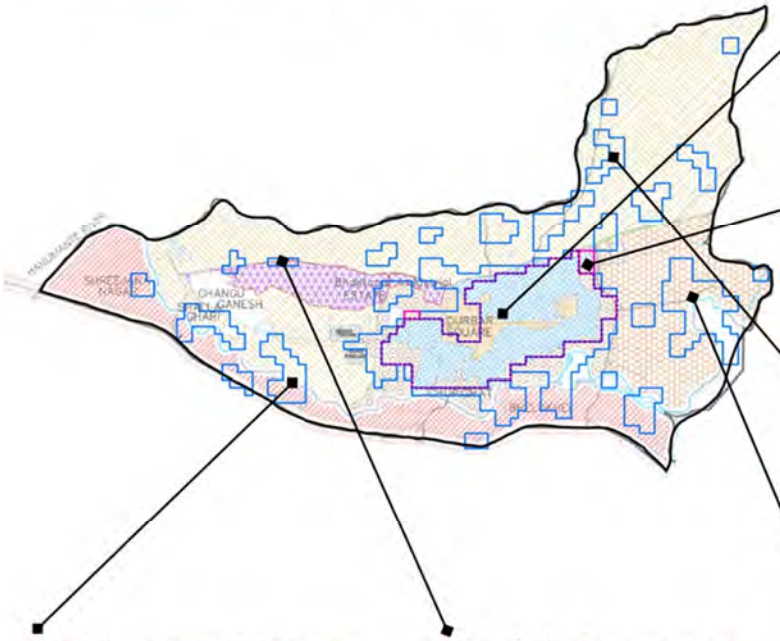
Disaster Stricken Area (Only)

- Some "Residential Area"
- Non urbanized area with several "Residential Area"

High-Dense Area (Only)

- Few "Residential Area" around the centre. (Most of the high-dense area got severe damages)

High-dense Area X **Disaster Stricken Area** X **Zoning Plan**



A: Dense area with huge Building Damages in the historical centre
> Need comprehensive reconstruction measures.

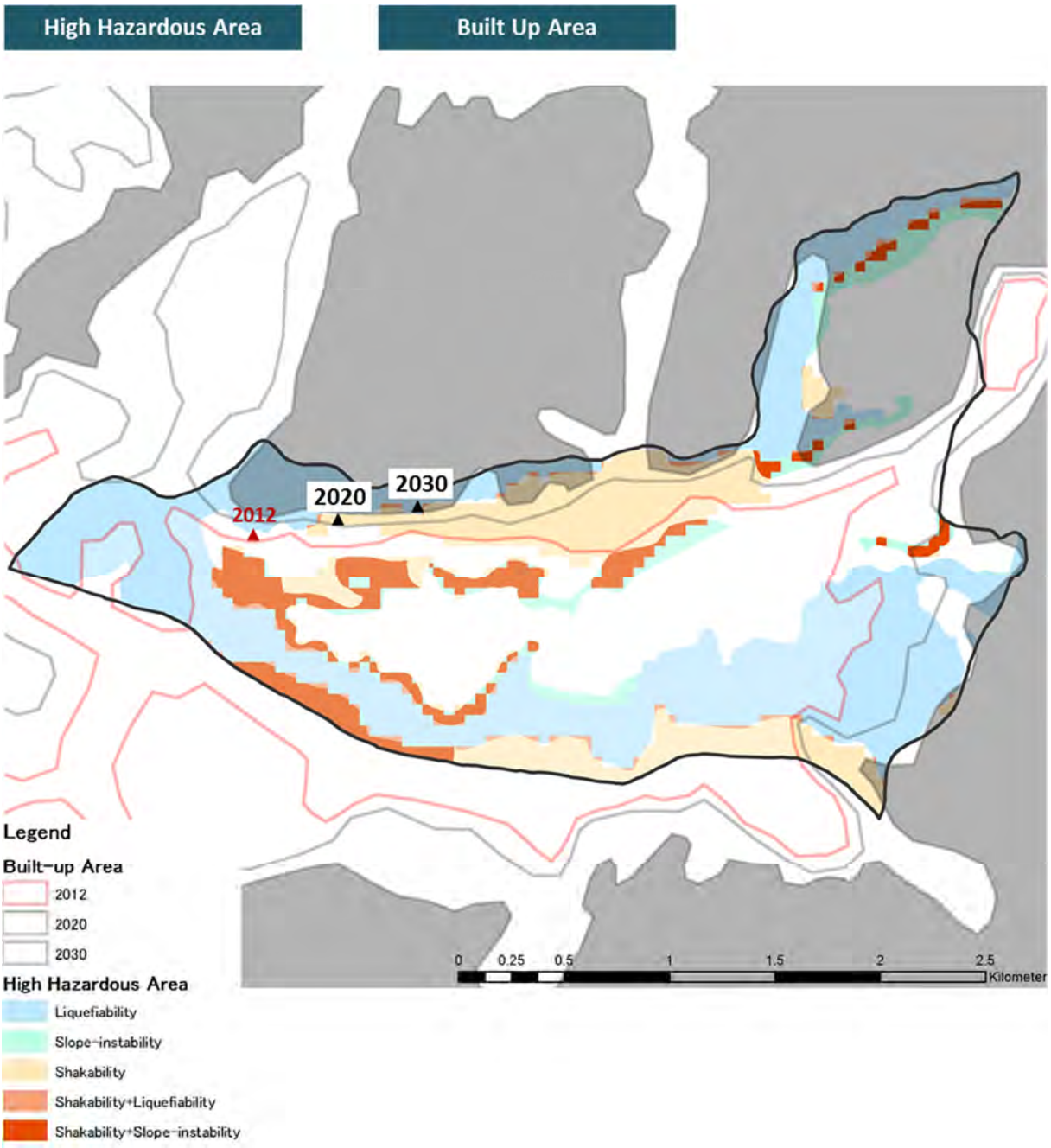
B: Dense, but not many damages. This area might get damages
> Need comprehensive prevention measures.

C: Designated as residential area and urbanization is expected
> Need to confirm geo./topo. Condition for building construction.

D: Designated as planned residential, but got damages
> Need to confirm geo./topo. Condition for building construction.

E: Nearby river, some damages are found.
> Need careful attention for reconstruction and future urbanization.

F: Roadside. Some area got damages.
> Need seismic resistance to secure traffic in emergency condition

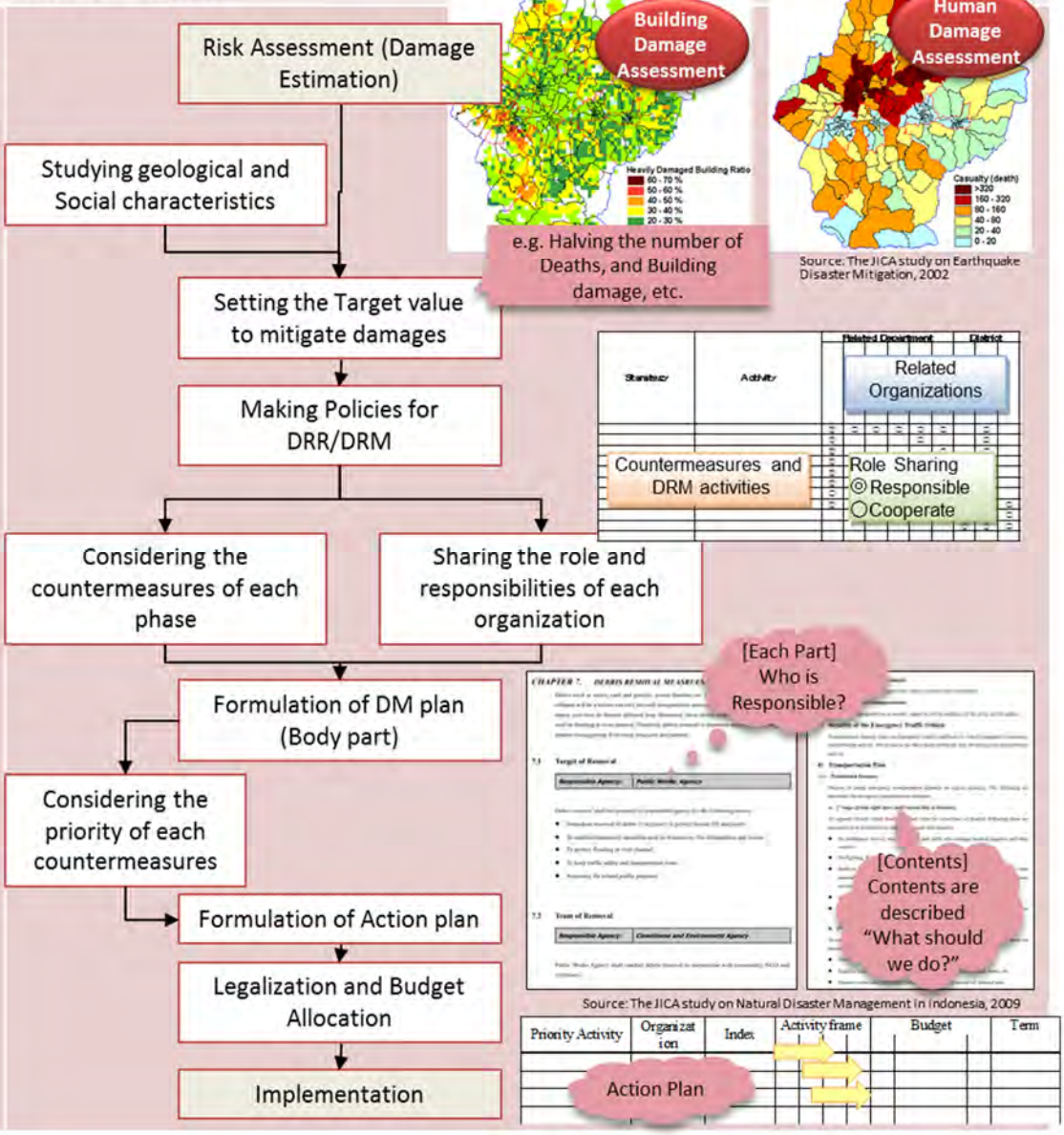


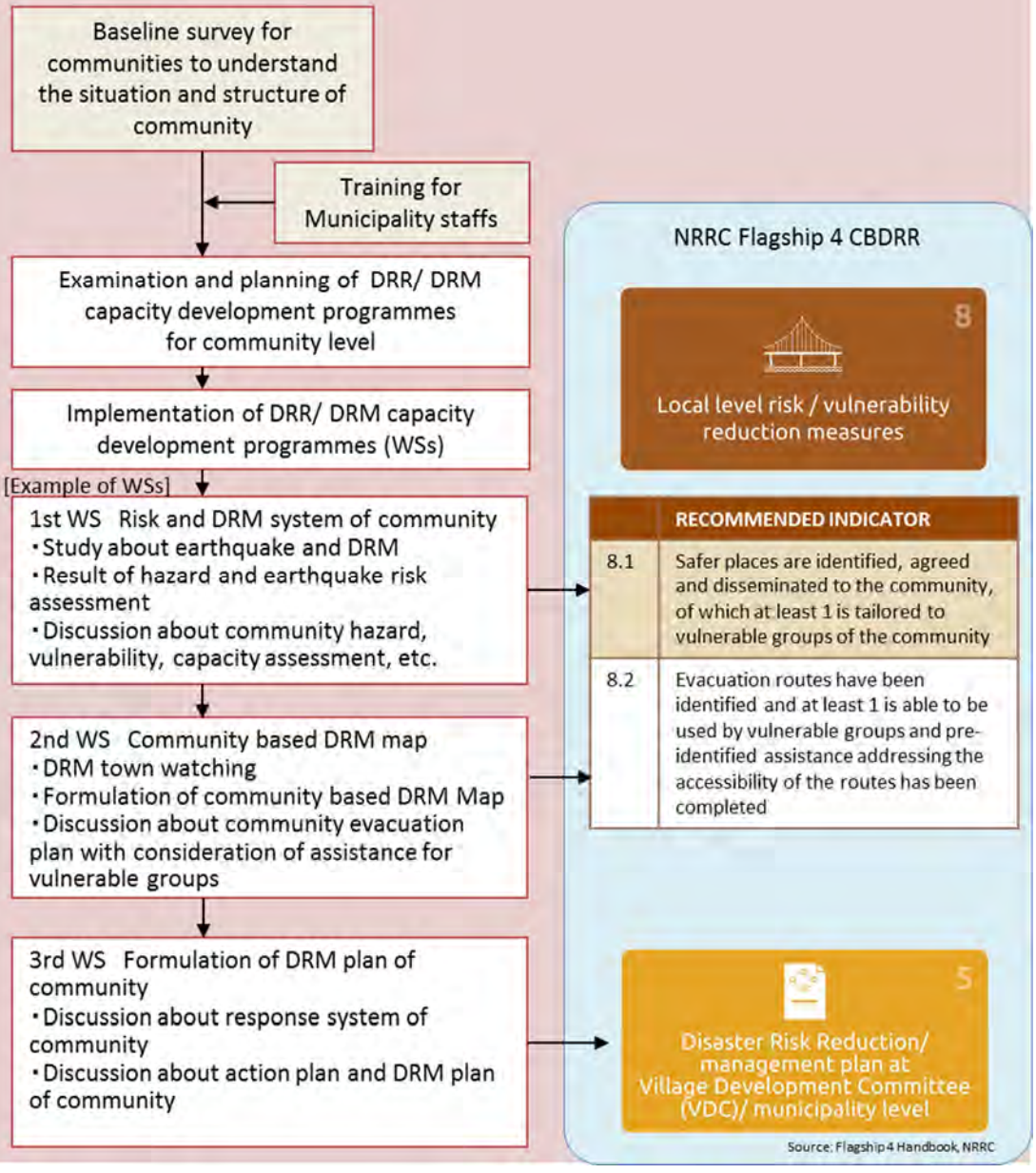
Past development

- Took place in the central area of Bhaktapur, where hazardous areas are relatively less
- Liquefiability is the major types of high hazardous areas

Future development

- Future growth is projected to happen outward
- Growth is projected to take place mainly in high liquefiable and shakable areas

Title	Formulation of Disaster Management Plan (5-1-1)
Responsible Agency	Responsible Agency: Muni(Physical Planning and Construction dep.) by the JICA Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley Supporting Agency: MoFALD
Objectives	・To protect the citizen's lives and property ・To set the target to prevent and mitigate the damages by the future earthquake ・To implement the countermeasures effectively among all stakeholders
Contents	・Regional characteristics of geological and social conditions ・Result of the Risk Assessment ・DRR Target based on the Risk Assessment ・DRR Policies ・Roles and Responsibilities of each organization ・Countermeasures for mitigation/preparedness, emergency response and recovery/reconstruction phases ・Action plan prioritized countermeasures by budget, emergency, and necessity ・Legalization and Budget allocation for Implementation, etc.
Schedule	2016.11 – 2017.12
Workflow & Output Image	

Title	Implementation of DRR/ DRM capacity development programmes for community leaders (5-5-4)
Responsible Agency	Responsible Agency: Muni(Administration dep., Physical Planning and Construction dep.)supported by the JICA Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley Supporting Agency: MoFALD
Objectives	・To develop the capacity on DRR/DRM for communities
Contents	・Establishment of Task forces ・Determination and implementation of DRR/DRM capacity development programmes (Examples of programmes) ・Know risks of own community (Hazard/Risk assessment, Field survey, Risk Mapping) ・Consider disaster preparedness of community (Disaster management planning, Making action plans, etc.)
Schedule	2016.12 – 2017.12
Workflow & Output Image	

CHAPTER 4.
MONITORING AND EVALUATION

Monitoring is an activity to observe the progress of the implementation of the action plan and to identify as well as anticipate the emergence of problems, so that they can be prevented or solved as early as possible.

Monitoring is carried out to observe the progress in the achievement of outputs, delivery of funds and emerging problems. Monitoring needs to be done regularly to obtain accurate information on the implementation of the reconstruction actions and the results achieved.

Evaluation of the implementation of the action plan will be done to the outcomes of actions in the form of impact or benefit for the community and/or Bhaktapur Municipality. In principle, evaluation is a series of activities that compare the realization of action inputs, outputs and outcomes with the plan. Evaluation is done based on the resources used and the indicators and targets of an action.

Monitoring and evaluation are conducted with regard to the following principle and format is shown as follows:

1. Effectiveness	A criterion for considering whether the implementation of action has benefited (or will benefit) and has reached its desired result
2. Efficiency	A criterion for considering how economic resources/inputs are converted to results. The main focus is on the relationship between project cost and effects/output
3. BBB Impact	A criterion for considering the effects of the project with an eye on the longer term effects, positive or negative, intended or unintended with the BBB concept

Format of Monitoring and Evaluation

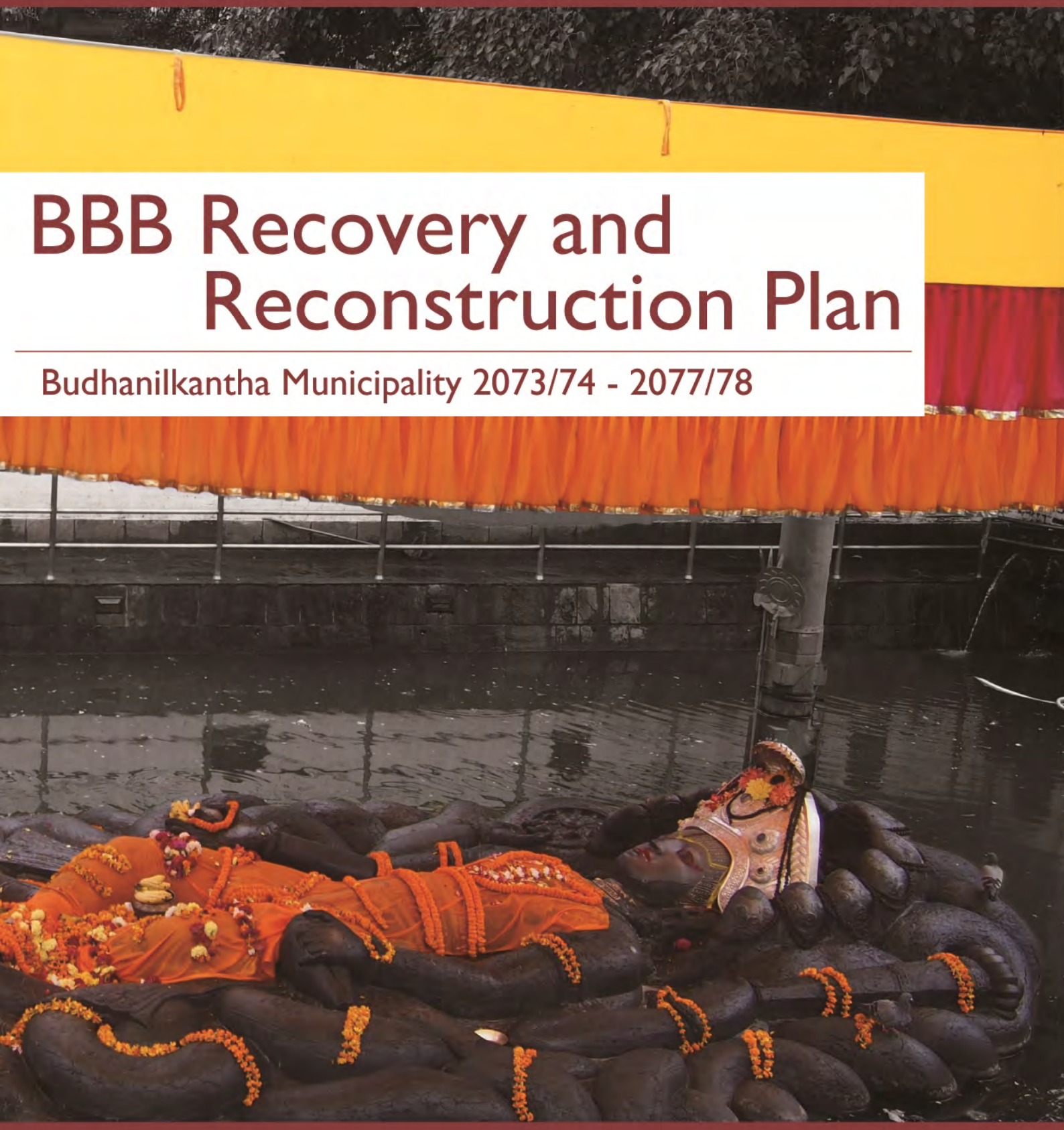
ACTION	PROGRESS / INDICATOR		BUDGET		EVALUATION (LEVEL OF ACHIEVEMENT)	SOLUTION, NOTES
	PLANNED	**REALIZATION**	**PLANNED**	**REALIZATION**		

Monitoring and Evaluation of the Action plan will be carried out by the responsible agencies of each action. Monitoring and Evaluation will be carried out once every six months.

The Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley in Nepal

BBB Recovery and Reconstruction Plan

Budhanilkantha Municipality 2073/74 - 2077/78



Government of Nepal
Budhanilkantha Municipality
Japan International Cooperation Agency

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Abbreviation

Abbreviation	Official Name (English)
AED	Automated External Defibrillator
BBB	Build Back Better
BCP	Business Continuity Planning
BPS	Building Permit System
CBDRM	Community Based Disaster Risk Management
CBS	Central Bureau of Statistics
CDMC	Community Disaster Management Committee
DDC	District Development Committee
DEOC	District Emergency Operation Center
DED	Department of Electricity Development
DM	Disaster Management
DMG	Department of Mines and Geology
DRM	Disaster Risk Management
DRR	Disaster Risk Reduction
DoR	Department of Road
DUDBC	Department of Urban Development and Building Construction
DWSS	Department of Water Supply and Sewerage
EQ	Earthquake
GDP	Gross Domestic Product
GIS	Geographic Information System
GoN	Government of Nepal
HFA	Hyogo Framework for Action
IOE	Institute of Engineering
JICA	Japan International Cooperation Agency
KUKL	Kathmandu Upatyaka Khanepani Limited
KV	Kathmandu Valley
KVDA	Kathmandu Valley Development Authority
MMI	Modified Mercalli intensity scale
MoE	Ministry of Education
MoF	Ministry of Finance
MoFALD	Ministry of Federal Affairs and Local Development
MoHA	Ministry of Home Affairs
MoHP	Ministry of Health and Population
MoIC	Ministry of Information and Communications
MoTCA	Ministry of Culture, Tourism and Civil Aviation
MoUD	Ministry of Urban Development

Abbreviation	Official Name (English)
Mw	Moment Magnitude
NBC	National Building Code
NGO	Non-Government Organization
NPC	National Planning Commission
NRA	National Reconstruction Authority
NRC	National Reconstruction Committee
NRCS	Nepal Red Cross Society
NRRC	Nepal Risk Reduction Consortium
NSC	National Seismic Center
NSET	National Society for Earthquake Technology Nepal
PDNA	Post Disaster Needs Assessment
PGA	Peak Ground Acceleration
PGV	Peak Ground Velocity
RC	Reinforced Concrete
RDMP	Regional Disaster Management Plan
RRP	Recovery and Reconstruction Plan
SAR	Search and Rescue
SFDRR	Sendai Framework for Disaster Risk Reduction
SOP	Standard Operation Procedure
TOT	Training-of-Trainers
UNDP	United Nations Development Program
UNISDR	United Nations International Strategy for Disaster Reduction
UNOCHA	United Nations Office for Coordination of Humanitarian Affairs
UNOSAT	United Nations Institute for Training and Research Operational Satellite Applications Programme
USAID	United States Agency for International Development
USGS	United States Geological Survey
VDC	Village Development Committees
WB	World Bank
WCDRR	Third UN World Conference on Disaster Risk Reduction
WG	Working Group
WS	Workshop

BASIC PLAN

CHAPTER 1.

OUTLINE OF PLAN

1-1. Background

Gorkha EQ was occurred on 25th April, 2015

On Saturday, 25 April 2015, at 11:56 local time, a huge 7.8 magnitude (USGS) earthquake (Gorkha EQ) struck Barpak in the historic district of Gorkha, about 76 km northwest of Kathmandu. Nepal had not faced a natural shock of comparable magnitude for over 80 years since the Bihar earthquake in 1934. In addition numerous aftershocks have occurred since the Gorkha EQ, the largest aftershock having a magnitude 7.3 on May 12.

The Gorkha EQ and aftershocks caused massive damage and losses, a lot of vulnerable buildings collapsed, which increased the number of deaths. Remarkable and regrettable damage also affected many historical buildings including World Heritage sites. A latest damage and loss assessment shows that over 8,800 people lost their lives and 22,000 people were injured. In addition, over 602,000 private houses and 2,600 public buildings were completely collapsed and 285,000 private houses and 3,700 public buildings were partially damaged. 19,000 classrooms were completely damaged and more than 11,000 classrooms were damaged partially (Data source: Ministry of Home Affairs, as of Nov, 2015). In addition, the national economy has faced a severe negative impact from this earthquake. On the Post Disaster Needs Assessment (PDNA) prepared by the participation of ministries and agencies, the representatives of international organizations and led by the National Planning Commission (NPC), a preliminary projection has estimated a budget amount of 669 Billion Nepalese rupees for the reconstruction.

Budhanilkantha Municipality was affected by the Gorkha EQ

In particular, Budhanilkantha Municipality has been affected by the Gorkha EQ, 19 people lost their lives and 87 people were injured. For the building damage, around 3,400 private houses collapsed completely, and around 6,500 buildings were damaged partially. In addition, several public buildings such as governmental buildings, schools have collapsed or have been affected.

Build Back Better Recovery and Reconstruction is necessary toward future

Though Budhanilkantha Municipality is still in the recovery stage, from now on, the necessary actions must be conducted towards the reconstruction. Residents hope for a quick recovery to normal conditions, however, it will not reduce the vulnerabilities of area for future disasters. Budhanilkantha Municipality has the risk of suffering from more catastrophic earthquakes in the future. To build a more resilient society than before the Gorkha EQ, the concept of "Build Back Better (BBB)" is necessary for the policies of recovery, rehabilitation and reconstruction. The concept "BBB" has become one of the priorities for action of the "Sendai Framework for Disaster Risk Reduction (2015-2030) ", adopted in Sendai, Japan 2015. Therefore, a recovery and reconstruction plan with the primary vision of BBB is prerequisite toward a more resilient society.

Reconstruction is required not only for urban development but also for the revitalization of livelihood, industry development, social welfare, education and widely various fields. This BBB Recovery and Reconstruction plan (RRP) of the Budhanilkantha Municipality shall be contributed as the Master Plan compiled of the necessary measures and actions in order to smoothly and quickly implement reconstruction for victims of life, industry and economy, urban planning for safety and a resilient city in the future through integrating disaster risk reduction into development measures. Furthermore, this plan shall be contributed as the clarification of the roles and responsibilities, and be contributed to the vital implementation with the coordination among all stakeholders.

1-2. Damage Status

1-2-1. Summary of the Gorkha earthquake

A huge earthquake of magnitude 7.8 (USGS) struck Nepal including Kathmandu, the capital city of Nepal, and the vicinity on 25th April 2015, Saturday, at 11:56 a.m. NST, the strongest one since the 1934 Bihar earthquake. The quake is believed to have occurred at the boundary area of the India Plate and Eurasia Plate with the epicentre approximately 80 km to the northwest of Kathmandu and a focal depth of 15 km. The fault plane is estimated as 150 km * 120 km (Yagi, http://www.geol.tsukuba.ac.jp/yagi-y/EQ/20150425). The rupture of the fault started at the hypocentre and transmitted southeast. The maximum slip is around 4m, which happened close to Kathmandu, which in turn caused strong ground motion and then severe damage near Kathmandu. The intensity of MMI at the fault area is mainly VIII with a very limited area of IX (Figure 1-1). There is one strong ground motion record available in KV opened by USGS. There were several great earthquakes which have occurred historically along the thrust boundary of the India Plate and the Eurasia Plate (Figure 1-2).

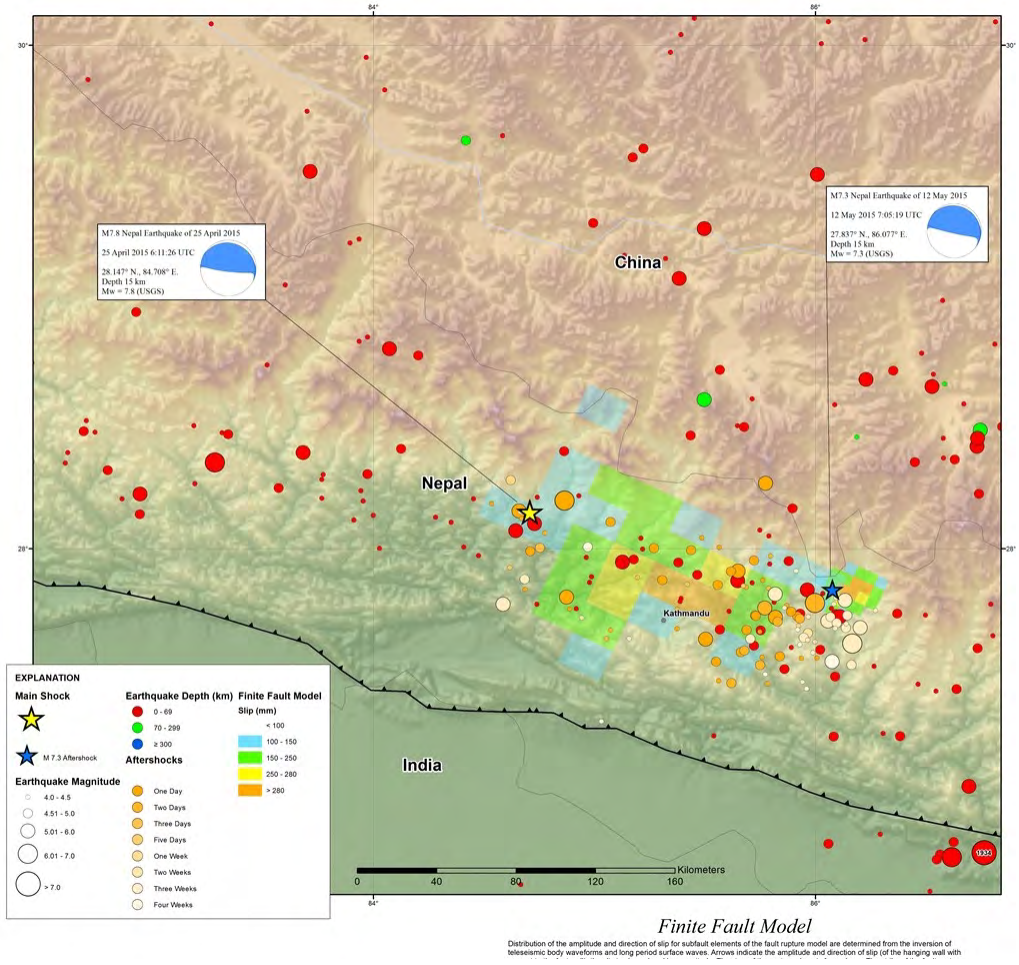


Figure 1-1 Distribution of intensity and estimated fault plane

Source: USGS, http://earthquake.usgs.gov/earthquakes/eqarchives/poster/2015/NepalSummary.php

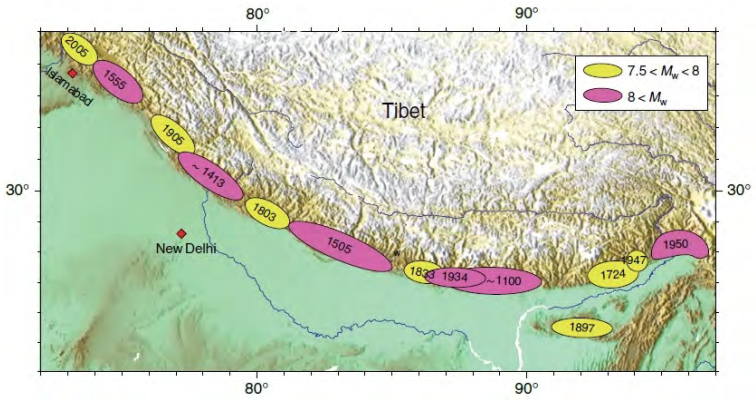


Figure 1-2 Historical earthquakes and central seismic gap

Source: Avouac, Treatise on Geophysics Vol.6, 2007

Hundreds of aftershocks have occurred to date from the Gorkha EQ (Figure 1-3). Three aftershocks larger than M6.0 have happened, and the largest one, with a magnitude of M7.3, happened on 12 May, which caused more than 200 deaths and 2,500 people injured. The large aftershocks are strong enough to cause vulnerable structure damage and it makes the situation worse since the main shock has caused damage for some structures, making them more vulnerable.

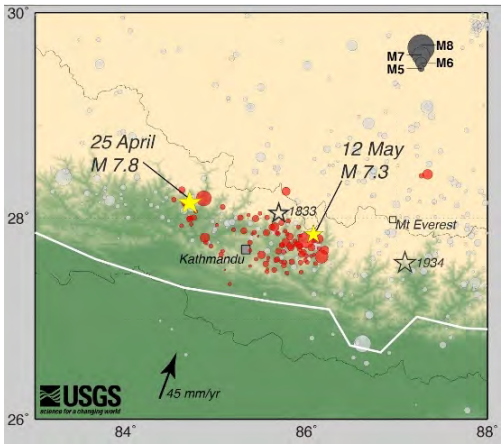


Figure 1-3 Spatial and time distribution of aftershocks more than M5.0

Source: USGS, http://www.usgs.gov/blogs/features/usgs_top_story/magnitude-7-8-earthquake-in-nepal

The seismic intensity of Budhanilkantha Municipality at the Gorkha EQ is shown in Figure 1-4.

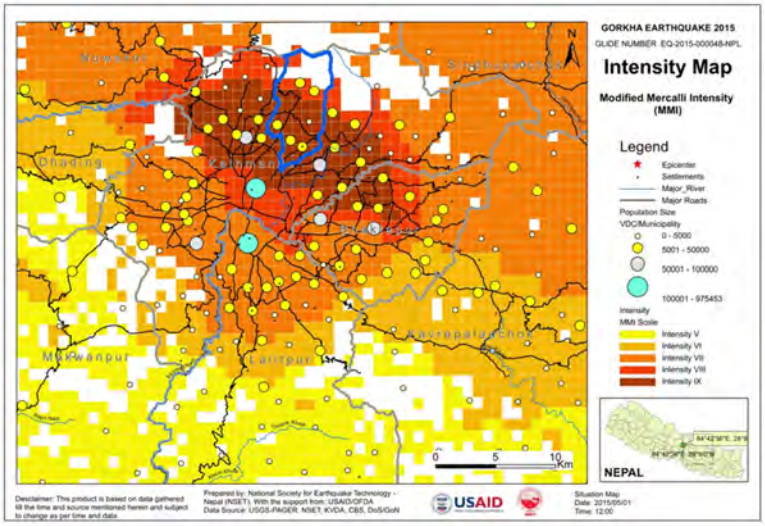


Figure 1-4 Seismic Intensity (MMI) of Budhanilkantha Municipality

Source: NSET, http://www.nset.org.np/eq2015/

1-2-2. Summary of Damage status

(1) Summary of Human Casualties

The following table shows the summary of damaged buildings from the Gorkha EQ in Budhanilkantha Municipality.

Table 1-1 Number of Human Casualties

Ward No.	Human Casualties		Census 2011			
	Death	Injured	Population			Household
			Male	Female	Total	
1	3	7	2,305	2,393	4,698	1,121
2	3	10	1,053	998	2,051	470
3		7	1,979	2,099	4,078	983
4	1	4	2,637	2,735	5,372	1,231
5	3	3	2,591	2,613	5,204	1,230
6		5	2,376	2,469	4,845	1,264
7	2		2,496	2,481	4,977	1,171
8		2	2,840	2,944	5,784	1,411
9	2	2	1,802	1,715	3,517	839
10	2	11	2,788	2,866	5,654	1,428
11		22	4,439	4,387	8,826	2,154
12	3	2	12,296	11,754	24,050	6,246
13		1	2,662	2,720	5,382	1,273
14			9,713	9,318	19,031	4,805
15		1	734	709	1,443	276
16		7	772	808	1,580	300
17		3	702	724	1,426	283
Total	19	87	54,185	53,733	107,918	26,485

Source: [Damage data] Budhanilkantha Municipality, [Census 2011] CBS

(2) Summary of Damaged Buildings

The following table shows the summary of human casualties from the Gorkha EQ in Budhanilkantha Municipality.

Table 1-2 Number of Damaged Buildings

Ward No.	Damaged Buildings			Census 2011						
	Fully Damage	Partially Damage	Total	Household by Type of foundation of house						Total
				MBBS	CBBS	RCCpill	Wpiller	Others	NS	
1	285	310	595	173	178	233	6	0	4	594
2	220	181	401	190	46	77	1	0	3	317
3	157	535	692	98	215	294	9	0	2	618
4	253	461	714	177	399	174	2	0	7	759
5	243	358	601	183	286	335	3	6	8	821
6	261	366	627	229	276	151	0	1	2	659
7	209	281	490	134	322	272	2	4	7	741
8	162	112	274	113	193	366	4	3	4	683
9	78	256	334	60	204	184	46	0	8	502
10	90	367	457	65	191	539	9	0	3	807
11	100	732	832	94	380	769	6	1	11	1,261
12	109	564	673	83	821	1,742	38	2	20	2,706
13	222	465	687	127	330	305	4	1	9	776
14	286	1181	1467	213	852	1,031	14	13	25	2,148
15	184	46+70(Minor)	300	134	31	67	7	9	0	248
16	293	114	407	150	80	37	0	0	2	269
17	230	170	400	135	105	5	1	0	1	247
Total	3,382	6,569	9,951	2,358	4,909	6,581	152	40	116	14,156

Source: [Damage data] Budhanilkantha Municipality, [Census 2011] CBS
MBBS: Mud bonded bricks/stone
CBBS: Cement bonded bricks/stone
RCCpill : RCC with pillar
Wpiller : Wooden pillar
NS: Not stated

(3) Damage distribution map

Damage distribution map of Schools of Budhanilkantha Municipality from the Gorkha EQ is shown as follows:

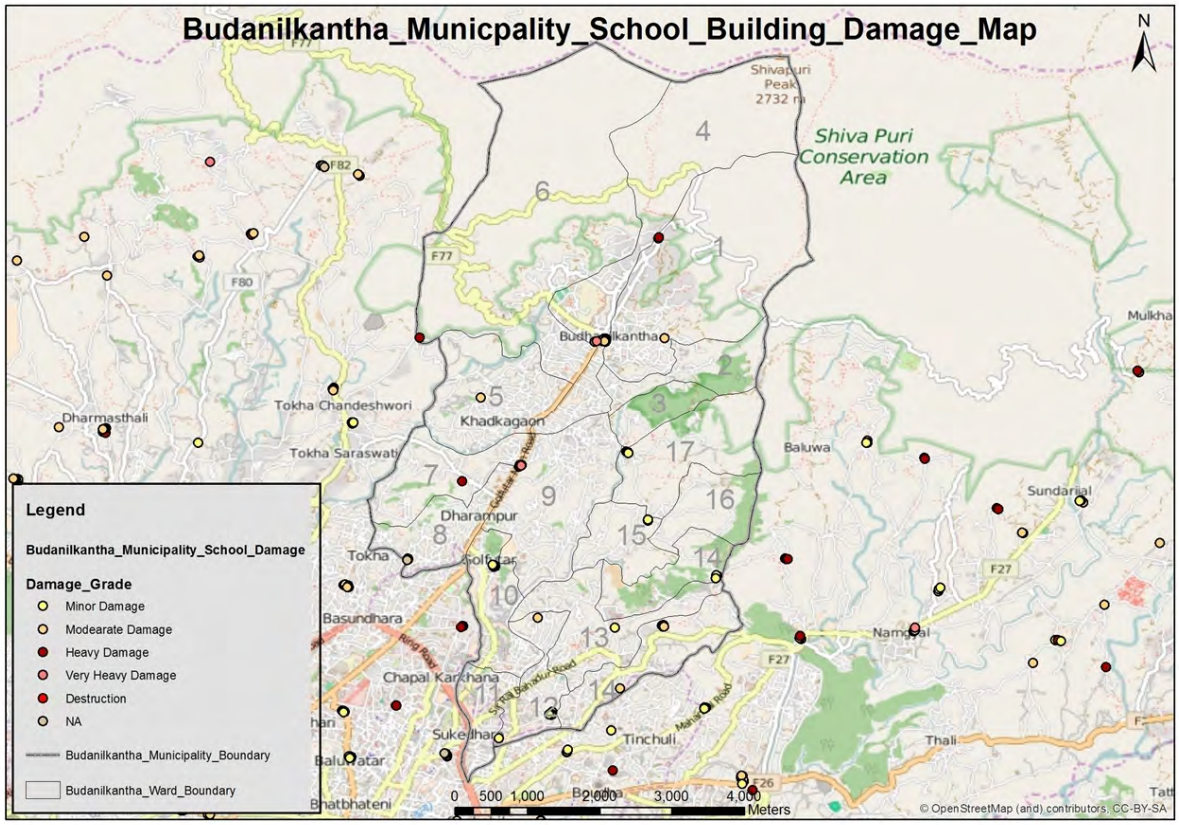


Figure 1-5 Damage Map of Schools

Data Source: Department of Education

(4) Damage status from PDNA

Damage statuses of several sectors from PDNA are shown as follows.

1) Housing and human Settlements

Table 1-3 Calculation of Rental Loss

District	Average monthly rent (NPR)	Damaged rental units	Destroyed rental units
Kathmandu	21,350	30,182	21,988

2) Health and Population

Table 1-4 Damage Status of Health Facilities

District	Hospital		Public Health Care Centre		Health Post		Others		Private sector facilities	
	CD	PD	CD	PD	CD	PD	CD	PD	CD	PD
Kathmandu	0	0	1	7	7	33	0	0	0	24

(CD: Completely Damaged, PD: Partially Damaged)

Table 1-5 Estimates of Damages and Losses by District (NPR million)

District	Infra-structure	Medical equipment	Office equipment	Medicines &supplies	Other logistics	Others losses	Total
Kathmandu	246	2	5	-	0	42	296

3) Nutrition

Table 1-6 Estimated Number of Affected Children under Five Years, and Pregnant and Lactating Women

District	Children <2years*	Children 6-23 months	Children< 5 years	Children 6-59 months	Pregnant women	Lactating women
Kathmandu	73,560	54,686	35,166	31,371	8,969	7,606

* Also gives an estimation of the number of mothers breastfeeding children under two years of age

4) Cultural Heritage

Table 1-7 Damages, Losses and Reconstruction Costs

District	Damage USD	Losses USD	Losses USD	Losses USD	Cost of Recovery and Reconstruction USD
	Damage to physical assets and infrastructure	Impact on livelihood estimated at 10% of damage	Losses from tourist ticket sales	Total value	20% added for the cost of retrofitting and improved seismic design of new structures
Kathmandu	$49,915,000	$4,991,500	$3,044,027	$8,035,527	$59,898,000

5) Agriculture

Table 1-8 District-wise Summary of Damages and Losses (NPR million)

District	Crop subsector			Livestock subsector			Agriculture total				
	Damage	Losses	Total Effect	Damage	Losses	Total Effect	Damage	Losses	Total Effect	Private (%)	Public (%)
Kathmandu	441.65	176.05	617.70	117.18	163.55	280.73	558.84	339.60	898.44	98.57	1.43

6) Irrigation

Table 1-9 Irrigation Systems in Earthquake-affected Districts with Damages and Losses

District	Number of affected schemes	Total cost of damage on irrigation scheme (NPR million) :*1	Cost of damage to office buildings (NPR million):*2	*1+*2	Total loss in CA (ha)	Total loss in Irrigation Service Fee collection (NPR million @ 20% collection rate)
Kathmandu	0	0.0	0.5	0.5	0	0.000

7) Commerce and Industry

Table 1-10 Estimated Damages and Losses to Commerce and Industry (NPR)

Industry	Micro		Cottage/Small		Medium & Large		District wise consolidated	
District	Damage	Loss	Damage	Loss	Damage	Loss	Damage	Loss
Kathmandu	93,420,000	1,080,168,750	2,323,566,083	72,484,770	1,292,632,000	2,262,461,354	3,709,618,083	3,415,114,874

Commerce	Micro		Cottage/Small		Medium & Large		District wise consolidated	
District	Damage	Loss	Damage	Loss	Damage	Loss	Damage	Loss
Kathmandu	748,730,400	2,098,714,000	1,302,913,742	24,637,266	122,619,222	1,920,690,042	2,174,263,364	4,044,041,307

8) Waste, Sanitation and Hygiene

Table 1-11 Damages and Losses in the 14 Severely-affected Districts

District	Water damages (NPR)	Sanitation damages (NPR)	Losses (NPR)
Kathmandu	67,852,500.0	68,277,600.0	236,193,564.0

Table 1-12 Recovery and Reconstruction Initiatives and Costs (Based on needs, DRM/BBB and recovery and reconstruction strategy)

District	Sanitation (NPR)	Water Systems (NPR)	Build Back Better (NPR)			Total Cost (NPR)	Total Cost, US$
			WSP/ Upgrading water quality	Infrastructure	Institutional capacity development		
Kathmandu	68,277,600.0	67,852,500.0	6,785,250.0	10,177,875.0	2,041,951.5	155,135,176.5	1,551,351.8

District	Budget allocation, US$		
	2015/16 (25%)	2016/17 (40%)	2017/18 (35%)
Kathmandu	387,837.9	620,540.7	542,973.1

9) Employment and Livelihoods

Table 1-13 Employment and Livelihoods Sector: Work Days Lost and Income Lost per District

District	Lost work days	Losses in personal income(in millions)	
		NPR	USD
Kathmandu	12,153,753	2,195.1	22.0

1-3. Objective

Objectives for formulation of RRP of Budhanilkantha Municipality are shown as follows; RRP is necessary for the setting and sharing of goals and direction, effective coordination of reconstruction projects, and effective implementation of reconstruction actions.

(1) Setting and sharing of goals and direction

- To clarify the goals and direction of the reconstruction.
- To promote more effective reconstruction actions
- To share the vision among all stakeholders such as government, private sectors and residents.
- To public relations of reconstruction measures/actions

(2) Synchronized coordination of reconstruction projects

- To clarify the role and responsibility of each reconstruction action among all stakeholders
- To coordinate the reconstruction actions among all stakeholders

(3) Effective implementation of reconstruction actions

- To implement reconstruction actions for not only urban development but also industry development, welfare, education, and widely various fields
- To clarify the priority of reconstruction actions
- To implement the reconstruction projects efficiently and comprehensively by monitoring consistency and coordinating such widely various reconstruction projects

1-4. Position

National Reconstruction and Rehabilitation Policy

The Nepal Government together with the international community carried out the Post Disaster Needs Assessment, just after the earthquake to identify the damage cost estimation. The report pointed out that the estimation value of disaster effects (damages and losses) caused by the earthquake is NRP 706 billion or its equivalent US$ 7 billion and 76 percent of the total effects represents the value of destroyed physical assets.

The Nepal Government initiated the concept of Build Back Better towards the resilience of the society with emphasis on the improvement of the Disaster Risk Reduction system in Nepal.

The government of Nepal proposed the bill to establish the National Reconstruction Authority (NRA) as the leading agency of the reconstruction from an earthquake. The bill prescribes the establishment of the National Reconstruction Committee (NRC) and Steering Committee both of which are chaired by the Prime Minister. The bill was approved by the

National Congress in January, 2016.

NRA has prepared the National Reconstruction and Rehabilitation Policy to envisage a guideline for reconstruction and recovery. The rehabilitation and recovery plan on the municipal level is expected to fulfil important roles as the basis for appropriately reflecting the national reconstruction policies to local community people.

Table 1-14 Objectives of National Reconstruction and Rehabilitation Policy

1.	To reconstruct, retrofit and restore the partial and completely damaged residential, community and government buildings and heritage sites to make them disaster resistant using local technology according to the need.
2.	To revive (reestablishment) the damaged cities and ancient settlements by maintaining the original shape with improved structure.
3.	To protect and promote the vulnerable individual and community of the quake affected areas.
4.	To develop new alternatives by reestablishing productive sector for economic opportunity and livelihood.
5.	To study and research on earthquake, its damages and effects, reconstruction, resettlement, rehabilitation and disaster risk reduction.
6.	To develop integrated and planned settlements.

Source: National Reconstruction and Rehabilitation Policy, 2072, NRA

Position of BBB Recovery and Reconstruction Plan Budhanilkantha Municipality

RRP of Budhanilkantha Municipality is the Master plan compiled of the necessary measures and actions in order to implement reconstruction smoothly and quickly for the victims.

RRP of Budhanilkantha Municipality is a municipal document that is owned by Budhanilkantha Municipality. The contents of RRP are related with the Post-Earthquake Recovery and Reconstruction Policy of the Government of Nepal. RRP is indicated the Role and Responsibilities of all sections of Budhanilkantha Municipality, agencies and institutions related to the implementation of recovery and reconstruction of Budhanilkantha Municipality from the Gorkha EQ. According to the concept of BBB and Mainstreaming Disaster Risk Reduction into Development, RRP will be processed to be the integration to the Regional Disaster Management Plan (RDMP).

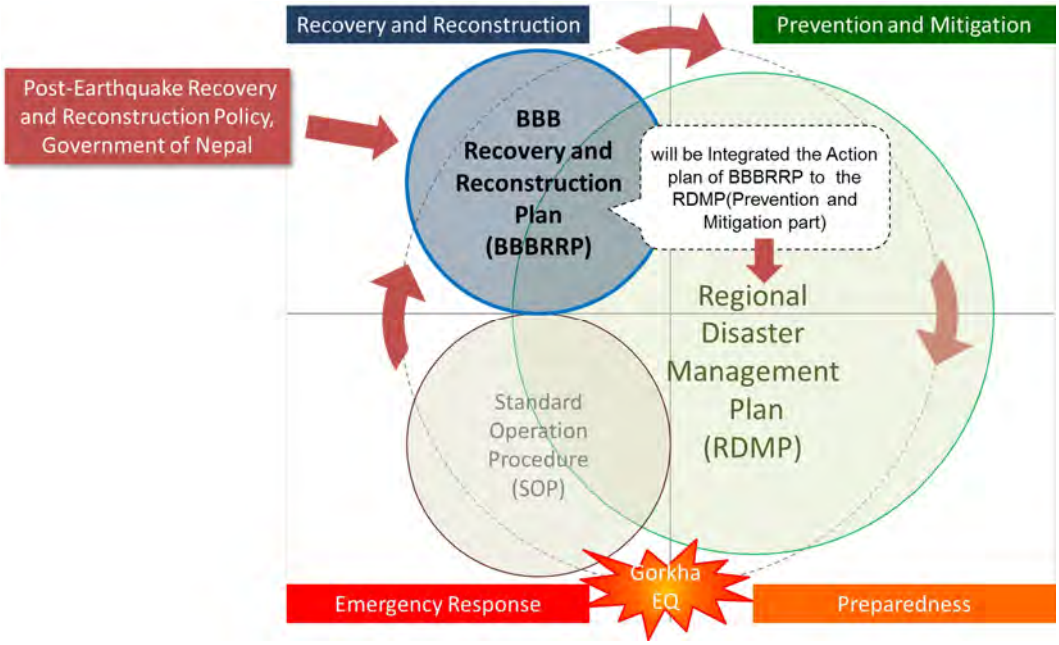


Figure 1-6 Position of BBB Recovery and Reconstruction Plan

The affected area in Budhanilkantha Municipality by the Gorkha EQ is not whole area, however, in order to move toward a more resilient society than before, the scope area of RRP is the whole area and all residents of Budhanilkantha Municipality.

1-5. Period

The target period of RRP of Budhanilkantha Municipality is basically five years and if divided into three phases; Recovery, Revitalization, Development (2073/2074 – 2077/2078). Particularly, in the recovery period, the recovery and reconstruction efforts from the damage of the Gorkha EQ will be conducted intensively. In the revitalization and development period, with the concept of BBB, the efforts leading to the positive reconstruction, restoration and future development will be conducted for the resilient society. The activities of the Revitalization and Development phases are to be integrated into the prevention and mitigation part of the Regional Disaster Management Plan.

Figure 1-7 Period of BBB Recovery and Reconstruction Plan

1-6. System

Structure of BBB Recovery and Reconstruction Plan

The RRP consists of the basic policy and action plan based on the vision of Budhanilkantha Municipality as shown in 2-2. The basic plan shows the entire image of the reconstruction such as vision and grand design based on the damage status and direction for the future. Each vision is divided into several policies, and in each policy the list of necessary countermeasures and actions for detail action plans is included. In order to achieve the policies, the action plan includes the responsible organizations in the municipality in consideration with the coordination with the national or district organizations. By considering budget, importance, urgency and time needed, each action plan is sorted into three phases by priority. The structure of RRP is shown as follows.

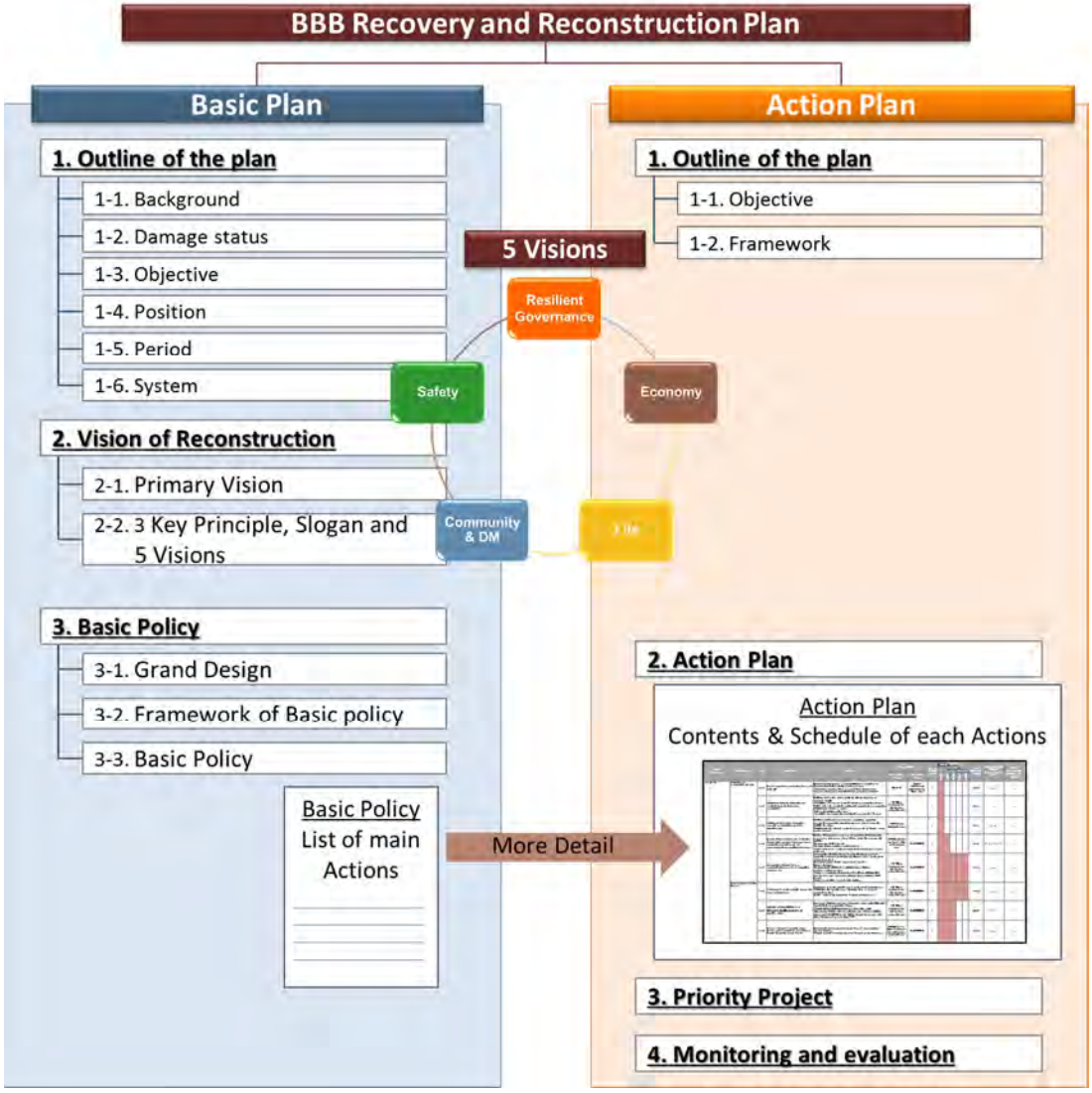


Figure 1-8 Structure of BBB Recovery and Reconstruction Plan

Reconstruction System of Budhanilkantha Municipality

According to the National Reconstruction Policy by NRA, the reconstruction system of Budhanilkantha Municipality shall be established as the following. Based on this system, the reconstruction project will be implemented systematically.

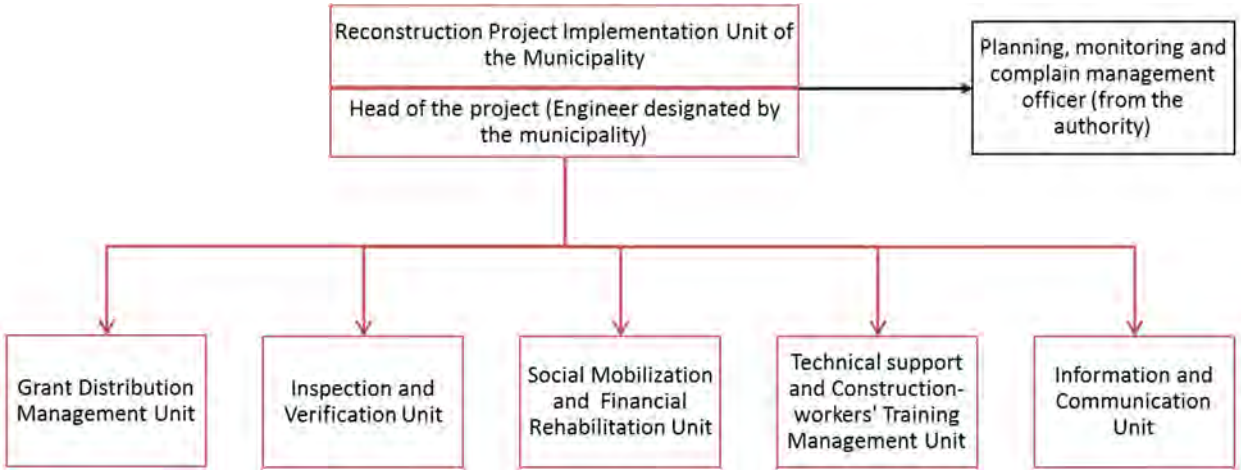


Figure 1-9 Reconstruction System of Budhanilkantha Municipality

Source: National Reconstruction Policy, National Reconstruction Authority

CHAPTER 2.
VISION OF RECONSTRUCTION

2-1. Primary Vision

Primary Vision for BBB recovery and reconstruction plan of Budhanilkantha Municipality is:

Build Back Better (BBB)

toward Seismically Safe and Secure Built Environment

According to the definition of UNISDR, "recovery" after a disaster is "the restoration, and improvement, where appropriate, of facilities, livelihood and living conditions of disaster-affected communities, including efforts to reduce disaster risk factors" (UNISDR, 2009)

The "Build Back Better" concept is an approach to build up a more resilient society during the reconstruction phase, including physical restoration of infrastructure, revitalization of livelihood and economy/industry, and the restoration of local culture and environment, after the disaster has struck. With lessons learned from the disaster experiences, this concept "BBB" has become one of the four priorities for action of the "Sendai Framework for Disaster Risk Reduction (2015-2030, SFDRR) ", adopted in Sendai, Japan 2015.

Priority for Action of SFDRR
Priority 1: Understanding disaster risk
Priority 2: Strengthening disaster risk governance to manage disaster risk
Priority 3: Investing in disaster risk reduction for resilience
Priority 4: Enhancing disaster preparedness for effective response and **"Build Back Better" in recovery, rehabilitation and reconstruction**

Reference: Sendai Framework for Disaster Risk Reduction 2015 - 2030

Chart of the Sendai Framework for Disaster Risk Reduction
2015-2030

Scope and purpose

The present framework will apply to the risk of small-scale and large-scale, frequent and infrequent, sudden and slow-onset disasters, caused by natural or manmade hazards as well as related environmental, technological and biological hazards and risks.
It aims to guide the multi-hazard management of disaster risk in development at all levels as well as within and across all sectors

Expected outcome

The substantial reduction of disaster risk and losses in lives, livelihoods and health and in the economic, physical, social, cultural and environmental assets of persons, businesses, communities and countries

Goal

Prevent new and reduce existing disaster risk through the implementation of integrated and inclusive economic, structural, legal, social, health, cultural, educational, environmental, technological, political and institutional measures that prevent and reduce hazard exposure and vulnerability to disaster, increase preparedness for response and recovery, and thus strengthen resilience

Targets

Substantially reduce global disaster mortality by 2030, aiming to lower average per 100,000 global mortality between 2020-2030 compared to 2005-2015	Substantially reduce the number of affected people globally by 2030, aiming to lower the average global figure per 100,000 between 2020-2030 compared to 2005-2015	Reduce direct disaster economic loss in relation to global gross domestic product (GDP) by 2030	Substantially reduce disaster damage to critical infrastructure and disruption of basic services, among them health and educational facilities, including through developing their resilience by 2030	Substantially increase the number of countries with national and local disaster risk reduction strategies by 2020	Substantially enhance international cooperation to developing countries through adequate and sustainable support to complement their national actions for implementation of this framework by 2030	Substantially increase the availability of and access to multi-hazard early warning systems and disaster risk information and assessments to people by 2030

Priorities for Action

There is a need for focused action within and across sectors by States at local, national, regional and global levels in the following four priority areas.

Priority 1	Priority 2	Priority 3	Priority 4
Understanding disaster risk	Strengthening disaster risk governance to manage disaster risk	Investing in disaster risk reduction for resilience	Enhancing disaster preparedness for effective response, and to «Build Back Better» in recovery, rehabilitation and reconstruction
Disaster risk management needs to be based on an understanding of disaster risk in all its dimensions of vulnerability, capacity, exposure of persons and assets, hazard characteristics and the environment	Disaster risk governance at the national, regional and global levels is vital to the management of disaster risk reduction in all sectors and ensuring the coherence of national and local frameworks of laws, regulations and public policies that, by defining roles and responsibilities, guide, encourage and incentivize the public and private sectors to take action and address disaster risk	Public and private investment in disaster risk prevention and reduction through structural and non-structural measures are essential to enhance the economic, social, health and cultural resilience of persons, communities, countries and their assets, as well as the environment. These can be drivers of innovation, growth and job creation. Such measures are cost-effective and instrumental to save lives, prevent and reduce losses and ensure effective recovery and rehabilitation	Experience indicates that disaster preparedness needs to be strengthened for more effective response and ensure capacities are in place for effective recovery. Disasters have also demonstrated that the recovery, rehabilitation and reconstruction phase, which needs to be prepared ahead of the disaster, is an opportunity to «Build Back Better» through integrating disaster risk reduction measures. Women and persons with disabilities should publicly lead and promote gender-equitable and universally accessible approaches during the response and reconstruction phases

Guiding Principles

Primary responsibility of States to prevent and reduce disaster risk, including through cooperation	Shared responsibility between central Government and national authorities, sectors and stakeholders as appropriate to national circumstances	Protection of persons and their assets while promoting and protecting all human rights including the right to development	Engagement from all of society	Full engagement of all State institutions of an executive and legislative nature at national and local levels	Empowerment of local authorities and communities through resources, incentives and decision-making responsibilities as appropriate	Decision-making to be inclusive and risk-informed while using a multi-hazard approach

Coherence of disaster risk reduction and sustainable development policies, plans, practices and mechanisms, across different sectors	Accounting of local and specific characteristics of disaster risks when determining measures to reduce risk	Addressing underlying risk factors cost-effectively through investment versus relying primarily on post-disaster response and recovery	«Build Back Better» for preventing the creation of, and reducing existing, disaster risk	The quality of global partnership and international cooperation to be effective, meaningful and strong	Support from developed countries and partners to developing countries to be tailored according to needs and priorities as identified by them

www.preventionweb.net/go/sfdrr
www.unisdr.org
isdr@un.org

UNISDR
The United Nations Office for Disaster Risk Reduction

In order to reduce the potential risk of disaster damage, it is necessary to construct houses in the area of lower disaster risk, and to build the urban structure resilient to such disaster. Disasters have demonstrated that the recovery, rehabilitation and reconstruction phase, which needs to be prepared ahead of a disaster, is a critical opportunity to "Build Back Better", including through integrating disaster risk reduction into development measures, making nations and communities resilient to disasters.

Once a serious disaster has occurred in Japan, on each occasion, Japan has revised its building code, design criteria, land use plan, government institutional structure and so on. This is really the sense of "Build Back Better". Therefore, the concept of "Build Back Better (BBB)" is necessary for the policies of recovery, rehabilitation and reconstruction, and BBB was set as the primary vision of RRP.

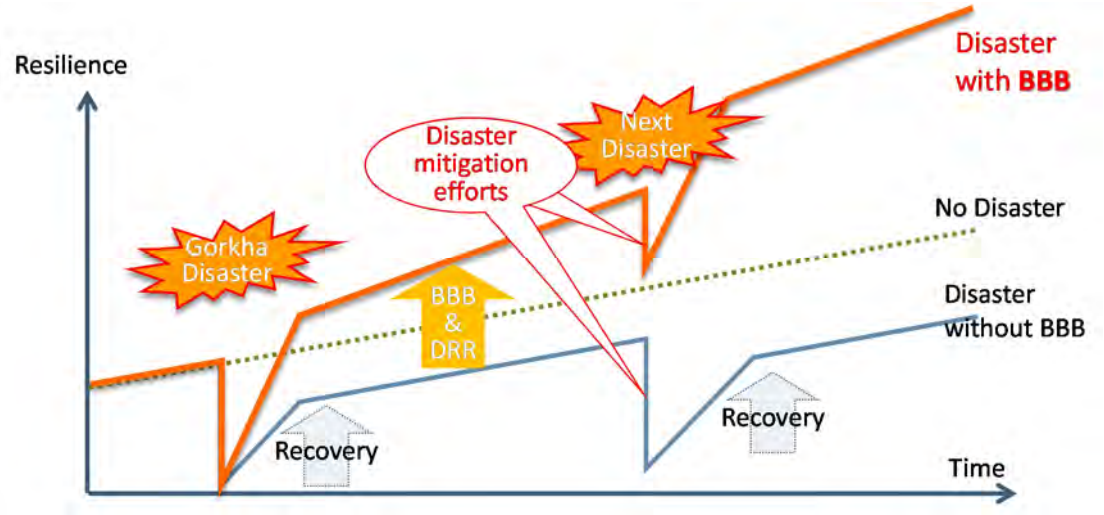


Figure 2-1 Time-sequence concept diagram of Build Back Better

Figure 2-2 Image of Build Back Better (The safety of the town was improved after rebuilding roads as wider ones (Same location in Kobe city))

Left: Before the Great Hanshin-Awaji Earthquake, Right: After the reconstruction from the Great Hanshin-Awaji Earthquake

Source: Disaster Management in Japan, Cabinet Office, Government of Japan

2-2. Three Key Principles, Slogan and Five Visions

2-2-1. Three Key Principles

Based on the primary vision "Build Back Better", in order to move forward with reconstruction, first safety must be ensured. On top of that, it is important to clarify the steps towards reconstruction for life and economy so that residents can continue to live with hope.

Therefore, the three key principles for reconstruction are: safety [Building Resilient Urban Structure, Life [Recovery of Affected People back to Normal] and Economy [Recovery of Regional Economy]. These Key Principles are common principles for recovery and reconstruction of all municipalities.

Figure 2-3 Key Principles for Recovery and Reconstruction

Life

The important subject is to help the affected people by the Gorkha EQ to get back their ordinary life by ensuring housing, educational environment and systems that protect lives and safety, such as health, medical and welfare services. Furthermore, from the BBB's point of view, the recovery and reconstruction plan should be a guide towards a better life with a stable livelihood for the future.

Safety

Ensuring the safety of residents is most important in order to move forward with reconstruction. Early recovery and seismic resistant measures for urban planning, such as public buildings, infrastructures and land use planning, shall be promoted for the safety and security of the people's life.

Economy

Economic activities which have been hampered by an earthquake have to be recovered at an early stage and they would be the vital issue for the city. In addition, the recovery of basic infrastructures such as road networks is also necessary to support economic activities. Thus, the recovery and reconstruction plan should aim at the vital regional economy and further development.

2-2-2. Slogan

Under the BBB concept, slogans showing the direction for the recovery and reconstruction of Budhanilkantha Municipality were set as follows. Since Budhanilkantha Municipality was newly established as the municipality, enhancement of governance is essential for the mitigation of the future earthquakes. Therefore, not only to recover the damage caused by the Gorkha EQ quickly, but also to build the resilient governance for the future earthquakes, Budhanilkantha Municipality goes toward the city to be a model city of BBB resilient disaster governance in the Kathmandu Valley and Nepal.

TOWARD MODEL CITY OF BBB RESILIENT GOVERNANCE

2-2-3. Five Visions

To achieve the objective of the plan, the BBB concept, key principles and slogan, and the visions for the recovery and reconstruction of Budhanilkantha Municipality were set. Three Visions “Life” “Safety” “Economy” consist of the key principles. In addition, the Gorkha EQ revealed the importance and usefulness of community as the following figure shows. The community helped a large number of victims of the Gorkha EQ because the community volunteer is the first executor for the SAR and Initial response activities. This means that the strengthening of community for disaster management will lead to the reduction of damages against future earthquakes. Therefore, the enhancement of community based disaster management (CBDRM) is set as the one of visions for BBB.

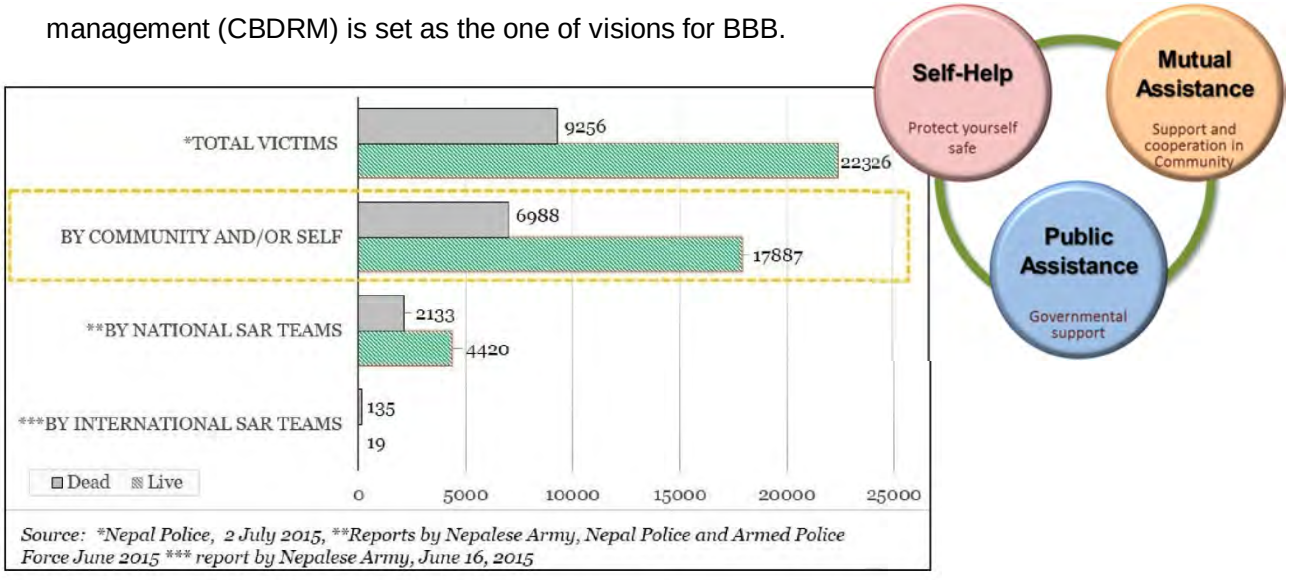


Figure 2-4 Extricated Victims and Recovered Dead Bodies by Different SAR Teams of Gorkha EQ

Source: NSET, Two decades of earthquake risk management actions judged against Gorkha earthquake of Nepal April 2015, New Technologies for Urban Safety of Mega Cities in Asia (USMCA 2015), Kathmandu, October 2015, http://www.nset.org.np/usmca2015/keynote/2_KN2_fullpaper_AmodmaniDixit.pdf

Furthermore, as indicated in 2-2-2 Slogan, in order to build the resilient governance for the future earthquakes with the concept of BBB, it is set as the one of the visions.

The detailed contents of the five visions set up are as follows. Under these visions, the necessary actions will be implemented.

Figure 2-5 Five Visions of BBB RRP

Table 2-1 Contents of Five Visions of BBB RRP

Vision		Contents
RESILIENT GOVERNANCE	Building Resilient Institutional Framework	Resilient governance shall be built for future disasters through the enhancement of the institutional framework for disaster management with the concept of BBB.
LIFE	Revitalization and Improvement of Livelihood	From Key Principles (Refer to 2-2-1)
SAFETY	Urban Planning for a Safer and Secure City	From Key Principles (Refer to 2-2-1)
ECONOMY	Promotion and Improvement of Industry	From Key Principles (Refer to 2-2-1)
COMMUNITY & DM	Strengthening of Community Disaster Risk Management & Resilient Disaster Management System of Municipality	Public awareness on disaster risk reduction/ management (DRR/DRM) and community based disaster risk management (CBDRM) shall be enhanced for the mitigation of future earthquakes. Resilient society shall be built for future disasters through the enhancement of the disaster management systems, facilities and infrastructure for disaster management with the concept of BBB.

CHAPTER 3.
BASIC POLICY

3-1. Grand Design

The grand design of BBB RRP Budhanilkantha Municipality as the indicated direction for reconstruction is shown in Figure 3-2 (p.24).

3-2. Framework of Basic policy

The overall framework of the basic policy is shown in Figure 3-3 (p.25). For each sub sector, the basic policy and main actions are indicated.

3-3. Basic Policy

The basic policy of each vision of BBB RRP is shown as follows. Each policy is indicated in the main list of actions.

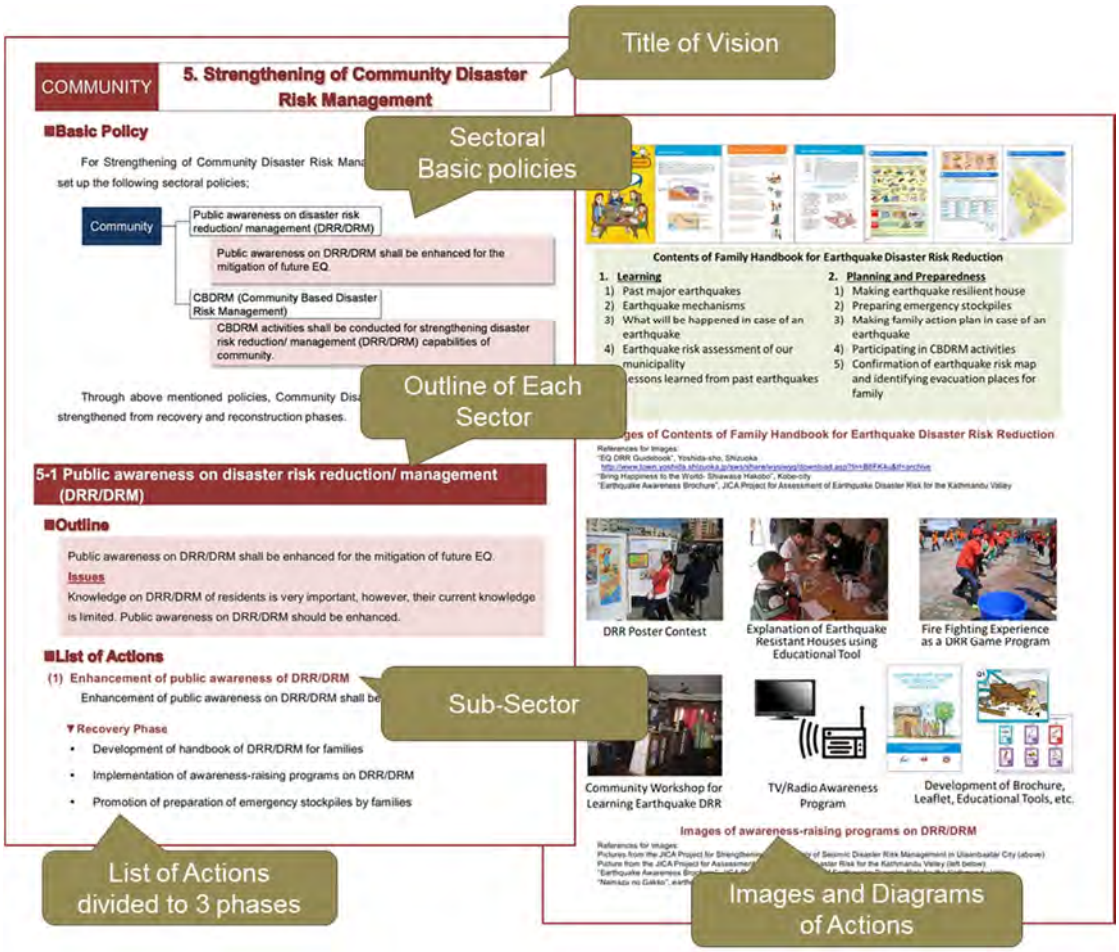


Figure 3-1 Structure of Basic Policy of BBB RRP

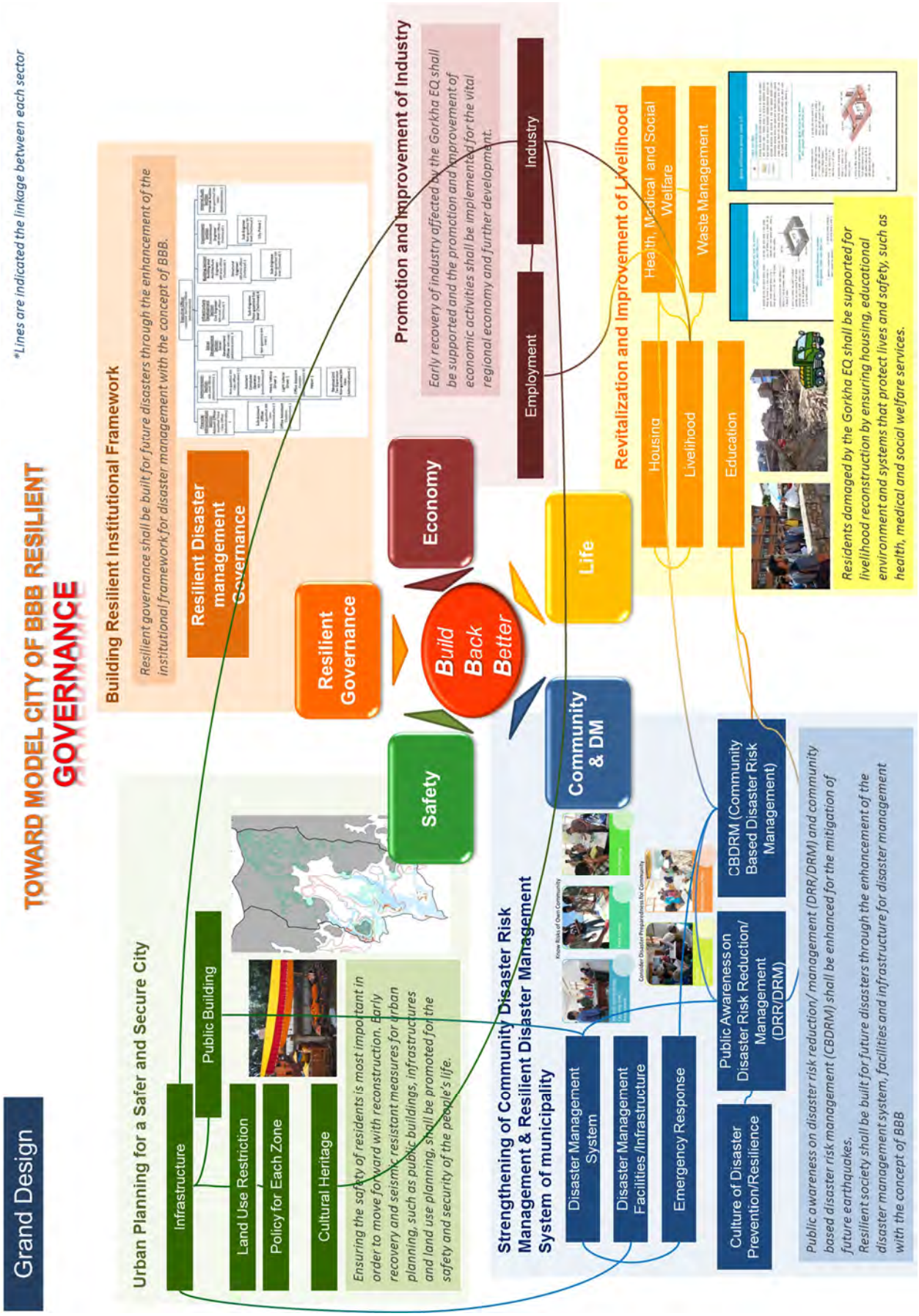


Figure 3-2 Grand Design of BBB RRP Budhanilkantha Municipality

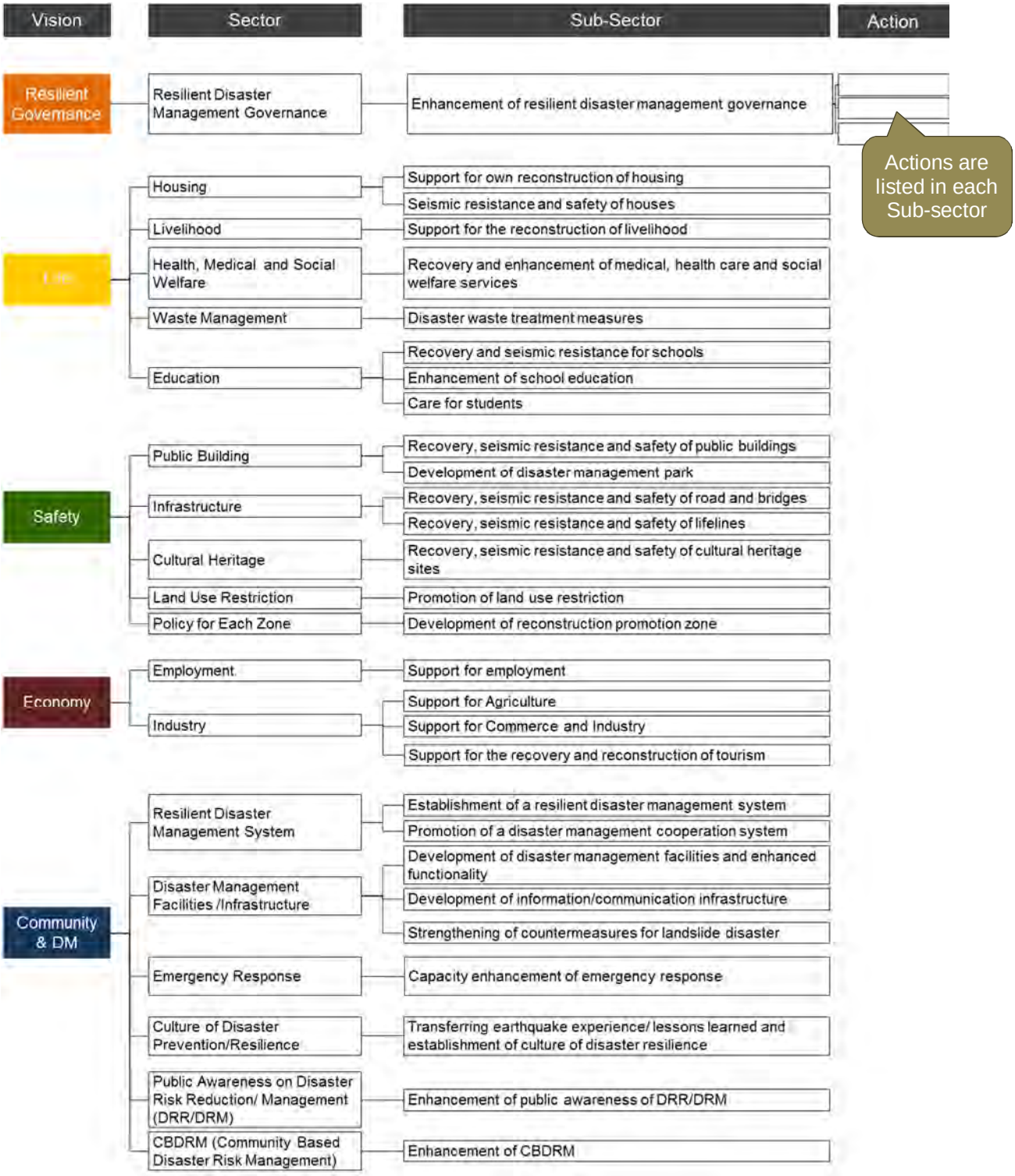


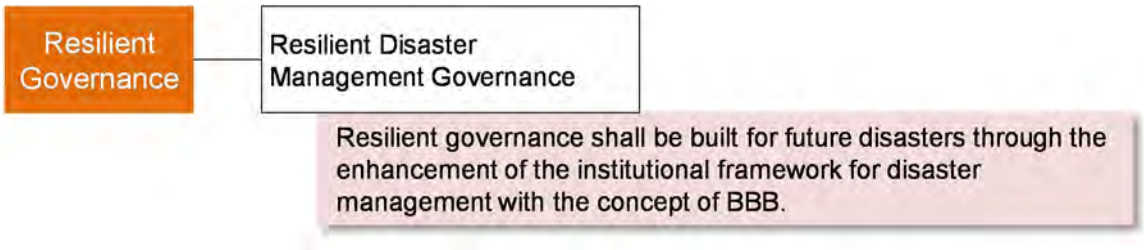
Figure 3-3 Framework of Basic Policy of BBB RRP Budhanilkantha Municipality

RESILIENT GOVERNANCE

1. Building Resilient Institutional Framework

■Basic Policy

For the building resilient institutional framework, the BBB recovery and reconstruction plan set up the following sectoral policies:



Through the above mentioned policies, the resilient governance shall be built for future disasters through the enhancement of the institutional framework for disaster management with the concept of BBB.

1-1 Resilient Disaster Management Governance

■Outline

Resilient governance shall be built for future disasters through the enhancement of the institutional framework for disaster management with the concept of BBB.

Issues

Since the municipality was newly established, the capability of governance is lacking.

■List of Actions

Recovery Phase

- Enhancement of governance through the reconstruction
- Establishment and enhancement of disaster management organization
- Establishment and enhancement of ward level disaster management organization
- Human resource development for disaster management administration
- Mainstreaming of disaster management in development

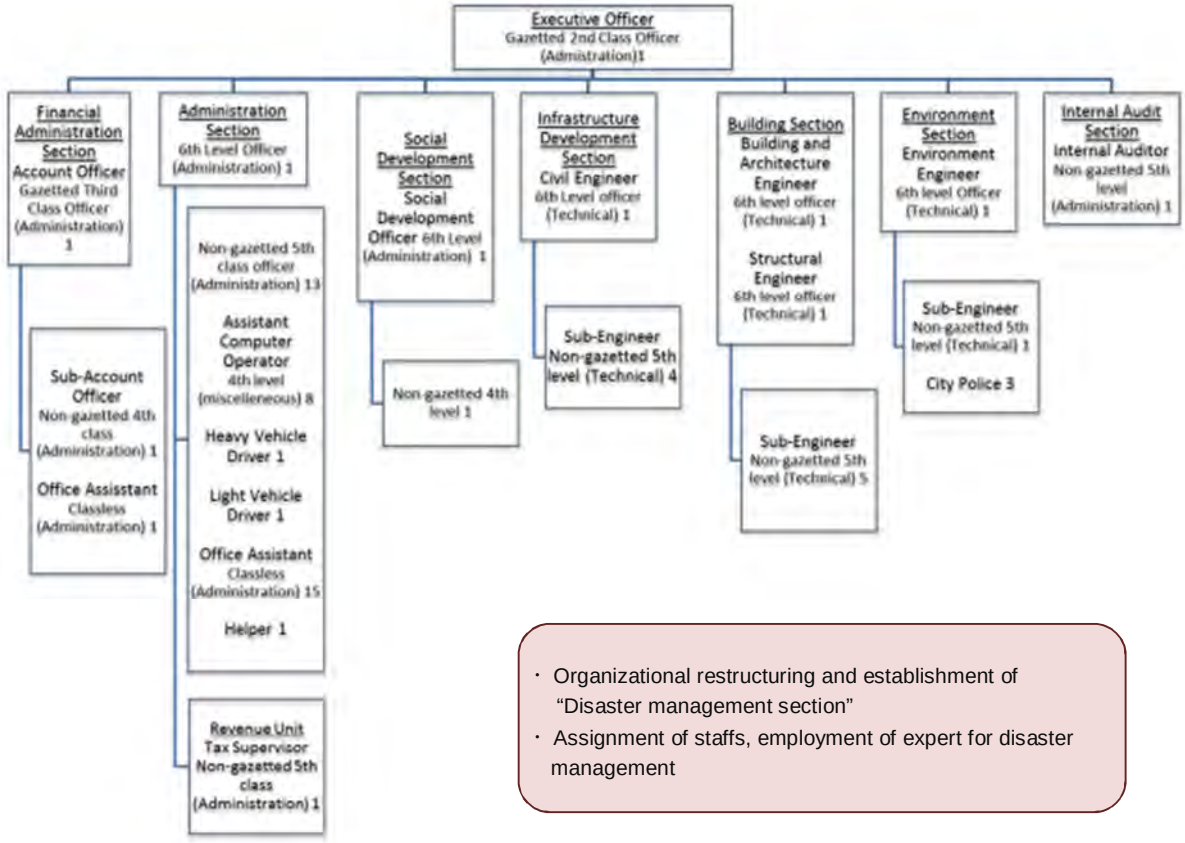
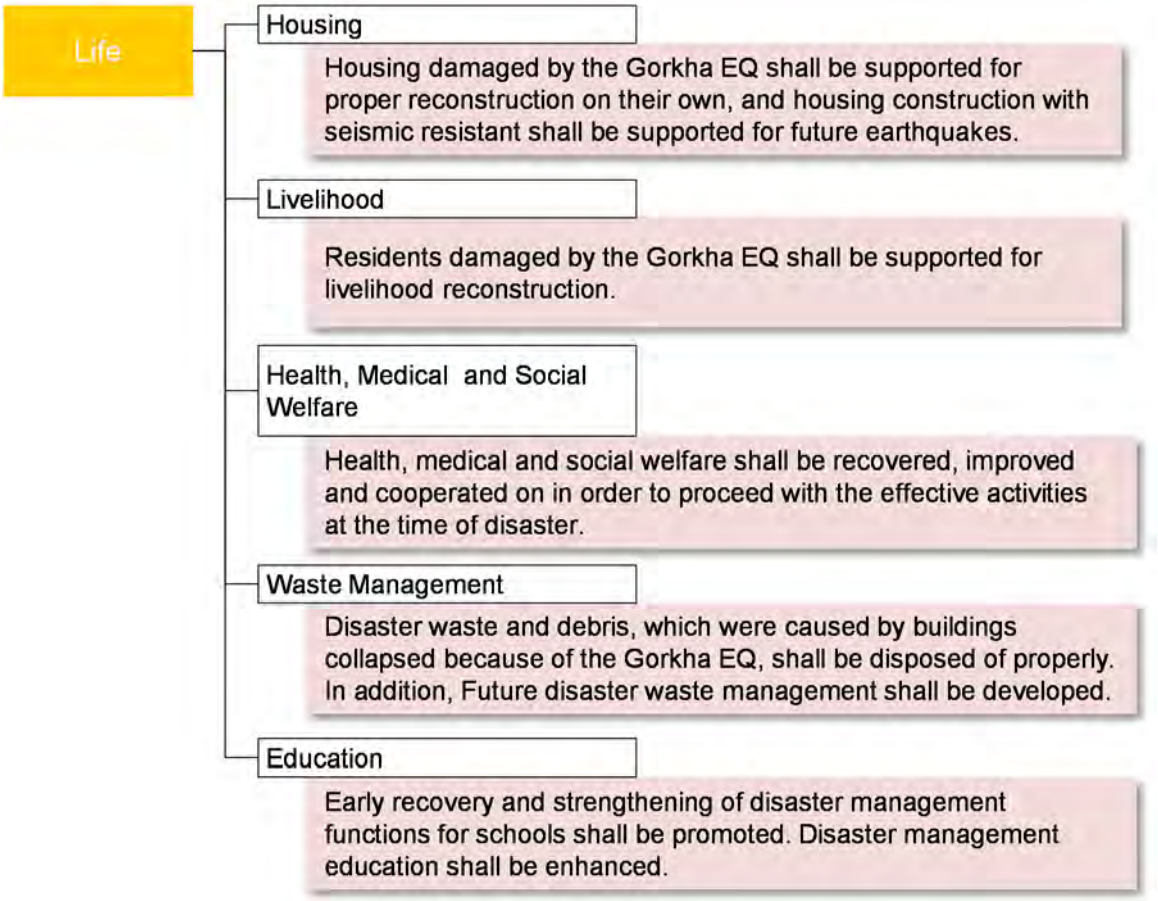


Image of Enhancement of disaster management organization

LIFE	2. Revitalization and Improvement of Livelihood

■Basic Policy

For the revitalization and improvement of livelihood, the BBB recovery and reconstruction plan set up the following sectoral policies for Life:



Through the above mentioned policies, the livelihood of residents should be revitalized and improved from the recovery and reconstruction phases.

2-1 Housing

■Outline

Housing damaged by the Gorkha EQ shall be supported for proper reconstruction on their own, and housing construction with seismic resistant shall be supported for future earthquakes.

Issues

Many houses collapsed in the Gorkha EQ. Proper reconstruction and seismic resistant measures are essential and important for the mitigation of human damages from future earthquakes.

■List of Actions

(1) Support for own reconstruction of housing

Housing damaged by the Gorkha EQ shall be supported for proper reconstruction by the owner with information provision and financial support.

Recovery Phase

- Financial support for the reconstruction of houses damaged by the Gorkha EQ
- Establishment of housing information and consultation bases for the housing reconstruction
- Establishment of housing reconstruction communities, reconstruction support for vulnerable people
- Provision of temporary houses in consideration of social welfare (provision of temporary houses separately for vulnerable people and deprived/marginalized people(Pichadiyeko barga))
- Implementation of training of house reconstruction for masons, local communities, technicians, etc.

Images of Seismic resistant and safety of houses

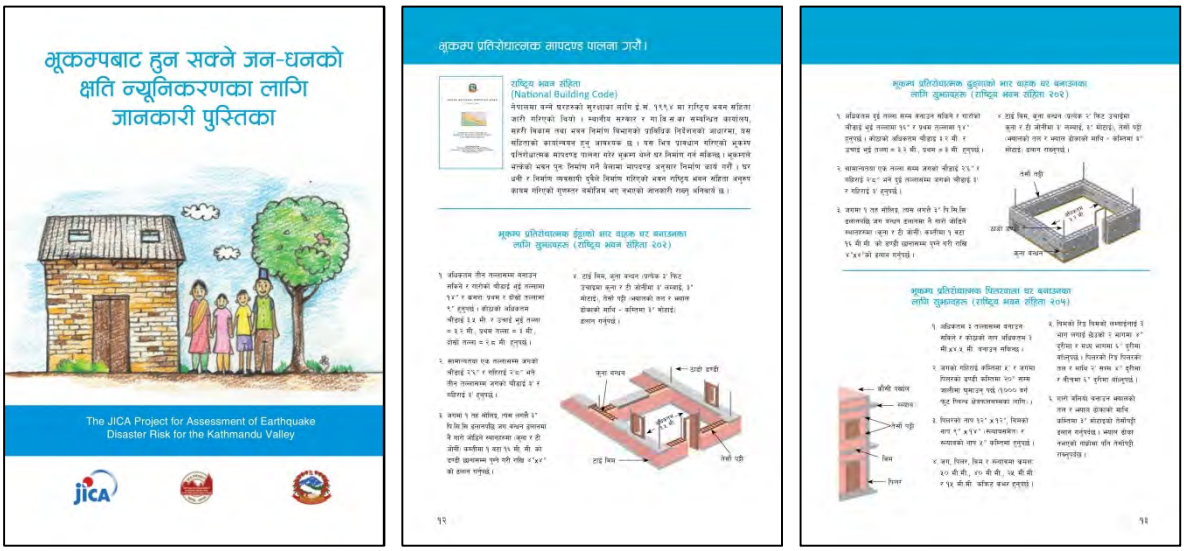
Source: JICA Project for the Transitional Project Implementation Support for Emergency Reconstruction Projects

(2) Seismic resistance and safety of houses

Housing construction with seismic resistance shall be supported for future earthquakes.

Recovery Phase

- Development of capacity and public awareness for seismic resistant houses
- Application of National Building Codes(NBC), enforcement of the building permission and inspection system
- Financial and technical support for seismic diagnosis, seismic resistant measures of houses, and the dispatch of experts for seismic diagnosis



Images of Brochure for construction of seismic resistant houses

Source: JICA Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley

2-2 Livelihood

■Outline

Residents damaged by the Gorkha EQ shall be supported for livelihood reconstruction.

Issues

Many people were affected and have difficulty in daily life because of the Gorkha EQ. Support for livelihood reconstruction is required.

■List of Actions

(1) Support for the reconstruction of livelihood

Residents damaged by the Gorkha EQ shall be supported for livelihood reconstruction.

Recovery Phase

- Financial support for the livelihood reconstruction of victims
- Establishment of a livelihood help desk
- Dissemination of reconstruction information

Help desk(Consultation service) for;	
1. Housing	6. Management and Labor
2. Nuclear radiation	7. Health, Child rearing and mother's milk
3. Nuclear Damage Compensation	8. Volunteer
4. Living expenses	9. Missing
5. Agricultural forestry industries and fishers	10. Prefectural administration

Examples of various help desk (Example of Fukushima prefecture (Damaged area of the Great East Japan EQ), Japan)

Source: Website on Fukushima prefecture, http://www.pref.fukushima.lg.jp/sec/01010d/shinsai-sodanmadoguchi.html#08 (Edited by JICA Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley)

2-3 Health, Medical and Social Welfare

■Outline

Health, medical and social welfare shall be recovered, improved and cooperated on in order to proceed with the effective activities at the time of disaster.

Issues

Several facilities, for health, medical and social welfare, were damaged by the Gorkha EQ. In particular, for vulnerable people and deprived/marginalized people (Pichadiyeko barga), health, medical and social welfare should be improved and cooperated.

■List of Actions

(1) Recovery and enhancement of medical, health care and social welfare services

Safer medical, health care and social welfare services shall be promoted in order to improve the services including the disaster phase.

Recovery Phase

- Recovery for hospitals on the municipal level, health centres and health posts
- Seismic diagnosis and seismic resistant measures of hospitals on the municipal level, health centres and health posts
- Establishment of a mental health care help desk for victims

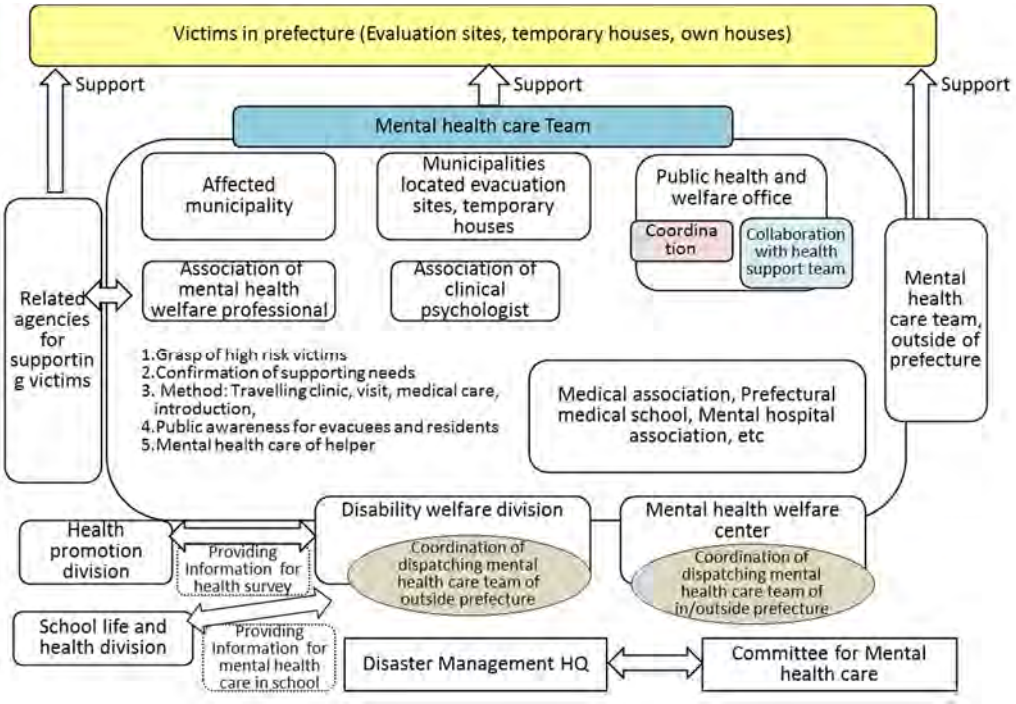


Image of countermeasures for mental health care (Example of Japan, Measures of Fukushima prefecture after the Great East Japan EQ 2011)

Source: Whitepaper on suicide prevention in Japan 2012, Cabinet office, government of Japan, http://www8.cao.go.jp/jisatsutaisaku/whitepaper/w-2012/html/honpen/column/clm6.html
(Edited by JICA Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley)

Revitalization Phase

- Formulation of a plan for vulnerable people

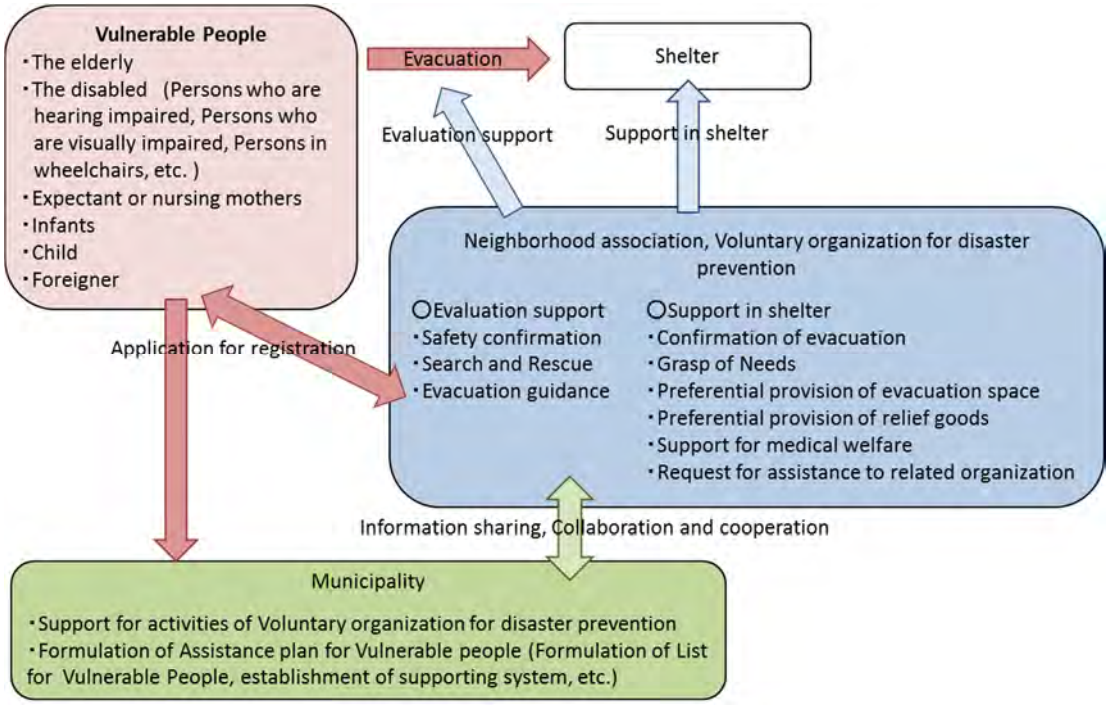


Image of Support for Vulnerable people (Example of Japan)

Source: General plan of evacuation support for vulnerable people in Ogori city, Japan (Edited by JICA Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley)

2-4 Waste Management

■Outline

Disaster waste and debris, which were caused by buildings collapsed because of the Gorkha EQ, shall be disposed of properly. In addition, Future disaster waste management shall be developed.

Issues

Because of the Gorkha EQ, large amounts of disaster waste and debris from many collapsed buildings and it is necessary to dispose of the waste quickly for reconstruction.

■List of Actions

(1) Disaster waste treatment measures

Disaster waste and debris caused by the Gorkha EQ shall be disposed of properly and immediately. Disaster waste management plan indicated treatment policies and procedures shall be formulated for future earthquakes.

Recovery Phase

- Disposal of disaster waste and debris properly (implementation of collection and disposal)

Revitalization Phase

- Formulation of a disaster waste management plan
- Ensuring of temporary stock places for disaster waste

	PREPAREDNESS	Disaster EMERGENCY RESPONSE	RECOVERY/RECONSTRUCTION
PLAN	Formulation of Disaster waste management plan	Formulation of Disaster waste treatment implementation plan	Revision of Disaster waste treatment implementation plan
ORGANIZATION	(Normal phase) Implementation of exercises, Conclusion of agreement for Wide area support	(Emergency phase) Grasp of damage status, Establishment of Initial system Initial response	
DISPOSAL	Grasp of equipment for the collection and transportation of waste	Setting up the collection route for the waste and excretion of evacuation sites	
	Ensure the temporary stock places for disaster waste (formulation of candidate sites)	Setting up the temporary stock places for disaster waste and management	Return of temporary stock places
	Estimation of amount of disaster waste by Risk assessment	Estimation of amount of disaster waste Estimation of possible amount of treatment	Revision of amount of disaster waste
	Flow of treatment Method of recycling	Waste separation and keeping Ensure the disposal site	Recycling and Disposal
FACILITY	Preparedness for the facility	Damage investigation, and Emergency recovery	Repair, recovery and reconstruction

Image for contents of Disaster waste management plan (Example of Japan)

Source: Guideline for formulation of disaster waste management plan in municipal level in Mie prefecture, Platform of disaster waster information, National Institute for Environmental Studies, Japan, https://dwasteinfo.nies.go.jp/topic/project_man.html#listarea
(Edited by JICA Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley)

2-5 Education

■Outline

Early recovery and strengthening of disaster management functions for schools shall be promoted. Disaster management education shall be enhanced.

Issues

Several schools were damaged by the Gorkha EQ. it is necessary to recover damaged schools and implement disaster management education for students.

■List of Actions

(1) Recovery and seismic resistance for schools

Early recovery and strengthening of disaster management functions for Schools shall be

promoted.

Recovery Phase

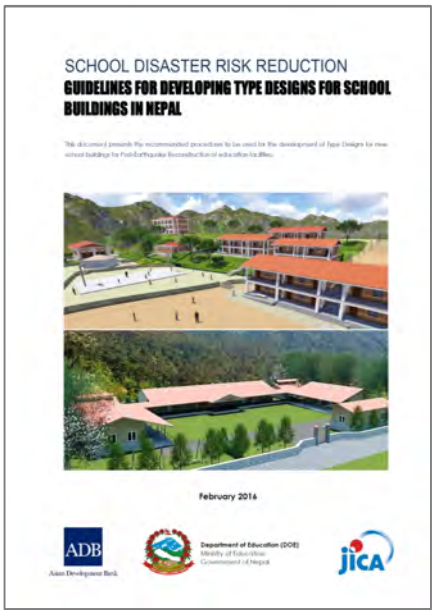
- Recovery and reconstruction of schools

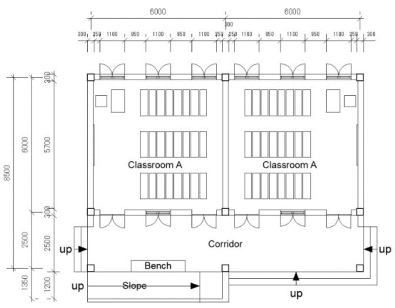
Revitalization Phase

- Seismic diagnosis and seismic resistant measures of schools

List of Damaged public schools

Name	Block	Stories	Structure_	Damage Grade
balbikash samaj Lower Secondary School	1	2.5	RC Frame	1
	2	1	Load Bearing	4
shree budhanilkanth Higher Secondary School	1	1	Load Bearing	1
	2	1	Load Bearing	1
	3	2	RC Frame	2
	4	2	RC Frame/Load Bearing	1
	5	2	RC Frame	1
	6	1	Load Bearing	4
	7	3	Load Bearing	2
shree ganesh Higher Secondary School	1	3	RC Frame	1
	2	2	RC Frame	1
	3	4.5	RC Frame	2
	4	4	RC Frame	4
Aatmabikash Primary School	1	1	Load Bearing	3
	2	2	Load Bearing	3
jan uddhar Secondary School	1	2	RC Frame	3
	2	1	Load Bearing	1
	3	1	Load Bearing	1
Madan aashrit L.School	1	2	Load Bearing	3
shree bhadrakali Primary School	1	1	Load Bearing	3
Shree JanaJhagriti Secondary School	1	2	RC Frame	3
	2	2	RC Frame	1
	3	2	RC Frame	1
shree mahakal jan jagriti Higher Secondary School	1	1	Load Bearing	1
	2	2	RC Frame	3
	3	2	RC Frame	1
	4	2	RC Frame	1
shree naulin Secondary School	1	3	RC Frame/Load Bearing	3
	2	1	Load Bearing	1
Shree Yagyamati Secondary School	1	1	Load Bearing	3
	2	2	Load Bearing	3
	3	2	RC Frame	1
	4	1	Load Bearing	2
Jay bhadrakali Secondary School	1	2	RC Frame/Load Bearing	2
Shree BalKumari Lower Secondary School	1	3	RC Frame	2
Shree Nepal Charter Primary School	1	1	RC Frame	2
shree ram Lower Secondary School	1	2.5	Load Bearing	2
Shree Bal Uddhar Higher Secondary School	1	4	RC Frame	1
	2	4	RC Frame	1
	3	3	RC Frame	1
	4	1	Load Bearing	1
Shree Gram Sikshya Mandir Higher Secondary School	1	3	RC Frame	1
Shree Pathivara Primary School	1	2	RC Frame	1





Ground Floor Plan 1:200

Seismic Resistant Building Guidelines of School

Source: Prepared by JICA and ADB for DOE
Left: GUIDELINES FOR DEVELOPING TYPE DESIGNS FOR SCHOOL BUILDINGS IN NEPAL
Center: INTERIM STRUCTURAL DESIGN CRITERIA FOR TYPE DESIGN OF SCHOOL BUILDINGS

Right: Design of New School Prototypes (Example of single story)

(2) Enhancement of school education

Disaster management education shall be enhanced based on the experiences and lessons from the Gorkha EQ.

Recovery Phase

- Education for disaster management

	Target	Examples of school curriculum		
		1st semester	2nd semester	3rd semester
11-12 years old	・To be able to understand the characteristics of the disaster in area and disaster management system ・To be able to estimate the risk caused by the disaster, to be able to take actions to avoid own risk in the event of a disaster ・To be able to take useful action in consideration of safety of family, friends and the surrounding people in the event of a disaster	◇Natural disasters in our region ◇Comfortable houses and clothes ◇What you can do ◇Evacuation drill(Earthquake)	◇Changes of weather ◇Let's know about the dangers of Flood ◇Our lives and the volcano ◇What would you do when you feel shaking in the town? ◇Evacuation drill(Tsunami)	◇Relevance between information industry and people's lives ◇Various activities in order to protect the safety of the people ◇To be able to prevent injury and simple medical care ◇Political effects of country ◇Preparation for emergency ◇Evacuation drill(Fire)
9-10 years old	・To be able to understand basic knowledge of disaster, to be able to think of contrivance to prevent disasters. ・To be able to have an interest about the dangers caused by the disaster, to be able to consider a way to avoid own risk ・To be able to avoid the risk in cooperation with family, friends and the surrounding people in the event of a disaster.	◇Live safely and town development ◇What would you do when heavy rain, strong wind, thunder happened? ◇Evacuation drill(Earthquake)	◇What would you do when the earthquake happened in the rest time? ◇Evacuation drill(Tsunami)	◇Let's make the original disaster management map ◇Specific examples of our predecessors who committed to the development of the region such as traditional tools, cultural assets and annual events, ◇Evacuation drill(Fire)
7-8 years old	・To be able to have an interest in disaster, to be able to think about safe behavior during disasters. ・To be able to feel danger caused by the disaster, to be able to take the appropriate action by following the adult instruction ・To be able to avoid the danger on own in the event of a disaster, to be able to contact with adults.	◇What would you do when fire happened? ◇Want to know your town more (Involvement of own, people and society) ◇Evacuation drill(Earthquake)	◇What to do when the earthquake happened? ◇Let's try to be able to do by your own ◇Let's go, let's use ◇Evacuation drill(Tsunami)	◇Town exploration ◇Evacuation drill(Fire)

Example of school curriculum for disaster management education in Japan

Source: Ministry of Education, Culture, Sports, Science and Technology, Deployment of disaster management education
(Edited by JICA Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley)

(3) Care for students

Health care and mental health care for students shall be enhanced.

Recovery Phase

- Training for teachers
- Establishment of a mental care counselling room

(1)Training in school
a. Workshop by researchers and experts of the region b. Workshop on sharing experiences by those who have experienced a disaster c. Workshop on planning and practices of disaster management education d. Briefing of planning and manual formulation of the school disaster management education e. Training by the school disaster management committee f. Workshop of treatment method for injury (cardiopulmonary resuscitation, AED, etc.) by the fire department, etc. g. Comprehensive disaster management drills (including the context confirmation of stockpile warehouse, and training for using the disaster prevention equipment) h. Workshop to understand the importance of life and history of disaster in Japan i. Training on mental health care
(2) Training in external institutions (Expert)
a. Training on school safety performed by the Ministry of Education, Culture, Sports, Science and Technology , Teacher Training Center b. Training for leader by local governments c. Training in disaster prevention experience facilities, etc. d. Holding planning committee for disaster management manual e. Training on emergency life-saving (including AED) f. Participation of comprehensive disaster management drill in region g. Training for fire protection manager h. Experience learning session on disaster volunteer
(3) Joint training with students and parents
a. Handing over the students b. Setting up of shelter c. Creation of disaster management maps d. Facility tours to study the history of past disasters e. Session to listen to the experiences of people who have experienced a disaster f. Training on knowing the business content of the people to protect the safety in the area such as fire department, etc.

Examples of training for teachers in Japan

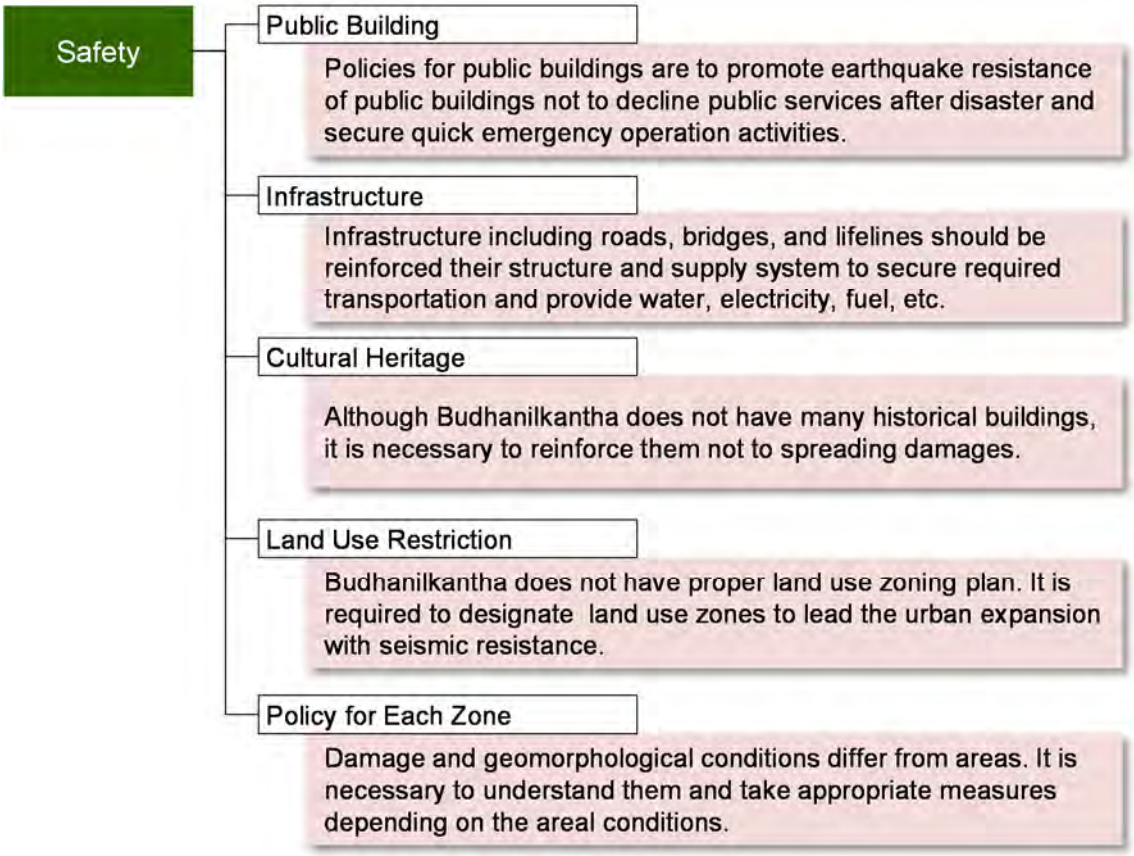
Source: Ministry of Education, Culture, Sports, Science and Technology, Deployment of disaster management education (Edited by JICA Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley)

SAFETY

3. Urban Planning for a Safer and Secure City

■Basic Policy

For safe, secure and sustainable urban development, the BBB recovery and reconstruction plan set up the following sectoral policies for urban planning



Through the above mentioned policies, a resilient and safe city should be built from the recovery and reconstruction phases.

3-1 Public Building

■Outline

Early recovery and seismic resistance measures for public buildings shall be prompt as to not cause the delay of public services.

Issues

In the Gorkha earthquake, several public buildings were damaged. It is necessary to recover immediately and conduct the seismic resistance measures since public buildings are the most important facilities for disaster management and public services.

■List of Actions

(1) Recovery, seismic resistance and safety of public buildings

Damage Status of various public buildings, such as governmental offices and facilities, etc. (Especially actions for hospitals and schools are indicated in Livelihood), shall be clarified in an early phase after a disaster. Recovery and reconstruction measures shall be taken as necessary to ensure public services. In addition, seismic resistant buildings shall be promoted to prepare another disaster.

Recovery Phase

- Immediate damage investigation of public buildings
- Emergency repair of damaged public buildings to secure safety and the construction of temporary public buildings for the operation of emergency relief, medical treatment, and evacuation of life under safe conditions

Images of Immediate Damage Investigation in Recovery Phase

Source: JICA Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley
Note: the Photos taken in Bhakutapur

Revitalization Phase

- Damage diagnosis of all public buildings and the reinforcement of public buildings
- Prioritization and examination of possible unification and rearrangement of public buildings to rebuild and repair public buildings
- Recovery and reconstruction of aseismic public buildings on the basis of the National Building Code (NBC)

Development Phase

- Capacity building and the establishment of a permit process for new public building construction in order to enforce the NBC and land use zoning
- Promotion of aseismic public buildings by unification and rearrangement of public buildings, including construction of common building for government offices

(2) Development of Disaster Management Park

Disaster management parks shall be developed for strengthening disaster management functions and providing public services; such as a “disaster management base” for the

operation of recovery and reconstruction activities and “evacuation site” for securing people’s lives.

Recovery Phase

- Using open spaces (parks) for the operation of emergency relief activities and providing public services

Revitalization Phase

- Designation of open spaces for reconstruction operation and long-term evacuation
- Development of open spaces as evacuation sites and disaster management bases

Development Phase

- Promotion of the construction of evacuation sites and disaster management bases, and the establishment of an institutional system for implementation, operation and management
- Establishment of a legal system to secure open spaces as evacuation sites and disaster management bases in newly developing areas (land pooling project, etc.)

	Classification	Description
Disaster Management Base	**Main Disaster Management Base**	Multiple Usage: Dealing with an extensive disaster required for smooth and accurate operation of recovery for Nation
	Regional Disaster Management Base	Multipole Usage for emergency responses and supporting evacuation life for Region
	Special Disaster Management Base	Single or multiple usage for specific functions (Not appropriate with camp/settlement) (Logistics, Debris Collection, Military Installation, Dead-body Management, etc.)
Evacuation Site	**Regional Evacuation Open Space**	Camp/Settlement” with some required facilities for evacuation life (Medical Care, Vulnerable Assistance, Storage and Distribution , etc.)
	Community Evacuation Open Space	Single Usage for “Camp/Settlement” (with originally suggested function or/and minimum required facilities (Rescue tools, First-aid kit, etc.)

Classification of Disaster Management Park

Source: JICA Project on Rehabilitation and Recovery from Nepal Earthquake

Example of Facilities Required for Disaster Management Park

Source: JICA Project on Rehabilitation and Recovery from Nepal Earthquake

3-2 Infrastructure

■Outline

Early recovery and seismic resistance of infrastructure shall be promoted for the development of safer infrastructure and lifelines.

Issues

Infrastructure was less damaged in Gorkha earthquake. However, because of the low development ratio from the time before the earthquake, problems occurred more for the livelihood at the time of the Gorkha earthquake. In addition to early restoration, new development is required.

■List of Actions

(1) Recovery, seismic resistance and safety of road and bridges

Road recovery for accelerating the reconstruction process shall be implemented and new road and bridges shall be constructed for safe urban development. After an emergency situation, it is necessary to secure safe roads for transportation and evacuation. Therefore, continuous efforts are also required in the rehabilitation and development phase to prepare for the next disaster.

Recovery Phase

- Recovery of roads and bridges in municipal level

Revitalization Phase

- Improvement of earthquake resistant roads for smooth transportation and evacuation, especially for designated emergency transportation roads and evacuation routes

Development Phase

- Continues efforts for improvement and construction of roads, including cooperation with the nation, Kathmandu Valley, districts, and adjacent municipalities/VDCs
- Promotion of road construction together with urban development projects, such as land pooling
- Examination of road standards for municipal roads in consideration of the characteristics of the municipality

(2) Recovery, seismic resistance and safety of lifelines

Early recovery and seismic resistance of lifelines shall be implemented for safer infrastructure. After a disaster, to secure water is important for evacuees, and electricity is necessary for emergency response operation. For the revitalization and development phases, continuous efforts to make safe infrastructure are required.

Recovery Phase

- Early recovery of supply lines and other related facilities and sanitation management

Revitalization Phase

- Taking seismic resistant measures for supply lines and other related facilities, and improve their supply systems
- Development of sustainable stockpiling of water and fuel for emergency use stored in earthquake resistant and safe facilities, and consideration of their distribution and supply system
- Improvement of the sanitation management system

Development Phase

- Continuous development of the expansion of the supplying area and upgrading of existing facilities to be aseismic resistance and with a stable water, sewage, and electricity supply system

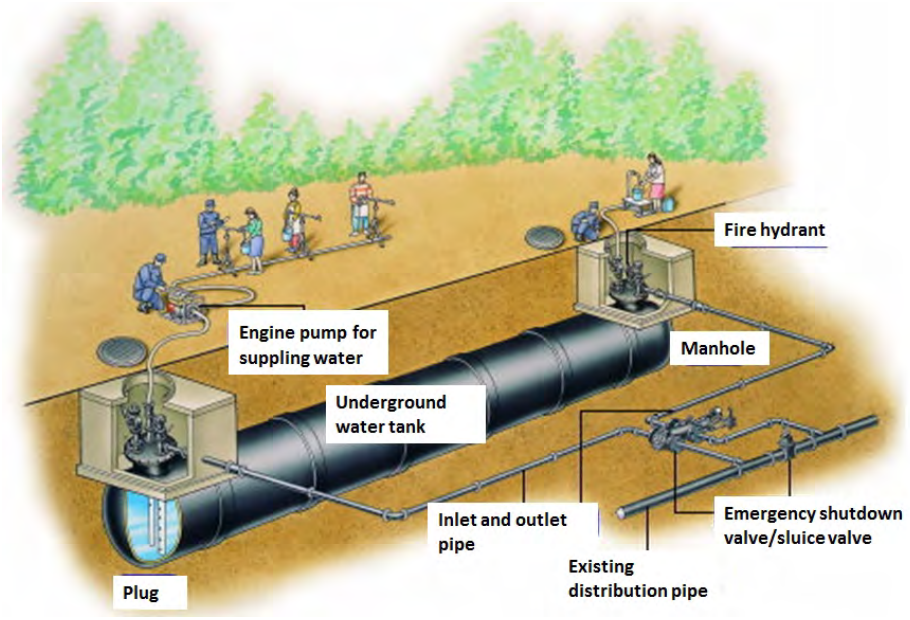
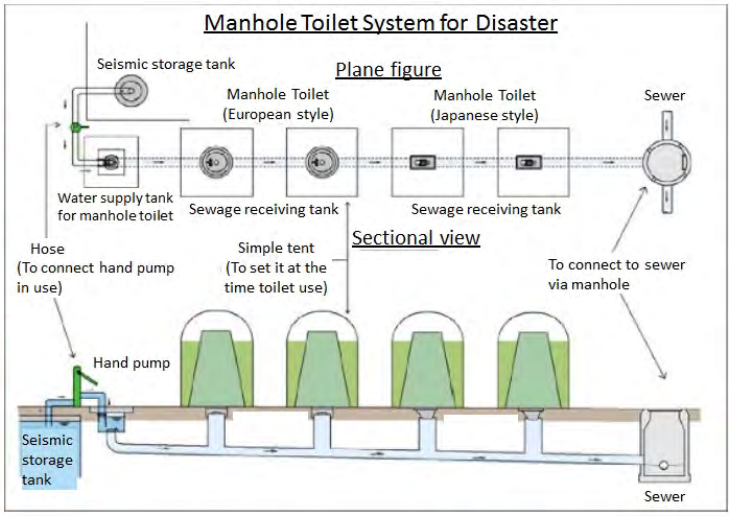


Image of Emergency Water Tank at Evacuation Site in Japan

Source: Saga City Waterworks and Sewerage Bureau (Edited by JICA Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley)



Manhole Toilet System for Disaster in Japan

Source: Ministry of Land, Infrastructure, Transportation and Tourism in Japan (Edited by JICA Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley)

3-3 Cultural Heritage

■Outline

Cultural Heritage, which is an important resource of a municipality, shall be restored to reduce the spreading damages, and recovered to regain the attraction.

Issues

Although not many historical buildings are located in the Municipality. It is necessary to recover or reconstruct immediately not to spread the damages and to conduct the seismic resistant measures since they are the important buildings for people and community.

■List of Actions

Find damaged historical buildings, and; 1) Temporary restoration is required to reduce spreading damages in the recovery phase. 2) Full restoration is required to get back to the original values. 3) Seismic resistance is required to prepare for another disaster in future.

Recovery Phase

- Immediate damage investigation of historical buildings and temporary restoration if necessary

Revitalization Phase

- Recovery through the judgement of urgency from seismic diagnosis and historical importance

Development Phase

- Identifying historically important buildings and evaluation of the vulnerability of buildings
- Restoration of the historical buildings to improve seismic resistance

Cultural Site in Budhanilkantha Municipality

Source: JICA Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley

3-4 Land Use Restriction

Outline

Land use restriction, in consideration of the disaster prone areas based on the classification of geomorphology and soil model, hazard analysis shall be considered for future development.

Issues

In the current situation, land use restriction is not considered as a part of the disaster vulnerability. For urban planning, multiple approaches are required to ensure the reconstruction process based on the land use policies in every stage of planning and implementation. Especially Budhanilkantha, it is strongly required to designate proper land use zones to follow the urban expansion.

List of Actions

Overall urban planning measures are necessary towards the development of municipal areas. Land use planning is one of the major items for this purpose. From the recovery phase, appropriate measures should be taken for a smooth urban development.

Recovery Phase

- Designation of hazardous areas

Revitalization Phase

- Designation of the land use zones and building regulations based on urban growth trend, geomorphology map, hazard assessment, and actual building damages (Risk Sensitive land use)
- Considering the location of open spaces and public buildings (administrative facilities, schools, and hospitals), which can be utilized as emergency response bases, and emergency medical treatment facilities, and evacuation sites in safer and accessible areas

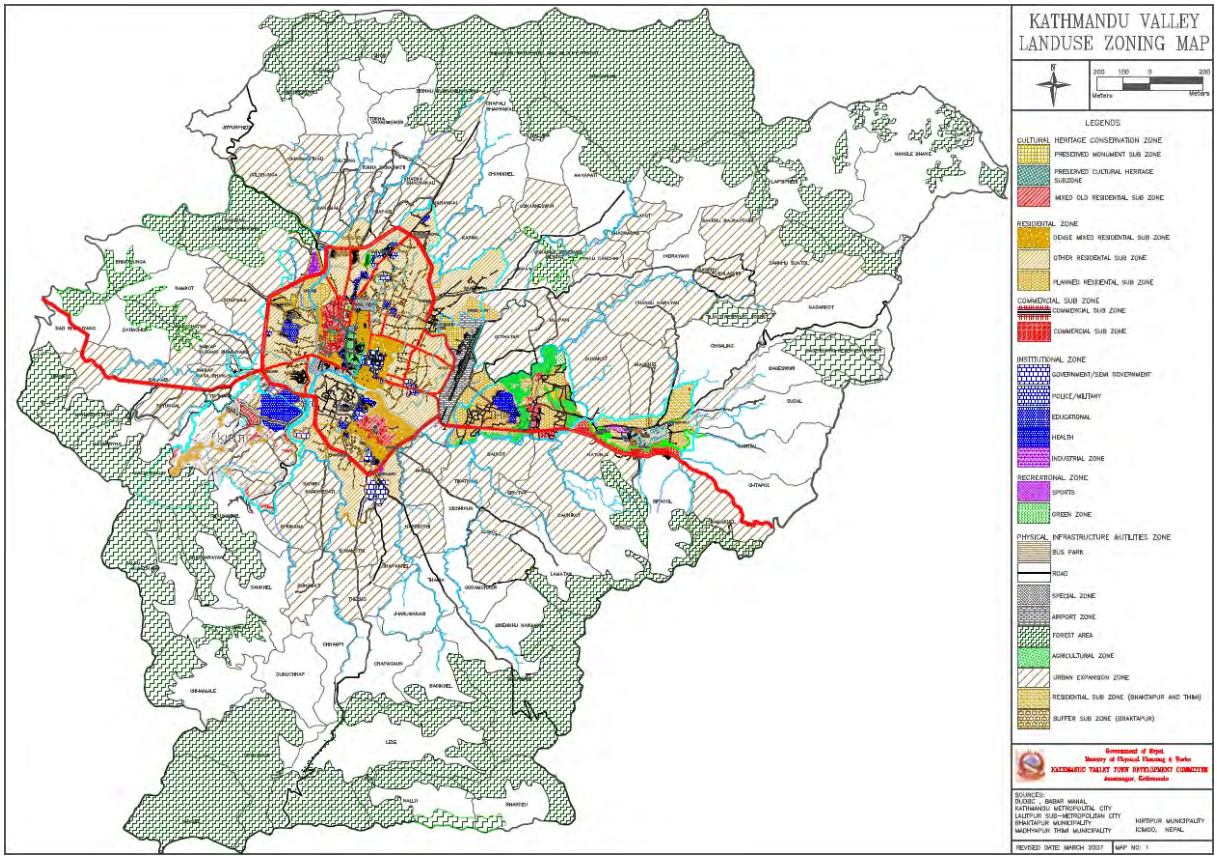
Development Phase

- Institutionalization of the land use zoning and building regulation and appropriate enforcement by municipality
- Promotion of the land use zoning to create a suburban area of Kathmandu Valley with urban planning of the municipality

type	Description
Residential	Residential area should be designated after considering geomorphology and soil condition, and safety. In the case of Budhanilkantha, residential areas should be carefully designated as the existing zoning does not have proper land use zones. It is also important to set evacuation open spaces and routes which should be carefully designed for safer evacuation. Catchment of hospital and public services, transportation convenience should be also considered.
Commercial /Business	Commercial areas in the municipality should be designated in urban planning point of view with consideration of development suitability.
Industry	Designation of industrial area aims to enhance regional industry which supports the economy of the area and reconstruction, and should be done when a suitable land is found. Appropriate designation with disaster management and facilities are also required.
Agriculture	It can be a buffer zone in urbanized areas. Marsh or lower lands should be designated as agricultural use especially for paddy fields. Buildings should not be built on those lands due to soft ground conditions. However, rapid urbanization would require those lands. In this case, more severe building regulations should be applied.

Direction for zoning revision by type of exiting land use

Source: The Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley in Nepal



Land Use Zoning Map in Kathmandu Valley (2007)

Source: Building By-laws Related to Construction in Municipalities and Urbanizing VDCs of Kathmandu Valley, Government of Nepal, Ministry of Physical Planning and Construction, and Kathmandu Valley Municipal Development Committee

3-5 Policy for Each Zone

■Outline

Safety urban planning and development shall be promoted for disaster affected areas. Especially, disaster stricken areas, high-dense areas, and geomorphological vulnerable areas need an overall approach to overcome the weaknesses against disaster.

Issues

The municipal areas are not highly dense, but some areas are vulnerable. Urbanization should take care of the development suitability and if inappropriate lands are developed, necessary measures should be taken for safer urban area.

■List of Actions

Recovery Phase

- Prior emergency relief operation for hazardous areas and areas which were severely damaged
- Designation of disaster stricken areas where intensive measures should be focused on urban planning, and high-dense areas and vulnerable areas which need disaster management for second disasters and other possible disasters

Revitalization Phase

- Revision of land use planning for those designated areas and taking actions as priority

Development Phase

- Overall approach of urban planning for the designated area in order to make the municipality resilient

Priority Area	Priority Measures	
	Developed Area	Future Development Area
High-dense Area / Disaster Stricken Area	> Update zoning plan reflecting urbanization and hazard types	N/A
Vulnerable Area	**1) Measures against liquefaction** > Improve soil and land	**1) Measures against liquefaction** > Minimize development **2) Measures against slope-instability** > Avoid development

Indication for Land Use Policy

Source: The Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley in Nepal

Development type	Type of hazard	Development strategy	Procedure	Programs/actions
Developed area	Slope-instability	Mitigate future disaster impacts by: 1) preventing slope failure and 2) identify area with high slope-instability, especially for **areas with larger population**	Designate: 1) high slope-instability areas; and 2) areas to prevent slope failure	1) **Invest on preventive construction measures** (for slope failure); 2) community/household relocation (small scale)
	Liquefiability	Mitigate future disaster impacts by improving (stabilizing) soil and land	Designate: 1) high liquefiable areas in **urbanized areas**	1) **Invest on preventive construction measures** (for liquefaction) especially for public buildings on urbanized land
	Shakability	Mitigate future disaster impacts by: 1) preventing building collapse in high shakability areas	Understand: 1) high shakable areas to strengthen buildings in the area	1) Improve **building earthquake resistant** (Public and important facilities have higher priorities)
	(active faults)	2) moving buildings (esp. public facilities) off from the active faults	Identify: 2) active faults and designate "fault zone" as hazardous area	2) Move high valuable facilities away from the faults when reconstructing
Future development area	Slope-instability	**Avoid**/minimize development of areas susceptible for slope failure	Designate high slope-instability areas	1) Designate high slope-instability areas as **urbanization controlled area in land use zoning** (to prevent any development); 2) minimize development on slope failure susceptible areas
	Liquefiability	Avoid/minimize future disaster impacts by minimizing vulnerable development in high liquefiable area	1) Understand high liquefiable areas, and 2) minimize development in the high liquefiable areas	1) include **preventive construction measures** (for liquefaction) esp. for new public buildings; 2) educate residents about liquefaction for stabilizing land upon new building construction
	Shakability	Avoid/minimize future disaster impacts by minimizing vulnerable development in high shakability area	1) understand high shakable areas to promote constructing more earthquake resilient buildings	1) **make new buildings earthquake resistant** upon construction (public and important facilities have higher priorities); 2) inform residents on shakability and **preventive measures upon new building construction**
	(active faults)	Avoid future earthquake impacts by controlling "fault zones"	2) Identify active faults and designate area hazardous as "fault zone"	3) Include the designated **"fault zone" to urbanization controlled area** in future land use zoning

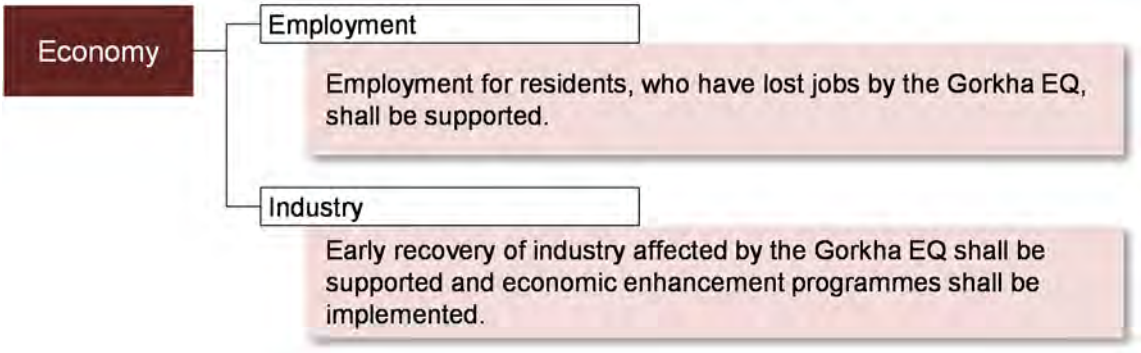
Details of policies and programs for Vulnerable Area

Source: The Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley in Nepal

ECONOMY 4. Promotion and Improvement of Industry

■ Basic Policy

For the promotion and improvement of industry, the BBB recovery and reconstruction plan set up the following sectoral policies for economy:



Through the above mentioned policies, industry and economic activities should be promoted and improved from the recovery and reconstruction phases.

4-1 Employment

■Outline

Employment for residents, who have lost jobs by the Gorkha EQ, shall be supported.

Issues

Many people were affected by the Gorkha EQ including works.

■List of Actions

(1) Support for employment

Employment support shall be implemented such as cash for work, and arrangement of employment opportunities for reconstruction work.

Recovery Phase

- Support for the employment of victims who have lost work (financial support)
- Support for employment, employment training in consideration of vulnerable people and deprived/marginalized people (Pichadiyeko barga)
- Support and introduction of cash or food for work
- Human resource development for reconstruction and arrangement of employment opportunities for reconstruction work

4-2 Industry

■Outline

Early recovery of industry affected by the Gorkha EQ shall be supported and an economic enhancement programme shall be implemented.

Issues

Because of the Gorkha EQ, Industry was damaged, thus should be recovered.

■List of Actions

(1) Support for Agriculture

Agricultural support shall be implemented such as the recovery and development of irrigation.

Recovery Phase

- Recovery support for agriculture
- Recovery and development of irrigation facilities

(2) Support for Commerce and Industry

The commerce and industry of residents shall be supported by the economic enhancement programmes.

Recovery Phase

- Recovery support for stores, shops and cottage industries

Revitalization Phase

- Support for expanding sales channels, trade

(3) Support for recovery and reconstruction of tourism

Recovery and reconstruction of Tourism facilities damaged by Gorkha EQ shall be promoted in order to attract tourists.

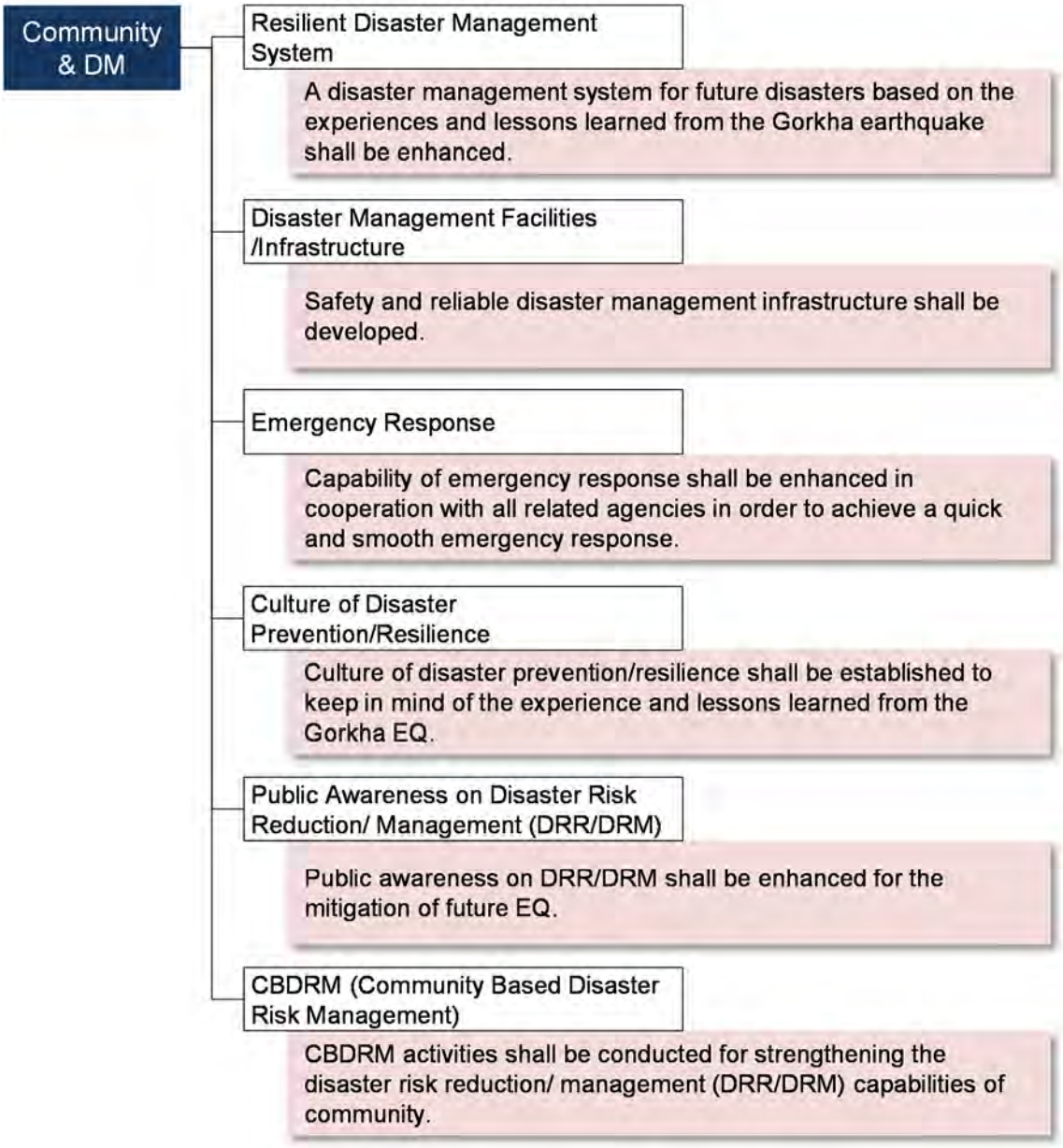
Revitalization Phase

- Promotion of tourism

COMMUNITY & DM	5. Strengthening of Community Disaster Risk Management & Resilient Disaster Management System of Municipality

■Basic Policy

For the strengthening of community disaster risk management & resilient disaster management system of municipality, the BBB recovery and reconstruction plan set up the following sectoral policies:



Through the above mentioned policies, the resilient disaster management shall be built and community disaster risk management should be strengthened from the recovery and reconstruction phases.

5-1 Resilient Disaster Management System

■Outline

A disaster management system for future disasters based on the experiences and lessons learned from the Gorkha earthquake shall be enhanced.

Issues

In the current situation, it is necessary to enhance the disaster management capabilities for future disasters, for resilience.

■List of Actions

(1) Establishment of a resilient disaster management system

A disaster management system shall be established for the enhancement of DRR for future disasters. A disaster management plan shall be formulated to implement projects aimed at DRR. In addition, disaster management administrative governance shall be enhanced.

Recovery Phase

- Accumulation of disaster data for the Gorkha EQ and historical disasters
- Understanding and dissemination of risk areas

Revitalization Phase

- Formulation of disaster management plan
- Formulation and dissemination of evacuation plan

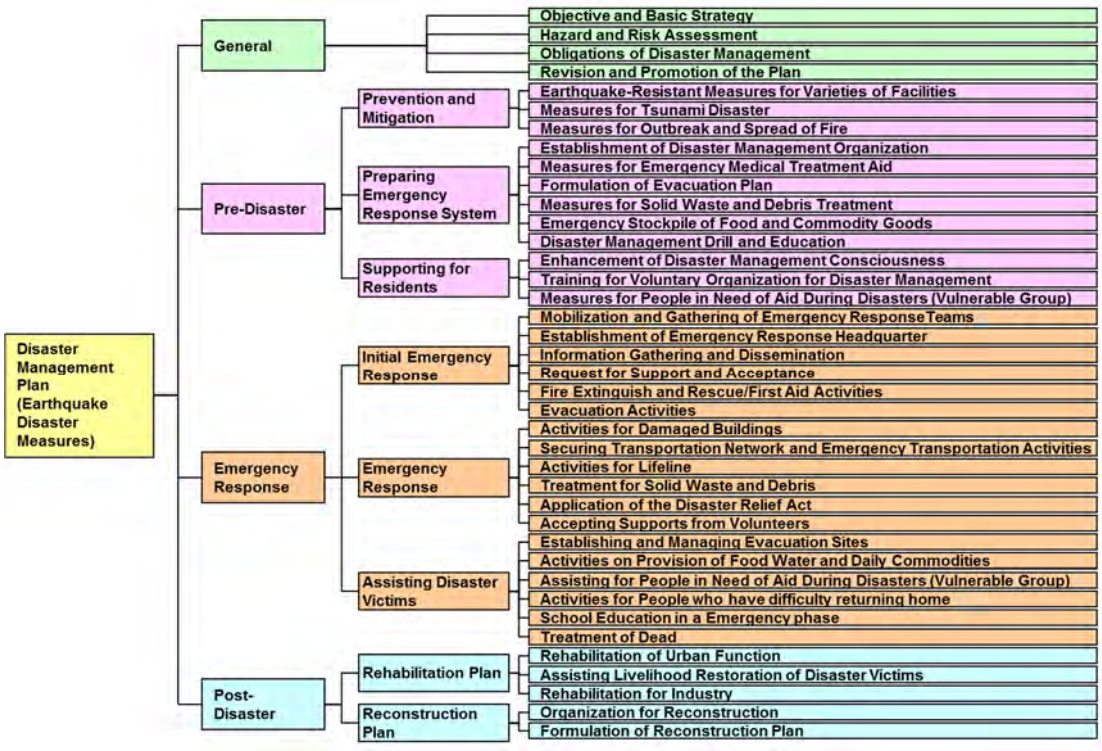


Image of Disaster Management Plan (Example of Japan)

(2) Promotion of disaster management cooperation system

A disaster management cooperation framework and support-acceptance system with other municipalities and institutions shall be enhanced in order to proceed emergency response and recovery smoothly.

Revitalization Phase

- Strengthening cooperation with other municipalities, the establishment of a support and acceptance system, and conclusion of agreements
- Strengthening cooperation with other agencies (Police, Army, Red Cross), the establishment of a support and acceptance system, and conclusion of agreements
- Development of an acceptance system for volunteers

Images of Agreement with related agencies (Example of Japan)

Title	Partner of Agreement
Agreement on Broadcast request	Several broadcasting companies
Agreement on News report request	Several newspaper publishing companies
Agreement on mutual support	1 metropolitan and 9 prefectures 16 large cities Nine-prefecture/city
Agreement on wide area support	Association of Prefectural Governors
Agreement on Post	Post bureau
Agreement on emergency response	Several Contractors Associations (Ex. Japan Road Contractors Association)
Agreement on support for stranded commuter	Oil business association Several convenient store company Several restaurant company
Agreement on procurement of drinking	Japan Soft Drink Association
Agreement on support for reconstruction of community development	Bar association, Engineering association
Agreement on information gathering by Amateur radio	Amateur radio association
Agreement on providing cars	Several rental car company
Agreement on providing emergency goods	Japan Life Co-operation League
Agreement on support by volunteer	Social welfare council
Agreement on using Facilities	Board of Education
Agreement on providing Privately-rented housing	Association of apartment house, etc.
Agreement on cooperation for housing reconstruction	The Housing Loan Corporation
Agreement on providing Foods	Instant food Association
Agreement on disaster relief and rescue	Red Cross
Agreement on medical activities	Tokyo medical association
Agreement on dental activities	Tokyo dental association
Agreement on medical relief activities	Tokyo Pharmacist Association
Agreement on emergency relief activities	Japan bonesetter association

Source: Disaster Management Plan, Tokyo Metropolitan Government (Edited by JICA Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley)

5-2 Disaster Management Facilities /Infrastructure

■Outline

Safety and reliable disaster management facilities and infrastructure shall be developed.

Issues

In the current situation, facilities and infrastructure specialized for disaster management are lacking.

■List of Actions

(1) Development of disaster management facilities and enhanced functionality

A disaster management base shall be developed and disaster management functions shall be enhanced.

Revitalization Phase

- Designation, development, improvement and enhancement of disaster management base facilities
- Development of stockpile warehouses, and ensuring disaster stockpiles
- Management and enhancement of the fire brigate/equipment

Development Phase

- Enhancement of the disaster management functions of schools

[Food]	[Daily necessities]	[Rescue equipment]
Hardtack	Feeding bottle	Water filter
Pregelatinized rice	Blanket	Assembled Water Tank
Modified milk powder	Carpet	Battery Floodlight
Mineral water	Plastic container	Cord reel
Canned rice porridge	Paper cup	Generator
Canned bread	Disposable diaper	Rice cooker
	Portable radio	Tent
[Medical equipment]	Med kit	Temporary toilet
Disaster medical kit	Sanitary goods	STRETCHER
	Underwear	Cot
[Fuel]	Blue plastic sheet	Trolley
Gasoline	Wet Towel (Wet Tissue)	Carpenter's tool
Kerosene		Rescue kit
		Partition panel

Images of stockpile warehouse and stockpile list (Example of Japan)

Source: Photo; Miyako city website http://www.city.miyako.iwate.jp/kikikanri/hinanjyobitiku_kateibitiku.html
List; Disaster Management Plan of Minato city
(Edited by JICA Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley)

(2) Development of information/communication infrastructure

Multiplexed disaster communication system and information sharing system shall be promoted in order to be able to execute the emergency response activities

Revitalization Phase

- Development of an information database for disaster management
- Establishment of an information sharing system
- Development of an information sharing system for vulnerable people and deprived/marginalized people (Pichadiyeko barga)

(3) Strengthening of countermeasures for Landslide disaster

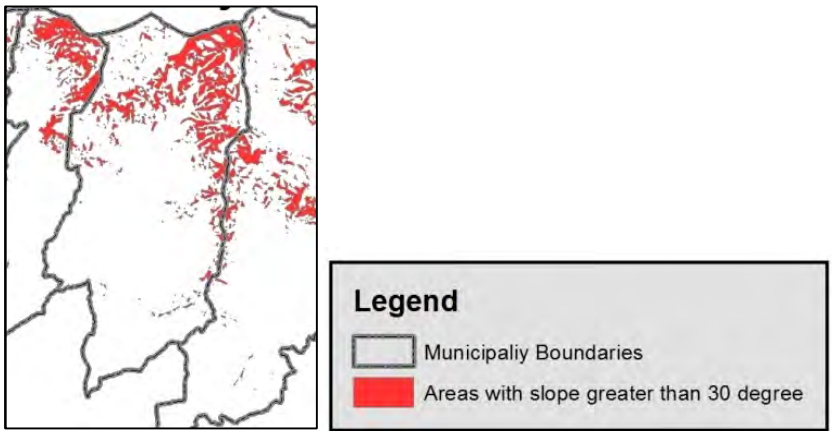
Countermeasures for Landslide disaster shall be strengthened for prevention and mitigation of landslide disaster cause of earthquake occurrence.

Recovery Phase

- Understanding the areas at risk from landslides

Revitalization Phase

- Application to land use restriction based on the risky areas
- Development of monitoring and warning facilities and countermeasures for landslides



Steep Areas (more than 30 degree of land inclination)

5-3 Emergency Response

■Outline

Capability of emergency response shall be enhanced in cooperation with all related agencies in order to achieve a quick and smooth emergency response.

Issues

In the current situation, it is necessary to enhance the disaster response capabilities for future disasters

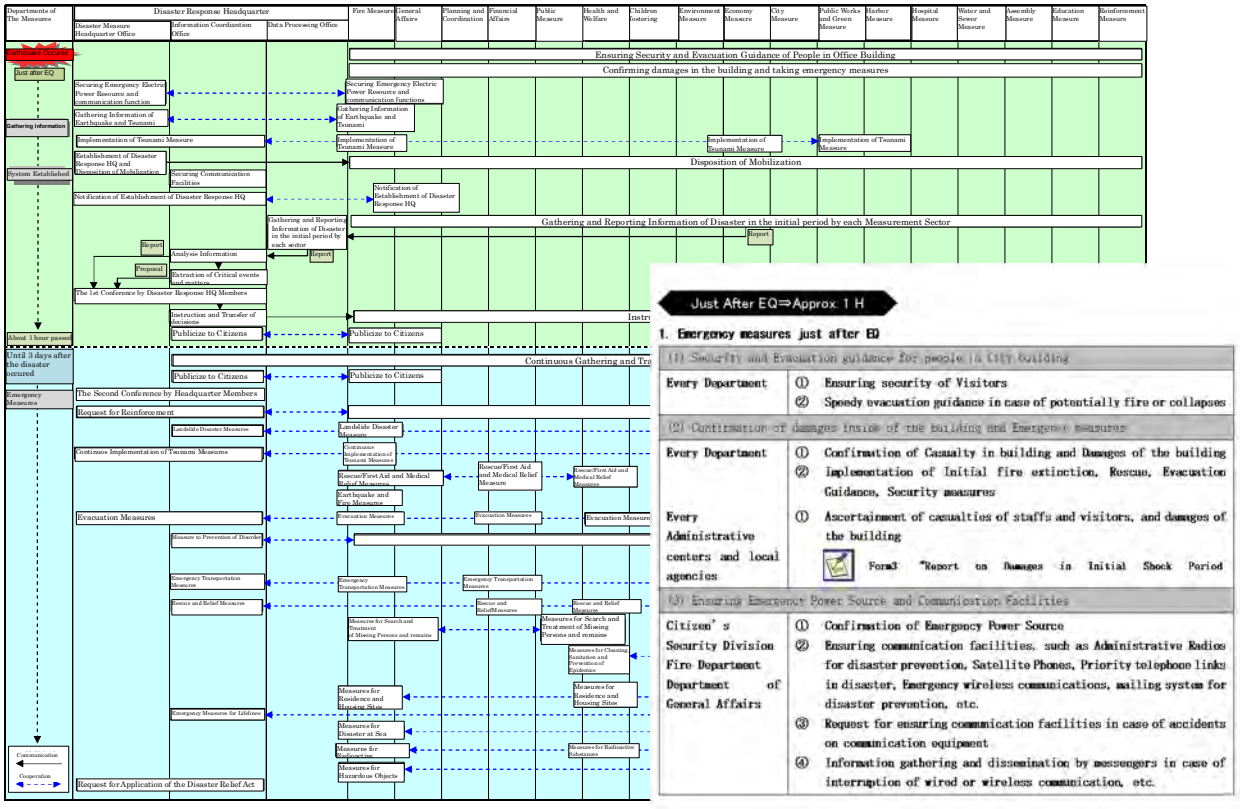
■List of Actions

(1) Capability enhancement of emergency response

The capability of a quick and smooth emergency response shall be enhanced such as the formulation of a manual for emergency response.

Revitalization Phase

- Establishment of an information collection and dissemination system
- Establishment of the initial system and mobilization system for emergency response
- Formulation of a disaster emergency response manual（SOP）
- Implementation of disaster management exercises for emergency response



Images of SOP (Flow chart and Checklist)

Source：SOP of Yokosuka city, Japan (Edited by JICA Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley)

Type		Contents (Example)
Classroom learning	Seminar Lecture	Basic knowledge of disaster, Hazard Mapping, Disaster management plan, Lessons learned from past disasters, etc.
	Self Learning	Basic learning from documents/books, e-learning, game etc.
Table Top Exercise (TTX)	Non-discussion style	Self Learning of story simulation, computer game, Training of situation estimated by Instructor-led (Image training)
	Discussion style	DIG, Workshop/Group work ,Discussion, Case method, etc.
CPX(Command Post Exercise)		Simulation of Emergency Response
Field Training Exercise (FTX)		Actual Exercise for emergency response in field such as Fire extinguish, Emergency medical, Traffic Control, Evacuation, Gathering to HQ, Establishment of Emergency Response HQ
Comprehensive Exercise		Full scale exercise (combined TTX & FTX), etc.

Types of Disaster management exercise

Images of Disaster management exercise (Example of Japan)

Source: Disaster Management in Japan, Cabinet Office, Government of Japan

5-4 Culture of Disaster Prevention/Resilience

■Outline

Culture of disaster prevention/resilience shall be established to keep in mind of the experience and lessons learned from the Gorkha earthquake.

Issues

It is necessary to take over the experiences and lessons for prevention/mitigation of damages from next earthquake.

■List of Actions

(1) **Transferring earthquake experiences/ lessons learned and establishment of culture of disaster resilience**

Education based on the earthquake experiences shall be promoted. A culture of disaster prevention/resilience shall be established for mitigating damages from future disasters

Recovery Phase

- Development of bases for culture of disaster prevention/ resilience
- Implementation of events for promoting the establishment of culture of disaster prevention/ resilience

Revitalization Phase

- Enhancement of disaster risk reduction education (education based on the earthquake experiences, learning for disaster risk reduction)

Images of monument of disaster

Left: Tsunami warning stone tablet in Aneyoshi, Miyako city, Japan, Right: Pier with the bared steel frame by the Great Hanshin-Awaji EQ
Source: Left photo; Disaster Management in Japan, Cabinet Office, Government of Japan, Right photo; JICA Study Team

5-5 Public Awareness on Disaster Risk Reduction/ Management (DRR/DRM)

■Outline

Public awareness on DRR/DRM shall be enhanced for the mitigation of future earthquakes.

Issues

Knowledge on DRR/DRM of residents is very important, however, their current knowledge is limited. Public awareness on DRR/DRM should be enhanced.

■List of Actions

(1) Enhancement of public awareness of DRR/DRM

Enhancement of public awareness on DRR/DRM shall be promoted.

Recovery Phase

- Development of a handbook on DRR/DRM for families
- Implementation of awareness-raising programmes on DRR/DRM
- Promotion of the preparation of emergency stockpiles by families

Contents of Family Handbook for Earthquake Disaster Risk Reduction

1. **Learning**
   1) Past major earthquakes
   2) Earthquake mechanisms
   3) What will be happened in case of an earthquake
   4) Earthquake risk assessment of our municipality
   5) Lessons learned from past earthquakes

2. **Planning and Preparedness**
   1) Making earthquake resilient house
   2) Preparing emergency stockpiles
   3) Making family action plan in case of an earthquake
   4) Participating in CBDRM activities
   5) Confirmation of earthquake risk map and identifying evacuation places for family

Images of Contents of Family Handbook for Earthquake Disaster Risk Reduction

References for Images:
"EQ DRR Guidebook", Yoshida-sho, Shizuoka
http://www.town.yoshida.shizuoka.jp/sws/share/wysiwyg/download.asp?fn=B8FK4u&tf=archive
"Bring Happiness to the World- Shiawase Hakobo", Kobe-city
"Earthquake Awareness Brochure", JICA Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley

DRR Poster Contest

Explanation of Earthquake Resistant Houses using Educational Tool

Fire Fighting Experience as a DRR Game Program

Community Workshop for Learning Earthquake DRR

TV/Radio Awareness Program

Development of Brochure, Leaflet, Educational Tools, etc.

Images of awareness-raising programs on DRR/DRM

References for Images:
Pictures from the JICA Project for Strengthening the Capacity of Seismic Disaster Risk Management in Ulaanbaatar City (above)
Picture from the JICA Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley (left below)
"Earthquake Awareness Brochure", JICA Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley
"Namazu no Gakko", earthquake DRR educational tool developed by PlusArts

DRR Goods Exhibition

Handkerchief printed how to use emergency stockpiles

Workshop on how to effectively use emergency stockpiles

Images of preparation of emergency stockpiles by families

References for Images:
"EQ DRR Guidebook", Yoshida-sho, Shizuoka
http://www.town.yoshida.shizuoka.jp/sws/share/wysiwyg/download.asp?fn=B8FK4u&tf=archive
Pictures from the JICA Project for Strengthening the Capacity of Seismic Disaster Risk Management in Ulaanbaatar City
"EQ Itsumo Handkerchief", developed by PlusArt

5-6 CBDRM (Community Based Disaster Risk Management)

Outline

CBDRM activities shall be conducted for strengthening the disaster risk reduction/ management (DRR/DRM) capabilities of community.

Issues

Importance of community roles for disaster risk management has been learned again from the Gorkha EQ. Community is the one of the most important elements for mitigation/prevention of disaster damages and initial emergency response to disasters, however, the community's DRR knowledge and capacity are limited. CBDRM should be enhanced for future disasters.

For the CBDRR/M, NRRC Flagship 4 has developed the nine minimum characteristics as the baseline components of a disaster resilient community in Nepal. Each action of the BBB RRP will be integrated to the following components:

9 Minimum Characteristics for a Disaster Resilient Community in Nepal

Source: Flagship 4 Handbook, NRRC

List of Actions

(1) Enhancement of CBDRM

CBDRM activities shall be conducted for strengthening DRR/ DRM capabilities of community.

Recovery Phase

- Establishment of "Community Disaster Management Committees (CDMCs)" as organizations for disaster preparedness, response, and rehabilitation at the community level

Revitalization Phase

- Formulation of community DRR/DRM plans
- Formulation of "community carte" for summarized information of current conditions on disaster management at the community level
- Implementation of DRR/ DRM capacity development programmes for community leaders
- Carrying out of community disaster management exercises

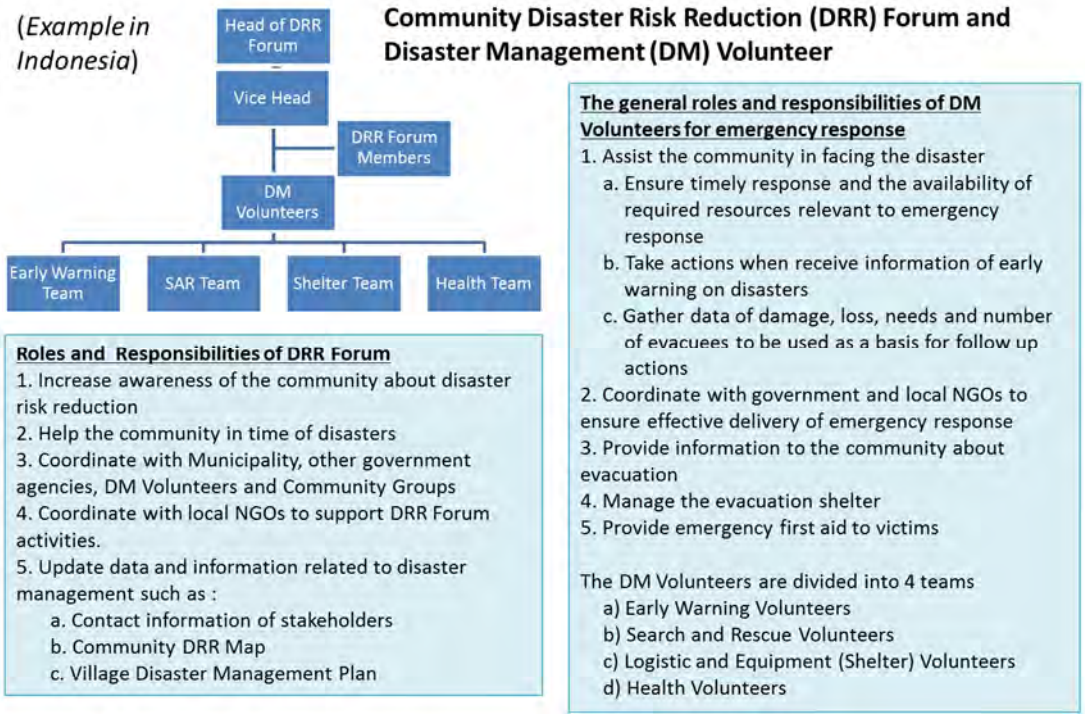
CHARACTERISTIC 1

Organisational base at Village Development Committee/ward and community level

1	A functional organisational base at VDC/ward and community level for the implementation and sustainability of DRR, which addresses the issues of protection, social inclusion (including gender balance), community ownership and participation and follows DRR initiatives.	
	KEY EXAMPLE INDICATORS	**VERIFICATION**
1.1*	VDC/municipality DM committee (LDMC) exists with roles and responsibilities in accordance with the LDRMP guidelines	Minutes of Meeting, ToR of the committee, VDC council minutes of meeting
1.2	Community DM committees(CDMC) or designated local level disaster management body, exists with roles and responsibilities	Minutes of Meeting, ToR of the committee
1.3	Decisions by the committees are fed back to all VDC/ municipality / community groups and who have rights to modify decisions	Social audit, Posting meeting minutes in public areas
1.4	33% Committee membership at VDC / community levels are represented by vulnerable groups, and discussion include issues specifically related to vulnerable groups	Minutes of Meeting
1.5	Coaching and support is given to vulnerable groups representatives in the committees, like community leadership training	Minutes of Meeting
1.6	% of other established community groups that have disaster risk management as regular agenda item	Minutes of meeting
	OTHER EXAMPLE INDICATORS	
	Protection issues are discussed in committee meetings at all levels	Minutes of Meeting
	Community is aware of budget and expenditure of DRM/DRR projects	Public audit, KAP

Indicators of Organizational base at ward and community level in Flagship4 of NRRC

Source: Flagship4 Handbook, NRRC



Images of Community Disaster Risk Reduction (DRR) Forum and Disaster Management (DM) Volunteer (Example in Indonesia)

Reference: JICA Project for Enhancement of the Disaster Management Capacity of BNPB and BPBD in Indonesia

Images of DRR/ DRM capacity development programmes

Reference: JICA Project for Enhancement of the Disaster Management Capacity of BNPB and BPBD in Indonesia

Example in Indonesia

Contents of DM Plan

Chapter 1: General
1.1 Concept and Mechanism of Village DM Plan
1.2 Background
1.3 Purpose and Objectives
1.4 Target
1.5 Scope
1.6 Position, Time Frame and Accountability
1.7 Legal Foundation
1.8 Definition
1.9 Structure of DM Plan

Chapter 2: General Description of Disaster
2.1 General Description of Village
2.2 General Description of Disaster
2.3 Tendency Analysis

Chapter 3: Disaster Risk Assessment
3.1 Hazards in the Area
3.2 Vulnerability
3.3 Capacity in the Area
3.4 Risk Assessment
3.5 Disaster Priority

Chapter 4: Disaster Management Policy
4.1 Vision and Mission
4.2 Disaster Management Policy
4.3 Disaster Management Institutions
4.4 Strategy of Disaster Management

Chapter 5: Disaster Management Activities
5.1 Focus, Programs, Activities for Disaster Management
5.2 Allocation of Tasks and Resources

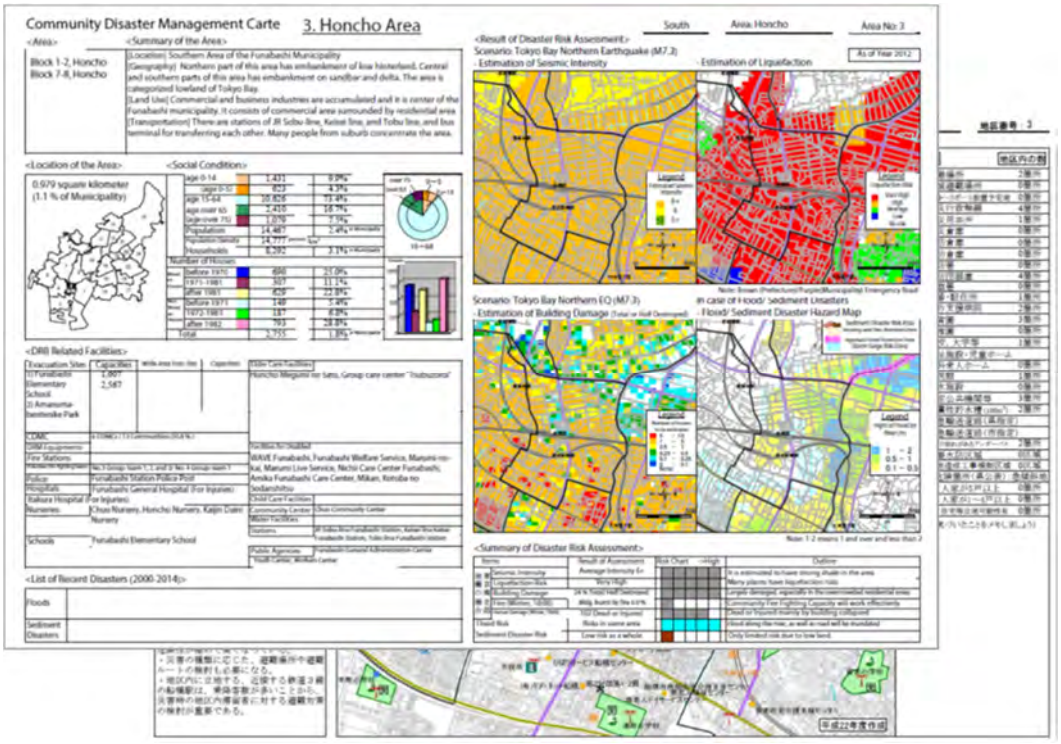
Chapter 6: Community Action Plan for Disaster Risk Reduction
6.1 Action Plan Identified for Village
6.2 Mainstreaming Strategy
6.3 Roles and Function of institution in village

Chapter 7: Monitoring, Evaluation, and Reporting
7.1 Monitoring
7.2 Evaluation
7.3 Reporting (Annual Report)

Chapter 8: Closing

Images of Community DRR/DRM plans (Example in Indonesia)

Reference: JICA Project for Enhancement of the Disaster Management Capacity of BNPB and BPBD in Indonesia



[Contents]

- Community Profiles (Population, Geography, Location)
- DRR related information (Status of preparedness, Vulnerable people, Evacuation places, etc.)
- Disaster Risk Assessment (maps and outlines)
- Community DRR Map, etc.

Images of Community carte (Example in Japan)

Reference: "Bosai Carte", Funabashi-city, http://www.city.funabashi.chiba.jp/kurashi/bousai/0010/p015641.html

Images of Community disaster management exercise (Example in Indonesia)

Reference: JICA Project for Enhancement of the Disaster Management Capacity of BNPB and BPBD in Indonesia

ACTION PLAN

CHAPTER 1.
OUTLINE OF PLAN

1-1. Objective

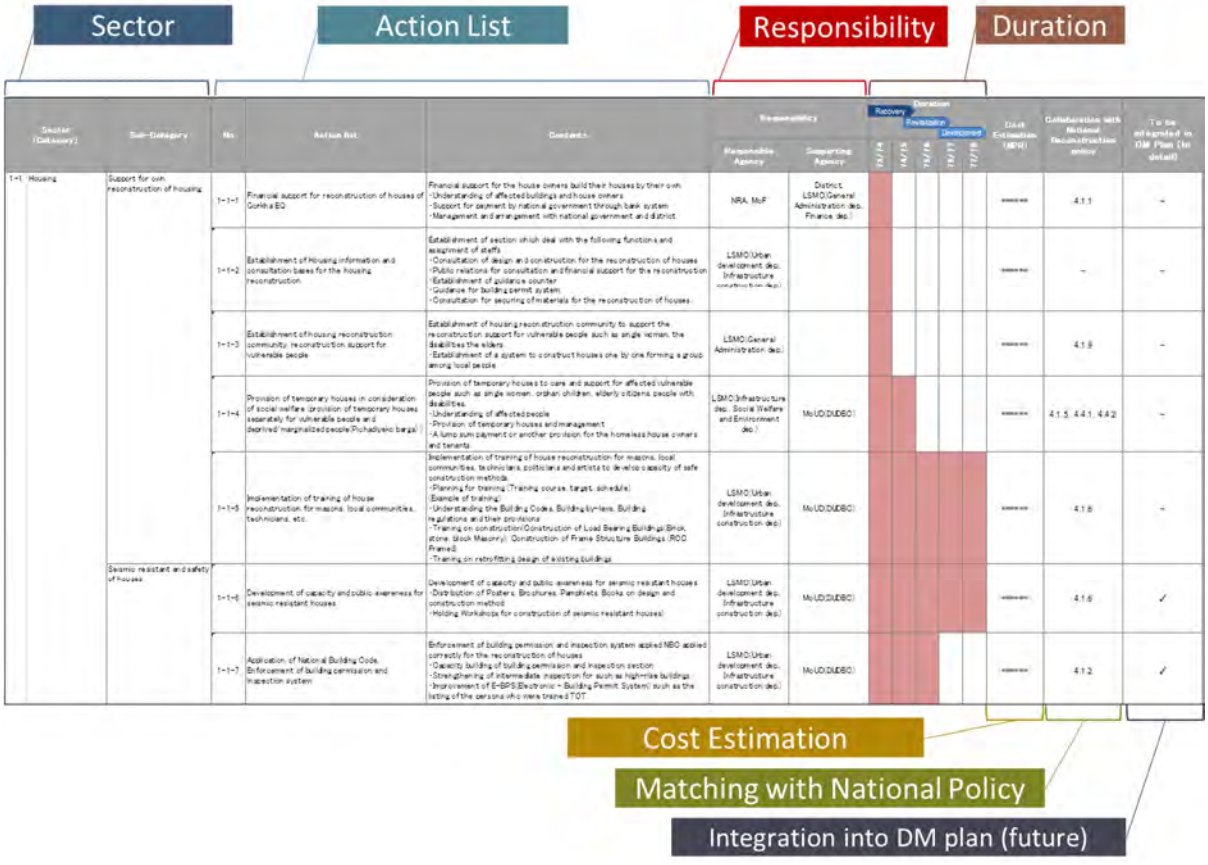
The action plan for BBB recovery and reconstruction of Budhanilkantha Municipality is arranged in a programme framework that emphasizes the implementation.

The action plan is indicated in the programmes by all reconstruction related agencies, considering the sustainability aspect, participative and strong commitment to promote actions that needs to be prioritized.

The action plan is prepared in the form of tables to make it more concise and easily understood at the time of implementation, monitoring and evaluation. This plan is divided into each vision.

1-2. Framework

Framework of Action plan is shown as follows. The action plan is indicated in the detailed contents of actions, duration (schedule), responsibilities, cost estimation, etc.



Framework of Action plan

CHAPTER 2.
ACTION PLAN

Sector (Category)	Sub-Category	No	Action list	Contents	Responsibility		Duration (Recovery / Revitalizatio / Developmen)					Cost Estimation (NPR)	Collaboration with National Reconstruction policy (Strategy)	To be integrated in DM Plan (to detail)
					Responsible Agency	Supporting Agency	73/74	74/75	75/76	76/77	77/78			
1. Building Resilient Institutional Framework														
1-1 Resilient Disaster Management Governance	Enhancement of resilient disaster management governance	1-1-1	Enhancement of governance through the reconstruction	Enhancement of governance through the reconstruction ・Establishment of a reconstruction system according to the national reconstruction policy (assignment of staff) ・Human development and capacity enhancement of municipal staff through the initiative coordination, implementation, monitoring and evaluation of reconstruction projects.	Muni(Administration sec., Building sec.)	MoFALD						10000000	6.5.4	–
		1-1-2	Establishment and enhancement of disaster management organization	Establishment and enhancement of the disaster management section on the municipal level. ・Organizational restructuring and establishment of the disaster management section. ・Assignment of staffs and the employment of experts for disaster management	Muni(Administration sec., Building sec.)	MoFALD						50000000	6.5.4	✓
		1-1-3	Establishment and enhancement of ward level disaster management organization	Establishment of disaster management section on the ward level ・Organizational restructuring including the establishment of a disaster management section on the ward level ・Determination of roles and responsibilities	Muni(Administration sec., Building sec.)	MoFALD						20000000	6.5.4	✓
		1-1-4	Human resource development for disaster management administration	Implementation of training for municipal staff in order to develop the human resources needed for disaster management administration. ・Consideration of training programmes for each level. ・Conducting the workshops and training.	Muni(Administration sec., Building sec.)	MoFALD						10000000	6.5.4	✓
		1-1-5	Mainstreaming of disaster management in development	Mainstreaming of disaster management in development ・Integration of disaster management aspect into the local development plan and all relevant plans	Muni(Administration sec., Building sec.)	MoFALD						5000000	6.5.4	✓
2. Revitalization and Improvement of Livelihood														
2-1 Housing	Support for own reconstruction of housing	2-1-1	Financial support for the reconstruction of houses damaged by the Gorkha EQ	Financial support for the house owners building their houses by their own power ・Understanding of affected buildings and house owners ・Support for payment by the national government through the bank system ・Management and arrangement with national government and districts	NRA, MoF	District, Muni(Administration sec., Financial Administration sec.)						100000000	6.1.1	–
		2-1-2	Establishment of housing information and consultation bases for the housing reconstruction	Establishment of a section which deals with the following functions and assignment of staff ・Consultation of design and construction for the reconstruction of houses ・Public relations for consultation and financial support for the reconstruction ・Establishment of guidance counter ・Guidance for the building permit system ・Consultation for the securing of materials for the reconstruction of houses	Muni(Infrastructure development sec., Building sec.)							50000000	6.1.4	–
		2-1-3	Establishment of housing reconstruction communities, reconstruction support for vulnerable people	Establishment of housing reconstruction communities to support the reconstruction support for vulnerable people such as single women, those with disabilities and the elderly. ・Establishment of a system to construct houses one by one by forming a group among local people.	Muni(Administration sec.)							50000000	6.1.1	–
		2-1-4	Provision of temporary houses in consideration of social welfare (provision of temporary houses separately for vulnerable people and deprived/marginalized people(Pichadiyeko barga))	Provision of temporary houses to care for and support affected vulnerable people such as single women, orphaned children, elderly. citizens, and people with disabilities. ・Understanding the affected people ・Provision of temporary houses and management. ・A lump sum payment or other provisions for the homeless house owners and tenants.	Muni(Building sec., Social Development sec.)	MoUD(DUDBC)						100000000	6.1.7	–
		2-1-5	Implementation of training of house reconstruction for masons, local communities, technicians, etc.	Implementation of training of house reconstruction for masons, local communities, technicians, politicians and artists to develop the capacity of safe construction methods. ・Planning for training (training course, target, schedule). (Example of training) ・Understanding the building codes, building by-laws, building regulations and their provisions. ・Training on construction (construction of load bearing buildings (brick, stone, block masonry)), construction of frame structure buildings (RCC Framed). ・Training on the retrofitting design of existing buildings.	Muni(Building sec.)	MoUD(DUDBC)						30000000	6.1.4	–
	Seismic resistance and safety of houses	2-1-6	Development of capacity and public awareness for seismic resistant houses	Development of capacity and public awareness for seismic resistant houses. ・Distribution of posters, brochures, pamphlets, books on design and construction methods. ・Holding workshops for the construction of seismic resistant houses.	Muni(Building sec.)	MoUD(DUDBC)						1000000	6.1.4	✓

Sector (Category)	Sub-Category	No	Action list	Contents	Responsibility		Duration (Recovery / Revitalizatio / Developmen)					Cost Estimation (NPR)	Collaboration with National Reconstruction policy (Strategy)	To be integrated in DM Plan (to detail)
					Responsible Agency	Supporting Agency	73/74	74/75	75/76	76/77	77/78			
		2-1-7	Application of National Building Codes(NBC), enforcement of the building permission and inspection system	Enforcement of the building permission and inspection system applied to NBC correctly for the reconstruction of houses. ・Capacity development of the building permission and inspection section. ・Strengthening of intermediate inspection for such as high-rise buildings. ・Establishment of E-BPS(Electronic – Building Permit System)	Muni(Building sec.)	MoUD(DUDBC)						10000000	6.1.2	✓
		2-1-8	Financial and technical support for seismic diagnosis, seismic resistant measures of houses, and the dispatch of experts for seismic diagnosis	Financial and technical support for seismic diagnosis, and seismic resistant measures of houses. ・Dispatch of experts, technicians for seismic diagnosis and checking houses.	Muni(Financial Administration sec., Building sec.)	MoUD(DUDBC)						10000000	6.1.2, 6.1.3	✓
2-2 Livelihood	Support for the reconstruction of livelihood	2-2-1	Financial support for the livelihood reconstruction of victims	Financial support for the affected families, such as there is a death in the family, except the residential homes damaged by the earthquake.・Understanding of affected families ・Support for payment by the national government through the bank system ・Management and arrangement with the national government and district.	NRA, MoF	District, Muni(Administratio n sec., Financial Administration sec.)						50000000	6.1.3	–
		2-2-2	Establishment of a livelihood help desk	Establishment of a livelihood help desk (consultation service) for livelihood reconstruction. ・Assignment of staff in charge (examples of services:) Support for Housing, Living Expenses, Agriculture, Industry, Labour, Health, Child Rearing and Mother's Milk, Volunteer, Administration	Muni(Administratio n sec.)							10000000	–	–
		2-2-3	Dissemination of reconstruction information	Dissemination of reconstruction information ・Gathering and summarizing of reconstruction information. ・Dissemination of reconstruction information periodically by utilizing public information papers, websites, etc.	Muni(Administratio n sec.)							3000000	–	✓
2-3 Health, Medical and Social Welfare	Recovery and enhancement of medical, health care and social welfare services	2-3-1	Recovery for hospitals on the municipal level, health centres and health posts	Recovery for hospitals at the municipal level, health centres and health posts ・Damage investigation at each hospital, health centre and health post ・Consideration of priority for reconstruction ・Reconstruction of each hospital, health centre and health post ・Provision and ensuring of medicines, equipment and health professionals.	MoHP, MoUD(DUDBC)	Muni(Social Development sec.)						100000000	6.1.7	✓
		2-3-2	Seismic diagnosis and seismic resistant measures of hospitals on the municipal level, health centres and health posts	Seismic diagnosis and seismic resistant measures of hospitals on the municipal level, health centres and health posts ・Dispatch of experts, or technicians for seismic diagnosis and checking hospitals. ・(If necessary) Seismic resistant measures and retrofitting or reconstruction shall be implemented. ・Fund assistance to promote the reconstruction of private hospitals. ・Establishment of a legal system in order to ensure seismic resistance of private hospitals.	MoHP, MoUD(DUDBC)	Muni(Social Development sec.)						100000000	6.1.7	✓
		2-3-3	Establishment of a mental health care help desk for victims	Establishment of a mental health care help desk for victims. ・Establishment of mental health care system/group by health technician. (Assignment of staff in charge, support/visit and care for victims)	Muni(Social Development sec.)							10000000	–	–
		2-3-4	Formulation of a plan for vulnerable people	Formulation of the plan for vulnerable people. ・Information collection of vulnerable people such as single women, orphaned children, elderly citizens, people with disabilities (Name, Address, Condition) ・Establishment of a support system (establishment of assistant group, etc.). ・Consideration of support for evacuation (evacuation guidance, safety confirmation) and support in shelter (preferential provision of goods).	Muni(Social Development sec.)	MoHP						3000000	6.3.1, 6.3.3	–
2-4 Waste Management	Disaster waste treatment measures	2-4-1	Disposal of disaster waste and debris properly (implementation of collection and disposal)	Disposal of disaster waste and debris: ・Investigation of amount and location of disaster waste and debris ・Contract with the providers for waste and debris management ・Disposal of disaster waste and debris ・Establishment of community groups for the support of building demolition especially for vulnerable people such as single women, those with disabilities and the elderly.	Muni(Environment sec.)	MoHP						1000000	–	–
		2-4-2	Formulation of a disaster waste management plan	Formulation of a disaster waste management plan for future earthquakes. (Example of contents) ・Establishment of a disaster waste management system. ・Estimation of the amount of debris. ・Promotion of recycling (development of recycle centres, etc.) ・Ensuring of temporary stock place for disaster waste.	Muni(Environment sec.)	MoHP						2000000	–	✓

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					Responsible Agency	Supporting Agency	73/74	74/75	75/76	76/77	77/78			
		2-4-3	Ensuring of temporary stock places for disaster waste	Ensuring of temporary stock places for disaster waste in advance so that the space can be effectively utilized. ・Investigation of open spaces and consideration of candidates for temporary stock place for disaster waste ・Development of the spaces can be effectively utilized for temporary stock place	Muni(Environment sec.)	MoHP						3000000	-	✓
2-5 Education	Recovery and seismic resistance for schools	2-5-1	Recovery and reconstruction of schools	Recovery and reconstruction of schools ・Damage investigation of each school ・Consideration of priority for reconstruction ・Reconstruction of schools	MoE, MoUD(DUDBC)	Muni(Social Development sec., Building sec.)						100000000	6.1.7	-
		2-5-2	Seismic diagnosis and seismic resistant measures of schools	Seismic diagnosis and seismic resistant measures of schools ・Dispatch of experts or technicians for seismic diagnosis and checking schools ・(If necessary) Seismic resistant measures, retrofitting and reconstruction shall be implemented. ・Fund assistance to promote the reconstruction for private schools. ・Establishment of a legal system in order to ensure the seismic resistance of private schools.	MoE, MoUD(DUDBC)	Muni(Social Development sec., Building sec.)						1000000	6.1.7	✓
	Enhancement of school education	2-5-3	Education for disaster management	Education for disaster management in the school curriculum. ・Consideration of school curriculum for the disaster management and the experience of the Gorkha EQ. (Example contents of curriculum) ・Learning about the disaster, mechanisms, disaster management. ・Learning about ensuring safety when a disaster happens. ・Sharing the experience of the Gorkha EQ. ・Implementation of evacuation drills.	MoE	Muni(Social Development sec.)						1000000	6.1.4	✓
	Care for students	2-5-4	Training for teachers	Training for teachers regarding disaster management in order to teach students and ensure the safety of students. ・Establishment of a school disaster management committee. ・Consideration of training for teachers (Example contents of training). ・Workshop on the planning and practices of disaster management education. ・Workshop on sharing experiences of the Gorkha EQ. ・Training on mental health care, treatment method for injury, etc.	MoE	Muni(Social Development sec.)						5000000	-	-
		2-5-5	Establishment of a mental care counselling room	Establishment of a mental care counselling room for the students affected by the Gorkha EQ in order to mitigate the mental hurt of the children. ・Establishment of a mental care counselling function in the health room in schools ・Training for school nurse・Dispatch of health technicians to schools.	MoE, MoHP	Muni(Social Development sec.)						3000000	-	-
3. Urban Planning for a Safer and Secure City														
3-1 Public Building	Recovery, seismic resistance and safety of public buildings	3-1-1	Immediate damage investigation of public buildings	Public buildings should be kept to their function as much as possible even after a disaster in order to conduct recovery and reconstruction activities smoothly, receive evacuees, and provide public services continuously. ・Conduct building damage investigation of public buildings. ・Classify the damage level: No-damage, Safe, Usable with temporary repair, Unusable (danger)	MoUD(DUDBC)	Muni(Building sec.)						5000000	6.1.6	✓
		3-1-2	Emergency repair of damaged public buildings to secure safety and the construction of temporary public buildings for the operation of emergency relief, medical treatment, and evacuation of life under safe conditions	In order to conduct precise recovery and reconstruction activities, emergency repair should be done for public buildings to ensure safety and/or temporary facilities should be prepared. ・Based on the building investigation, usable buildings should be used as much as possible. ・Temporary repair should be done for buildings which received moderate damage. ・In the case of a massive disaster, temporary facilities to provide public services should be prepared (tent or any temporary structure). ・For this purpose, open spaces with disaster management functions should be distributed in urbanized areas.	MoUD(DUDBC)	Muni(Building sec.)						5000000	6.2.1	-
		3-1-3	Damage diagnosis of all public buildings and the reinforcement of public buildings	Towards the revitalization of the affected area, a detailed damage diagnosis should be done and it will be the basis of rebuilding of public buildings. ・Conduct detailed building diagnosis for public buildings. ・Consider methods for rebuilding and reinforcement.	MoUD(DUDBC)	Muni(Building sec.)						5000000	-	✓

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					Responsible Agency	Supporting Agency	73/74	74/75	75/76	76/77	77/78			
		3-1-4	Prioritization and examination of possible unification and rearrangement of public buildings to rebuild and repair public buildings	Before starting construction work, the public buildings should be prioritized. It is also necessary to consider the unification and rearrangement of functions in order to conduct efficient public services. ・Prioritization of public building for reconstruction. ・As the municipality was newly established, Unification and rearrangement of public buildings is recommended for smooth operation of public services in the municipal area.	Muni(Building sec.)	MoUD(DUDBC)						5000000	6.1.6	✓
		3-1-5	Recovery and reconstruction of aseismic public buildings on the basis of the National Building Code (NBC)	Based on the prioritization, reconstruction work should be accelerated and new buildings should follow the NBC to secure seismic resistance. As the municipality was newly established, reconstruction of public buildings should be followed the NBC and building permission process. ・Prioritized public building should be rebuilt or repaired based on the NBC.	MoUD(DUDBC)	Muni(Building sec.)						100000000	6.1.6	✓
		3-1-6	Capacity building and the establishment of a permit process for new public building construction in order to enforce the NBC and land use zoning	Building permission process should be done properly in the municipality, then secure NBC and zoning regulation to make the municipal area resilient. ・Establishment of clear procedure for building permission based on NBC and land use zoning. ・Capacity building: Education to municipal officers who take responsible for building permission ・As Budhanilkantha is newly established municipality, the capacity building should be done properly.	Muni(Building sec.)	MoUD(DUDBC)						10000000	–	✓
		3-1-7	Promotion of aseismic public buildings by unification and rearrangement of public buildings, including construction of common building for government offices	For aseismic building construction, it is effective that some of the public buildings are unified and rearranged. Common buildings for government offices should secure its seismic resistance. ・Based on the examination of possible unification and rearrangement, common buildings for government offices should be built. ・Arrangement of related government agencies and organizations. ・Budhanilkantha is newly established municipality, public buildings are not well organized at present. In order to fulfil the public services, joint public building is recommended.	Muni(Building sec.)	MoUD(DUDBC)						1000000	6.1.6	✓
	Development of Disaster Management Park	3-1-8	Using open spaces (parks) for the operation of emergency relief activities and providing public services	After a huge disaster, public buildings might be damaged and be in danger. Open spaces can be places where public services are provided and emergency relief activities are operated. ・Designation of open spaces for emergency relief, medical treatment, evacuation, etc. ・Build temporary public facilities to provide public services. ・Suburban area still has many open land areas (farms, forest, etc.). Effective usage of such land should be	Muni(Infrastructure development sec., Building sec.)	MoUD(KVDA)						10000000	6.1.7	✓
		3-1-9	Designation of open spaces for reconstruction operation and long-term evacuation	Based on the open space policies by KVDA, distribution and usage of open spaces are examined and designated in the municipal area. ・Examination of the location and usage of open spaces, which have supplemental function of public services. ・Designation of open spaces in the unraised area	Muni(Infrastructure development sec., Building sec.)	MoUD(KVDA)						1000000	6.1.7	–
		3-1-10	Development of open spaces as evacuation sites and disaster management bases	For the preparation of another disaster or second disaster, open spaces should be developed as disaster management bases and evacuation sites. ・Examination of the function of each open space and prioritization for development ・Obtain consensus from neighbours ・Develop open spaces (including space for stockpiling, evacuation routes, etc.) ・Understanding of parks and open spaces to be utilized as temporary heliports. ・Designation of temporary heliports. ・Development of temporary heliports (securing enough spaces). ・Dissemination of evacuation sites to residents ・For future urbanized areas, new open spaces should be secured in the process of urbanization.	Muni(Infrastructure development sec., Building sec.)	MoUD(KVDA)						1000000	6.1.7	✓
		3-1-11	Promotion of the construction of evacuation sites and disaster management bases, and the establishment of an institutional system for implementation, operation and management	For the development phase, continuous efforts are required to develop open spaces. At the same time, institutional, operation and management systems also need to be improved. ・Prioritization for the implementation of open spaces, and the implementation (construction or improvement of existing open spaces) ・Establishment of an institutional system on the national level as well asthe municipal level for implementation. ・Establishment of an operation and management system on the municipal level as well as the community level, as most of the open spaces are expected to be managed by community organizations. A supporting system for the community organization is also needed. ・Revision of the open space network following urban expansion	Muni(Infrastructure development sec., Building sec.)	MoUD(KVDA)						1000000	–	✓
		3-1-12	Establishment of a legal system to secure open spaces as evacuation sites and disaster management bases in newly developing areas (land pooling project, etc.)	Urbanized areas are expected to be enlarged. To prepare for the next disaster, it is necessary to secure open spaces in a newly developed urban area. ・Establishment of a legal system to secure open spaces when an urban area is planned, such as land pooling scheme, etc.	Muni(Infrastructure development sec., Building sec.)	MoUD(KVDA)						******	–	✓

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					Responsible Agency	Supporting Agency	73/74	74/75	75/76	76/77	77/78			
3-2 Infrastructure	Recovery, seismic resistance and safety of road and bridges	3-2-1	Recovery of roads and bridges in municipal level	After a disaster, transportation is important for emergency relief activities and transport goods. Temporary recovery of major roads and bridges should be done if roads and bridges get damaged. ・Emergency damage investigation on major roads ・Temporary recovery measures should be taken for nationally and regionally important roads. (Such as Golfutar Main Road) ・Minimum recovery, including debris removal, should be done for local roads to secure people' s lives.	Muni(Infrastructure development sec., Building sec.)	MoPIT, MoUD, MoFALD						100000000	6.1.7	-
		3-2-2	Improvement of earthquake resistant roads for smooth transportation and evacuation, especially for designated emergency transportation roads and evacuation routes	Towards reconstruction and even further development, repairing roads with seismic resistance is required. It is also necessary to prepare for a second and other disasters. Especially designated emergency transportation roads should be repaired as a priority. ・Designation of a traffic control road network and emergency transportation road and improvement of designated roads and bridges. ・Detailed survey for the structure of bridges and reinforcement or reconstruction based on the survey result ・Promotion of road widening. ・Seismic resistance of buildings along designated evacuation routes.	Muni(Infrastructure development sec., Building sec.)	MoPIT, MoUD, MoFALD						100000000	6.1.7	✓
		3-2-3	Continues efforts for improvement and construction of roads, including cooperation with the nation, Kathmandu Valley, districts, and adjacent municipalities/VDCs	Recovery and reconstruction of roads and bridges should be done continuously. As a road connects adjacent areas, the nation, Kathmandu Valley, district and municipality should collaborate and effective improvement is required. ・Review of an urban transport master plan and continuous promotion of improvement of roads and bridges. ・Cooperation with road and bridge development in different administrative levels. ・Securing the connectivity of roads by sharing information between different administrative organizations. A committee should be held for this purpose as needed. ・Construction of road and bridges on the municipal level for smooth emergency response, evacuation and transportation	Muni(Infrastructure development sec., Building sec.)	MoPIT, MoUD, MoFALD						100000000	6.1.7	✓
		3-2-4	Promotion of road construction together with urban development projects, such as land pooling	Road development should be done with urban development project in surrounding areas. It is expected that some land pooling scheme would be done following urban expansion. Roads construction should be done with the land pooling project by securing seismic resistance. ・Construction of seismic resistant road when land pooling or any other urban development project would be done. ・The municipality is expected to have more urbanized area, promotion of urban development with seismic resistant road construction is important. Arrangement between adjacent municipalities is also required for better and resilient urban area.	Muni(Infrastructure development sec., Building sec.)	MoPIT, MoUD, MoFALD						10000000	6.1.7	✓
		3-2-5	Examination of road standards for municipal roads in consideration of the characteristics of the municipality	In order to improve roads, the standards of road construction should be revised to secure seismic resistance and disaster prevention function. For the pilot municipality, the road standards should be based on the characteristic of the municipality. A long-term view is required and it should be done with the urban transport master plan of Kathmandu Valley. ・Review of the existing road standards and urban transport master plan ・Examination of the minimum requirements which should be suited for the municipality	Muni(Infrastructure development sec., Building sec.)	MoPIT, MoUD, MoFALD						5000000	-	✓
	Recovery, seismic resistance and safety of lifelines	3-2-6	Early recovery of supply lines and other related facilities and sanitation management	To accelerate the recovery and reconstruction process, it is required to repair supply lines and the related facilities of lifelines. ・Water and electricity: Recovery of supply lines and related facilities ・Sewage: recovery of the sewage treatment system and sanitation management	KUKL, NEA	Muni(Infrastructure development sec., Building sec.)						10000000	6.1.7	-
		3-2-7	Taking seismic resistant measures for supply lines and other related facilities, and improve their supply systems	After an emergency response from the disaster, upgrading of lifelines would be started. At that time, improvement of the supply system for the future should be considered. ・Seismic resistance of the supply system of water and electricity and improvement of the system ・Examination of the usage of solar energy, especially for public buildings and disaster management park ・Improvement of drainage, sewage, and sanitation systems	KUKL, NEA	Muni(Infrastructure development sec., Building sec.)						10000000	6.1.7	✓
		3-2-8	Development of sustainable stockpiling of water and fuel for emergency use stored in earthquake resistant and safe facilities, and consideration of their distribution and supply system	In order to for prepare second or other disasters, stockpiling is important for emergency situations. Water should be stored in a sanitary manner, and liquefied petroleum gas and petrol should be stored under safe conditions. Storage should be in a disaster management park. ・Examination of the quantity of drinkable water and fuels at a storage. Population covered by an emergency management park should be considered. ・Stockpiling of drinkable water in a sanitary manner ・Fuel (liquefied petroleum gas for cooking and petrol for generators and emergency transportation) should be stored in a safe condition.	KUKL, Muni(Infrastructure development sec., Building sec.)							10000000	6.1.7	✓
		3-2-9	Improvement of the sanitation management system	Introducing a clean sewage treatment system by considering sanitation which can be a problem in emergency situations. ・Promotion of a sewage treatment system. ・Temporary toilet (such as manhole toilet) should be installed in an emergency disaster management park for sanitation management.	KUKL	Muni(Infrastructure development sec., Building sec.)						1000000	-	✓

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					Responsible Agency	Supporting Agency	73/74	74/75	75/76	76/77	77/78			
		3-2-10	Continuous development of the expansion of the supplying area and upgrading of existing facilities to be aseismic resistance and with a stable water, sewage, and electricity supply system	Expansion of the service area of lifelines with a seismic resistant system to secure a stable supply system even in emergency situations. ・Improvement of the supply system of lifelines and expansion of the service areas. ・When an urbanized area is enlarged, a stable supply system should be installed by considering future disasters.	Related lifeline organizations	Muni(Infrastructure development sec., Building sec.)						100000000	-	✓
3-3 Cultural Heritage	Recovery, seismic resistance and safety of cultural heritage sites	3-3-1	Immediate damage investigation of historical buildings and temporary restoration if necessary	In the municipal area, not many heritage monuments are existed. Damage investigation of old buildings should be done first to understand the disaster damages. There are no areas where historical buildings concentrated, but necessary measure should be taken not to disturb relief activities. ・Debris removal should be quickly done for buildings which were severely damaged ・Emergency damage investigation for the old buildings ・Emergency repair should be done for buildings which has high collapse risk not to spread the damages, and a measure for public to be away from the buildings should be taken.	Muni(Infrastructure development sec., Building sec.)							100000000	-	-
		3-3-2	Recovery through the judgement of urgency from seismic diagnosis and historical importance	Reconstruction of the cultural heritage sites is not directly related to people's life. However, repairing to prevent secondary disaster is required. For this purpose, detailed damage survey, seismic diagnosis, historical and cultural importance of the heritage should be clarified and reconstruction should be done. ・Detailed damage survey ・Seismic diagnosis ・Survey for cultural and historical importance ・Reconstruction measures of historical buildings based on damaged level	Muni(Infrastructure development sec., Building sec.)	MoTCA						2000000	6.2.2	-
		3-3-3	Identifying historically important buildings and evaluation of the vulnerability of buildings	It is important to identify historical buildings and its cultural value first. Then structural vulnerability should be observed for preservation of the heritage sites.. ・Identification of historical buildings and their structural vulnerability ・Making list of the historical buildings for basic document for preservation and restoration	Muni(Infrastructure development sec., Building sec.)	MoTCA						1000000	6.2.5	✓
		3-3-4	Restoration of the historical buildings to improve seismic resistance	Based on the evaluation, restoration and preservation should be conducted. At this time, historical monuments should be treated as a cultural centre of the area. ・Restoration based on the evaluation ・Evaluation of technical measures to improve seismic resistance with keeping the historical value. ・Temple or other important monuments which are located in villages should be carefully preserved when surrounding area would be developed.	Muni(Infrastructure development sec., Building sec.)	MoTCA						100000000	6.2.5	✓
3-4 Land use restriction	Promotion of land use restriction	3-4-1	Designation of hazardous areas	Areas where severe damage by the disaster occurred should be designated and necessary measures should be taken to prevent secondary disasters. In the municipal area, many steep slopes are found in many places, and they have a risk of land slide. Designation should be considered the slopes. ・Designation of hazardous areas ・Prior emergency response should be done for those designated areas ・No-entry measures should be taken as needed	Muni(Infrastructure development sec., Building sec.)	MoUD(KVDA)						1000000	6.5.1	✓
		3-4-2	Designation of the land use zones and building regulations based on urban growth trend, geomorphology map, hazard assessment, and actual building damages (Risk Sensitive land use)	Based on geomorphological maps and hazard analysis (if available), land use and building regulation should be revised to make the city resilient. Actual damage situations can be used for the revision as well. In the municipal area, no proper land use regulations are observed as the municipality was recently established. Following the future urban expansion, land use regulation is essential to make safer suburban city. ・Analysis and comparison of geomorphological maps, hazard analysis and actual damage ・Analysis of urban growth trend ・Revision of land use and building regulations ・Reconstruction based on the revision	Muni(Infrastructure development sec., Building sec.)	MoUD(KVDA)						2000000	6.5.1, 6.6.1	✓
		3-4-3	Considering the location of open spaces and public buildings (administrative facilities, schools, and hospitals), which can be utilized as emergency response bases, and emergency medical treatment facilities, and evacuation sites in safer and accessible areas	For the smooth reconstruction from a disaster, the distribution and location of public facilities should be reconsidered for providing effective public services. It is also useful to prevent secondary disasters. Open spaces, schools, hospitals and government buildings should be examined. ・Examination and designation of the location of open spaces for effective evacuation and emergency relief operation. ・Examination of the location of public buildings in order to provide public services under a disaster situation. ・A supplementary road network should be also examined to connect each public facility for the more effective usage of the facilities.	Muni(Infrastructure development sec., Building sec.)	MoUD(KVDA)						30000000	-	✓

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					Responsible Agency	Supporting Agency	73/74	74/75	75/76	76/77	77/78			
		3-4-4	Institutionalization of the land use zoning and building regulation and appropriate enforcement by municipality	In order to make a resilient city, land use zoning and building regulations should be enforced. For this purpose, necessary measures should be taken. As Budhanilkantha is a new municipality, definite enforcement is required. Support by DUDBC is also necessary. ・Enforcement of building approval process in the municipality ・In the process, land use and building regulations should be confirmed. Support by DUDBC should be considered if needed.	Muni(Infrastructure development sec., Building sec.)	MoUD(KVDA, DUDBC)						2000000	6.6.1	✓
		3-4-5	Promotion of the land use zoning to create a suburban area of Kathmandu Valley with urban planning of the municipality	By land use zoning, new urbanized areas should be properly designated. No proper land use control has been done in the municipal area, it is important to enlarge the urbanized area by city planning and the regulation. ・Designation of new residential area and creating safer city by building regulations. ・It is recommended to make comprehensive expansion plan of new residential area with road, lifelines, and social infrastructure should be planned.	Muni(Infrastructure development sec., Building sec.)	MoUD(KVDA)						200000000	6.6.1	✓
3-5 Policy for each zone	Development of reconstruction promotion zone	3-5-1	Prior emergency relief operation for hazardous areas and areas which were severely damaged	Areas struck by huge damage and are vulnerable according to geomorphological maps and hazard analysis, prior recovery activities should be done to ensure the safety of the people. ・Identify areas with huge damage by conducting an emergency damage survey ・Identify areas which are vulnerable against a disaster by analysing geomorphological maps and hazard analysis ・Prior recovery and reconstruction measures should be taken to those identifying areas. ・Pay attention to the geological condition, especially in those municipal areas which have steep slopes	Muni(Infrastructure development sec., Building sec.)	MoUD(KVDA)						4000000	6.6.1	✓
		3-5-2	Designation of disaster stricken areas where intensive measures should be focused on urban planning, and high-dense areas and vulnerable areas which need disaster management for second disasters and other possible disasters	Hazardous areas, highly-dense areas, and vulnerable areas should be designated for concentrated reconstruction measures. ・Designation of hazardous areas for prior recovery measures in order to prevent the spread of damage ・Designation of highly-dense areas for preventing secondary damage and to secure safe evacuation ・Designation of vulnerable areas such as steep slopes or soft soils for preventing secondary disasters. ・Pay attention to slopes as the municipal area has some steep slopes	Muni(Infrastructure development sec., Building sec.)	MoUD(KVDA)						2000000	6.6.1	✓
		3-5-3	Revision of land use planning for those designated areas and taking actions as priority	For those designated areas, special attention should be given and land use zoning and building regulation should consider the characteristics of the areas to create a resilient city. ・Designation and enforcement of land use zoning and building regulations fitting to the characteristics of the designated areas	Muni(Infrastructure development sec., Building sec.)	MoUD(KVDA)						1000000	6.6.1	✓
		3-5-4	Overall approach of urban planning for the designated area in order to make the municipality resilient	It is recommended to have a long-term perspective of urban planning approach, especially for the designated areas. ・Comprehensive approaches are recommended with land use zoning, building regulations, infrastructure development, and so on. ・Restriction of construction in the case that an area is highly vulnerable for a disaster.	Muni(Infrastructure development sec., Building sec.)	MoUD(KVDA)						1000000	6.6.1	✓
4. Promotion and Improvement of Industry														
4-1 Employment	Support for employment	4-1-1	Support for the employment of victims who have lost work (financial support)	Financial support for the victims who have lost work ・Understanding of the victims who have lost work ・Support for payment by national government through the bank system ・Management and arrangement with national government and district	NRA, MoF	District, Muni(Administration sec., Financial Administration sec.)						5000000000	6.4.2	-
		4-1-2	Support for employment, employment training in consideration of vulnerable people and deprived/marginalized people (Pichadiyeko barga)	Support for employment, employment training in consideration of vulnerable people and deprived/marginalized people (Pichadiyeko barga) ・Special allowance for social security to such as the single women, poor, those with disabilities and elderly citizens ・Implementation of skill training programmes for employment	NRA	District, Muni(Administration sec.)						5000000000	6.3.1, 6.3.2	-
		4-1-3	Support and introduction of cash or food for work	Support and introduction of cash or food for work for livelihood reconstruction ・Operation of cash or food for work programme ・Work for reconstruction such as debris disposal and reconstruction of buildings, etc.	NRA	District, Muni(Administration sec.)						200000000	6.4.1	-
		4-1-4	Human resource development for reconstruction and arrangement of employment opportunities for reconstruction work	Human resource development for reconstruction ・Establishment of a training centre ・Implementation of skill training programmes for employment ・Establishment of an employment centre and introduction of employment opportunities for reconstruction work	NRA	District, Muni(Administration sec.)						5000000	6.4.1, 6.4.2	-
4-2 Industry	Support for Agriculture	4-2-1	Recovery support for agriculture	Recovery support for agriculture ・Arrangement and provision of the seeds, fertilizers and other agricultural inputs to farmers at a cheaper price.	District							50000000	6.4.2	-
		4-2-2	Recovery and development of irrigation facilities	Recovery and development of irrigation facilities. ・Damage investigation of irrigation facilities. ・Recovery of damaged irrigation facilities. ・Maintenance, retrofitting and improvement of irrigation facilities .	District							100000000	6.1.7	-

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					Responsible Agency	Supporting Agency	73/74	74/75	75/76	76/77	77/78			
	Support for Commerce and Industry	4-2-3	Recovery support for stores, shops and cottage industries	Recovery support for private enterprises ・Provision of financial support(loan) for private enterprises such as cottage industries to repair and reconstruct the stores, shops and warehouses and to reopen their industries and businesses.	NRA, MoF	District, Muni(Administration sec., Financial Administration sec.)						1000000000	6.4.2	–
		4-2-4	Support for expanding sales channels, trade	Support for expanding sales channels, trade ・Consultation and Promotion of cottage, small and medium industries in the municipality area.	District, Muni(Administration sec.)							10000000	6.4.2, 6.5.2	–
	Support for the recovery and reconstruction of tourism	4-2-5	Promotion of tourism	Promotion of tourism ・Dissemination of tourism information periodically by utilizing website, etc. ・Creation and distribution of guide maps and sign boards indicating emergency response actions and evacuation sites.	Muni(Administration sec.)							3000000	6.4.3	–
5. Strengthening of Community Disaster Risk Management & Resilient Disaster Management System of Municipality														
5-1 Resilient Disaster Management System	Establishment of a resilient disaster management system	5-1-1	Formulation of disaster management plan	Formulation of a disaster management plan ・Policy making based on the risk assessment ・Consideration of countermeasures for mitigation/preparedness, emergency response and recovery/reconstruction phases ・Legalization and budget allocation for implementation	Muni(Administration sec., Building sec.)	MoFALD						–	6.5.4	✓
		5-1-2	Accumulation of disaster data for the Gorkha EQ and historical disasters	Accumulation of disaster data ・Accumulation and database compilation of historical disaster data including the Gorkha EQ ・Studying the Gorkha EQ, the past disasters and disaster trends.	Muni(Administration sec., Building sec.)	MoFALD						1000000	6.5.4	✓
		5-1-3	Formulation and dissemination of evacuation plan	Formulation and dissemination of an evacuation plan. ・Designation of evacuation sites/routes and dissemination. ・How to lead others to the evacuation site. ・How to operate the evacuation site.	Muni(Administration sec., Building sec.)	MoFALD						1000000	6.5.4	✓
		5-1-4	Understanding and dissemination of risk areas	To understand the risk area of the municipality, and dissemination to the residents. ・Hazard and risk assessment and understanding the risk areas. ・Dissemination to the residents such as creation of risk maps and disaster management maps.	Muni(Administration sec., Building sec.)	MoFALD						1000000	6.5.4	✓
	Promotion of a disaster management cooperation system	5-1-5	Strengthening cooperation with other municipalities, the establishment of a support and acceptance system, and conclusion of agreements	Conclusion of agreements for strengthening cooperation with other municipalities and the establishment of a support and acceptance system. ・Coordination with MoFALD for the cooperation system among municipalities.	Muni(Administration sec.), MoFALD							100000	6.5.4	✓
		5-1-6	Strengthening cooperation with other agencies (Police, Army, Red Cross), the establishment of a support and acceptance system, and conclusion of agreements	Conclusion of agreements for strengthening cooperation with other related agencies for emergency response and the establishment of a support and acceptance system. ・Coordination with Police, Army, Red Cross, etc.	Muni(Administration sec., Building sec.), MoFALD	MoFALD, MoHA, Nepal Army, Red Cross						1000000	6.5.4	✓
		5-1-7	Development of an acceptance system for volunteers	In order to manage the volunteers, a development of acceptance system should be created as follows. ・Establishment of section or assignment of staff in charge of volunteer activities. ・Establishment of a contact centre for volunteers.	Muni(Administration sec.)	MoFALD						1000000	6.5.4	✓
5-2 Disaster Management Facilities /Infrastructure	Development of disaster management facilities and enhanced functionality	5-2-1	Designation, development, improvement and enhancement of disaster management base facilities	Designation, development, improvement and enhancement of disaster management base facilities. ・Designation of disaster management base facilities in a municipality (Municipal office, etc.). ・Improvement and enhancement of facilities as the disaster management base. (Seismic resistant measures, stockpile, communication facilities, etc.)	Muni(Administration sec., Building sec.)	MoFALD, MoUD(DUDBC)						1000000	6.5.4	✓
		5-2-2	Development of stockpile warehouses, and ensuring disaster stockpiles	Development of stockpile warehouses, and ensuring disaster stockpiles. ・Development of stockpile warehouses and installation. ・Listing of necessary emergency goods (food, medical equipment, daily necessities, rescue equipment, fuel, etc.). ・Procurement of stockpiles.	Muni(Administration sec., Building sec.)	MoFALD						10000000	6.5.4	✓
		5-2-3	Management and enhancement of the fire brigade/equipment	Management and enhancement of the fire brigade/equipment ・Establishment of the fire brigade organization (municipal and ward level), allocation of resources ・Procurement of the fire equipments (portable fire engines, fire extinguishers, search and rescue equipments, etc.) ・Training and awareness raising activities	Muni(Administration sec., Building sec.)	MoFALD						10000000	6.1.5	✓
		5-2-4	Enhancement of the disaster management functions of schools	Enhancement of the disaster management functions of schools in order to secure the children and promote the disaster management base. ・Seismic resistant measures ・Securing stockpiles ・Development of communication facilities, etc.	Muni(Administration sec., Building sec.)	MoFALD, MoUD(DUDBC), MoE						10000000	6.5.4	✓

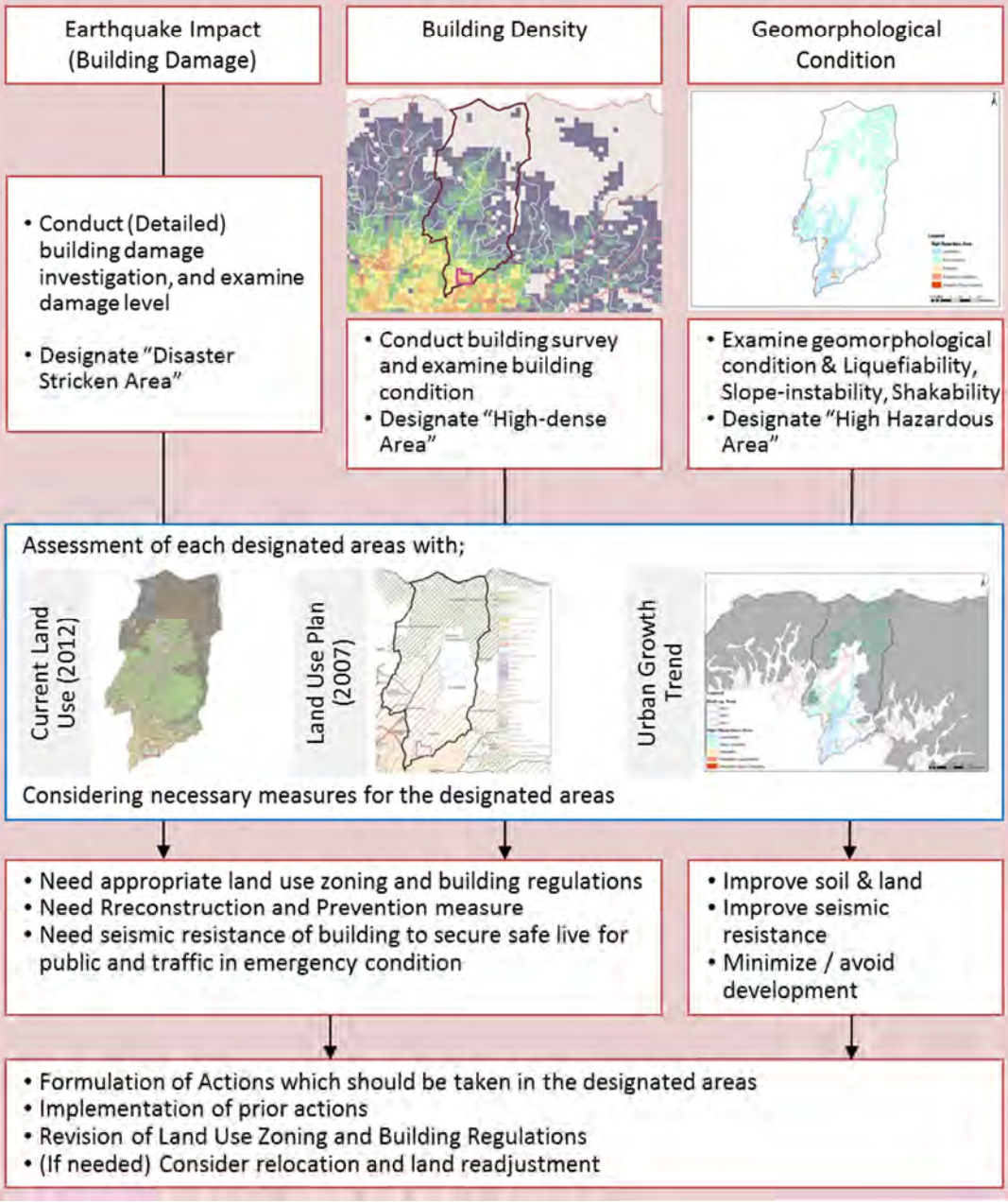
Sector (Category)	Sub-Category	No	Action list	Contents	Responsibility		Duration (Recovery / Revitalizatio / Developmen)					Cost Estimation (NPR)	Collaboration with National Reconstruction policy (Strategy)	To be integrated in DM Plan (to detail)
					Responsible Agency	Supporting Agency	73/74	74/75	75/76	76/77	77/78			
	Development of information/communication infrastructure	5-2-5	Development of an information database for disaster management	Development of a disaster information database ・Information of past disasters ・Information of people/section of related agencies (Name of contact person, contact number)	Muni(Administration sec., Building sec.)	MoFALD						2000000	6.5.4	✓
		5-2-6	Establishment of an information sharing system	Establishment of an information sharing system to cooperate and operate in an emergency smoothly and quickly ・Development of a damage and recovery information sharing system with the rescue and health/medical institutions, road and bridges, lifelines, etc. (Radio system, dispatch the personnel from each agency to the municipal disaster response committee)	Muni(Administration sec., Building sec.)	MoFALD						3000000	6.5.4	✓
		5-2-7	Development of an information sharing system for vulnerable people and deprived/marginalized people (Pichadiyeko barga)	Development of an information sharing system for vulnerable people and deprived/marginalized people (Pichadiyeko barga) ・Collection and sharing of information for vulnerable people (Name, Address, Condition, etc.) ・Establishment of a support system. (establishment of assistant group, etc.)	Muni(Administration sec., Building sec.)	MoFALD						4000000	6.5.4	✓
	Strengthening of countermeasures for landslide disaster	5-2-8	Understanding the areas at risk from landslides	Understanding the areas at risk from landslides ・Field surveys and studying of geographical features ・Designation of areas at risk from landslides	Muni(Administration sec., Building sec.)	MoUD, MoFALD						4000000	6.5.4	✓
		5-2-9	Application to land use restriction based on the risky areas	Application to land use restriction based on the risky areas ・Understanding of risky areas and residential areas ・Application to land use restriction and building permission	Muni(Administration sec., Building sec.)	MoUD, MoFALD						2000000	6.5.4	✓
		5-2-10	Development of monitoring and warning facilities and countermeasures for landslides	Development of monitoring and warning facilities, countermeasures for landslides ・Development of monitoring and warning facilities ・Development of slope protection	Muni(Administration sec., Building sec.)	MoUD, MoFALD						50000000	6.5.4	✓
5-3 Emergency Response	Capacity enhancement of emergency response	5-3-1	Establishment of an information collection and dissemination system	Establishment of an information collection and dissemination system・Establishment of information collection from the ward level・Establishment of an information dissemination system (development of information flow (from municipality to residents), utilization of media)	Muni(Administration sec., Building sec.)	MoFALD, MoHA, District						1000000	6.5.4	✓(SOP)
		5-3-2	Establishment of the initial system and mobilization system for emergency response	Formulation of manuals including the following items in order to execute the initial emergency response activities smoothly: ・Establishment of a disaster response committee (how to inform, gather, etc.) ・Establishment of an initial system such as the mobilization of staff (how to inform, gather, etc.)	Muni(Administration sec., Building sec.)	MoFALD, MoHA, District						1000000	6.5.4	✓(SOP)
		5-3-3	Formulation of a disaster emergency response manual(SOP)	Formulation of a disaster emergency response manual(SOP) (Examples of contents) ・Flow chart and check list of each section and each response activity such as search and rescue, medical, food provision, etc. ・Several formats for information collection, etc.	Muni(Administration sec., Building sec.)	MoFALD, MoHA						-	6.5.4	✓(SOP)
		5-3-4	Implementation of disaster management exercises for emergency response	Implementation of disaster management exercises for capacity development of emergency response. ・Formulation of step-by-step exercise programmes for capacity development (From seminars, table-top-exercises, to command post exercises) ・Exercise in collaboration with other agencies ・Verification of exercises and revision of SOP (Examples of contents) ・Information collection and dissemination, sharing ・Mobilization ・Coordination with other agencies	Muni(Administration sec., Building sec.)	MoFALD, MoHA, District, all related agencies						2000000	6.5.4	✓
5-4 Culture of Disaster Prevention/Resilience	Transferring earthquake experiences/ lessons learned and establishment of culture of disaster resilience	5-4-1	Development of bases for culture of disaster prevention/ resilience	In order to keep the memory of the Gorkha EQ, development as a base for culture of disaster prevention/resilience ・Consideration of the bases for culture of disaster prevention/resilience (Candidate of base) ・New monument, construction of reconstruction park ・Damaged and remaining heritage sites such as temples	Muni(Administration sec., Building sec.)	MoFALD						20000000	6.5.4	✓
		5-4-2	Implementation of events for promoting the establishment of culture of disaster prevention/ resilience	Implementation of events for promoting the establishment of culture of disaster prevention/resilience ・Disaster management exercises every April 25(the day of Gorkha EQ) to keep the memory of the Gorkha EQ	Muni(Administration sec., Building sec.)	MoFALD						1000000	6.5.4	✓

Sector (Category)	Sub-Category	No	Action list	Contents	Responsibility		Duration: Recovery / Revitalizatio / Developmen					Cost Estimation (NPR)	Collaboration with National Reconstruction policy (Strategy)	To be integrated in DM Plan (to detail)
					Responsible Agency	Supporting Agency	73/74	74/75	75/76	76/77	77/78			
		5-4-3	Enhancement of disaster risk reduction education (education based on the earthquake experiences, learning for disaster risk reduction)	Implementation of activities for the establishment of a culture of disaster prevention/resilience through the following activities. (Examples of activities) ・Education and learning for DRR/DRM based on the earthquake experience by such as story teller ・Collaboration with the DRR/DRM events and existing events	Muni(Administration sec., Building sec.)	MoFALD, MoE						2000000	6.5.4	✓
5-5 Public Awareness on Disaster Risk Reduction/ Management (DRR/DRM)	Enhancement of public awareness of DRR/DRM	5-5-1	Development of a handbook on DRR/DRM for families	Development and Distribution of a handbook about DRR/DRM for families (Examples of contents) ・Learning about disasters (earthquake mechanisms, etc.) ・What to do in the event of disaster ・Preparedness (Making earthquake resilient houses, preparing emergency stockpiles)	Muni(Administration sec., Building sec.)	MoFALD						3000000	6.5.4	✓
		5-5-2	Implementation of awareness-raising programmes on DRR/DRM	Implementation of awareness-raising programmes on DRR/DRM (Examples of programmes) ・Community workshop for learning DRR/DRM ・Development/Utilization of educational tools ・TV/Radio awareness programme	Muni(Administration sec., Building sec.)	MoFALD						300000	6.5.4	✓
		5-5-3	Promotion of the preparation of emergency stockpiles by families	Promotion of the preparation of emergency stockpiles by families. ・Preparation of list of emergency ・Promotion of preparation of emergency stockpiles by families (Development of brochure, leaflet for stockpiles)	Muni(Administration sec., Building sec.)	MoFALD						2000000	6.5.4	✓
5-6 CBDRM (Community Based Disaster Risk Management)	Enhancement of CBDRM	5-6-1	Establishment of "Community Disaster Management Committees (CDMCs)" as organizations for disaster preparedness, response, and rehabilitation at the community level	Establishment of "Community Disaster Management Committees (CDMCs)" ・Determination of members of CDMC based on the Ward Citizen Forum ・Determination and allocation of roles and responsibilities of CDMC ・Determination of DRR/ DRM capacity development programmes	Muni(Administration sec., Building sec.)	MoFALD						1000000	6.5.4	✓
		5-6-2	Formulation of community DRR/DRM plans	Support for Formulation of Community DRR/DRM plans ・Hazard/Risk assessment of community level based on the risk assessment on the municipal level ・Establishment of planning committee ・Formulation of Community DRR/DRM plans （Example of contents：General overview, Community profile, Risk assessment, Disaster management policy, Action plan, etc.)	Muni(Administration sec., Building sec.)	MoFALD						10000000	6.5.4	✓
		5-6-3	Formulation of "community carte" for summarized information of current conditions on disaster management at the community level	Formulation of "community carte" (Examples of contents) ・Community Profiles(Population, Geography, Location) ・DRR related information (Status of preparedness, Vulnerable people, Evacuation places/routes, etc.) ・Disaster Risk Assessment (maps and outline) ・Community DRR Map, etc.	Muni(Administration sec., Building sec.)	MoFALD						2000000	6.5.4	✓
		5-6-4	Implementation of DRR/ DRM capacity development programmes for community leaders	Implementation of DRR/DRM capacity development programmes for community leaders ・Establishment of Task forces ・Determination and implementation of DRR/DRM capacity development programmes (Examples of programmes) ・Know risks of own community (Hazard/Risk assessment, Field survey, Risk Mapping) ・Consider disaster preparedness of community (Disaster management planning, Making action plans, etc.)	Muni(Administration sec., Building sec.)	MoFALD						2000000	6.5.4	✓
		5-6-5	Carrying out of community disaster management exercises	Carrying out of community disaster management exercises ・Formulation of annual plan for disaster management exercise ・Carrying out of community disaster management exercise (Examples of exercise) ・Evacuation exercise ・Fire-fighting exercise ・SAR, first-aid exercise	Muni(Administration sec., Building sec.)	MoFALD						2000000	6.5.4	✓

CHAPTER 3.
PRIORITY PROJECT

The priority projects are selected through the priority, necessity and importance of the projects in the Action Plan. The Priority projects are to prepare as a project sheet for each project, and are to describe further details of the contents. Based on this sheet, the Budhanilkantha Municipality implements the actual project.

Title	Implementation of training of house reconstruction for masons, local communities, technicians, etc. (2-1-5)
Responsible Agency	Responsible Agency: Muni(Building sec.) Supporting Agency: MoUD(DUDBC)
Objectives	・To develop the capacity of safe construction methods.
Contents	・Planning for training (training course, target, schedule). (Example of training) ・Understanding the building codes, building by-laws, building regulations and their provisions. ・Training on construction (construction of load bearing buildings (brick, stone, block masonry)), construction of frame structure buildings (RCC Framed).
Schedule	2016.7 –
Workflow & Output Image	Planning for training ・Training course ・Target ・Implementation schedule Training for designers ・Understanding the building codes(NBC), building by-laws, building regulations ・Implementation of NBC, training on design ・Training on retrofitting design of existing buildings Training for masons Construction training of load bearing buildings (brick, stone, block masonry) ・Introduction for course, Lecture on NBC ・Construction of foundation ・Construction of walls ・Construction of floor and roof ・Quality control of construction materials ・Retrofitting of existing buildings Training for masons Construction training of frame structure buildings (RCC Framed) ・Introduction for course, Lecture on NBC ・Construction of foundation ・Construction of beams and columns ・Construction of floor and roof ・Quality control of construction materials ・Retrofitting of existing buildings Image of mason training  Source: JICA Project for the Transitional Project Implementation Support for Emergency Reconstruction Projects

Title	Designation of disaster stricken areas, high-dense areas, and vulnerable areas (3-5-2)
Responsible Agency	Responsible Agency: Muni (Infrastructure development sec., Building sec.) supported by the JICA Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley Supporting Agency: MoUD and KVDA
Objectives	・To conduct concentrated reconstruction measures in the designated areas and make the municipal area resilient.
Contents	・Designation of "Disaster Stricken Area" for prior recovery not to spreading damages ・Designation of "High-dense Area" for preventing secondary damages and to secure safe evacuation ・Designation of "High Hazardous Area" considering liquefaction, slope failure, and shakability for better reconstruction and future urbanization in safe condition.
Schedule	2016.7 – 2017.12
Workflow & Output Image	

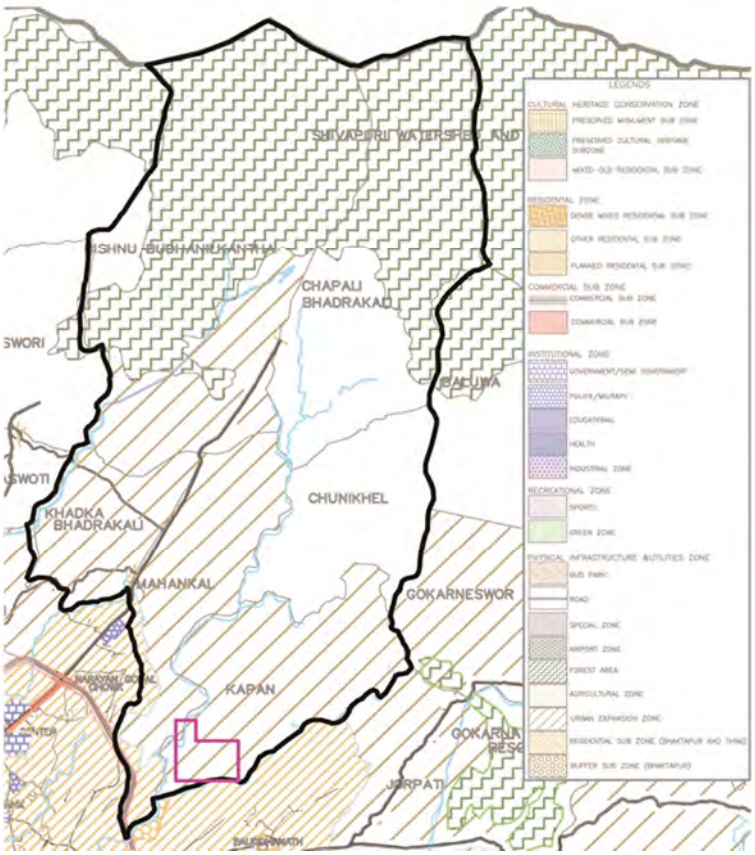
High-dense Area X **Current Land Use**

Most of the High-dense area is in "Residential Area"

High-Dense Area (Only)

- Southern Part of the Municipality
- Designated as Urban Expansion Zone, but already urbanized.

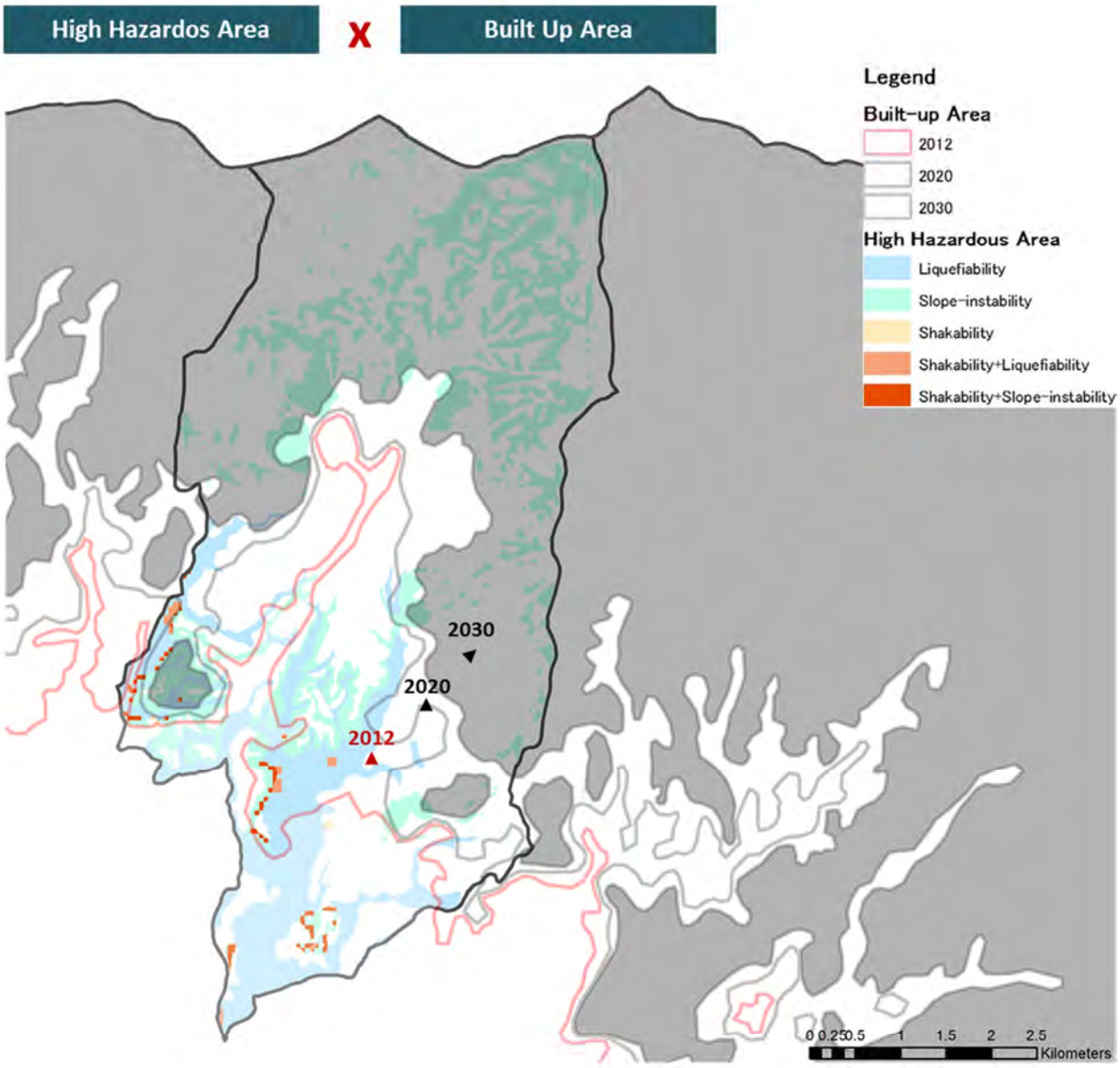
High-dense Area X **Zoning Plan**



All High-dense area is in "Urban Expansion Zone"

It is expected that urbanized is encroaching towards north. Zoning classification is "Urban Expansion Zone" or there is no designation.

> Need Appropriate Land Use Zones for the High-dense area (as well as other municipal areas)

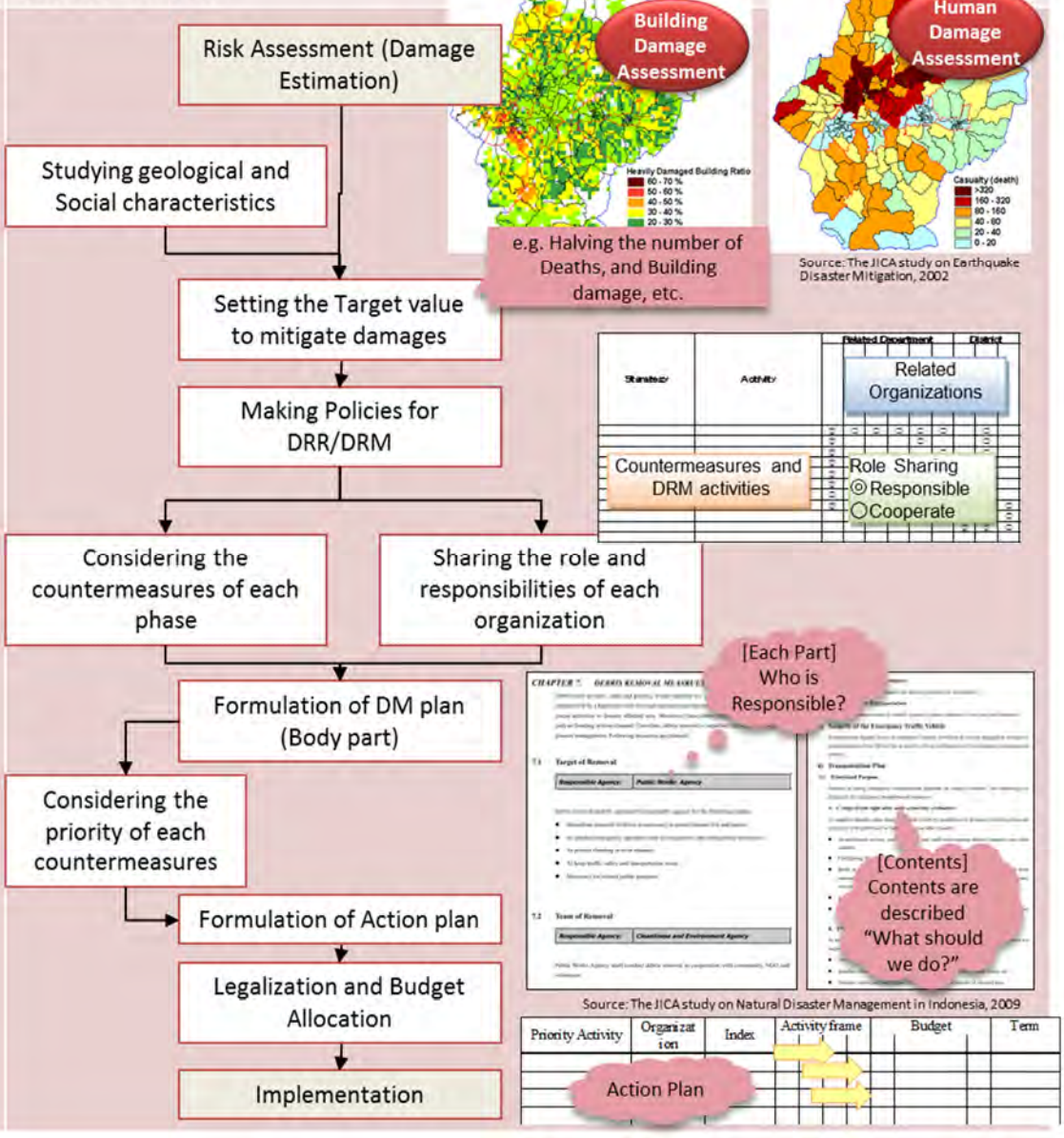


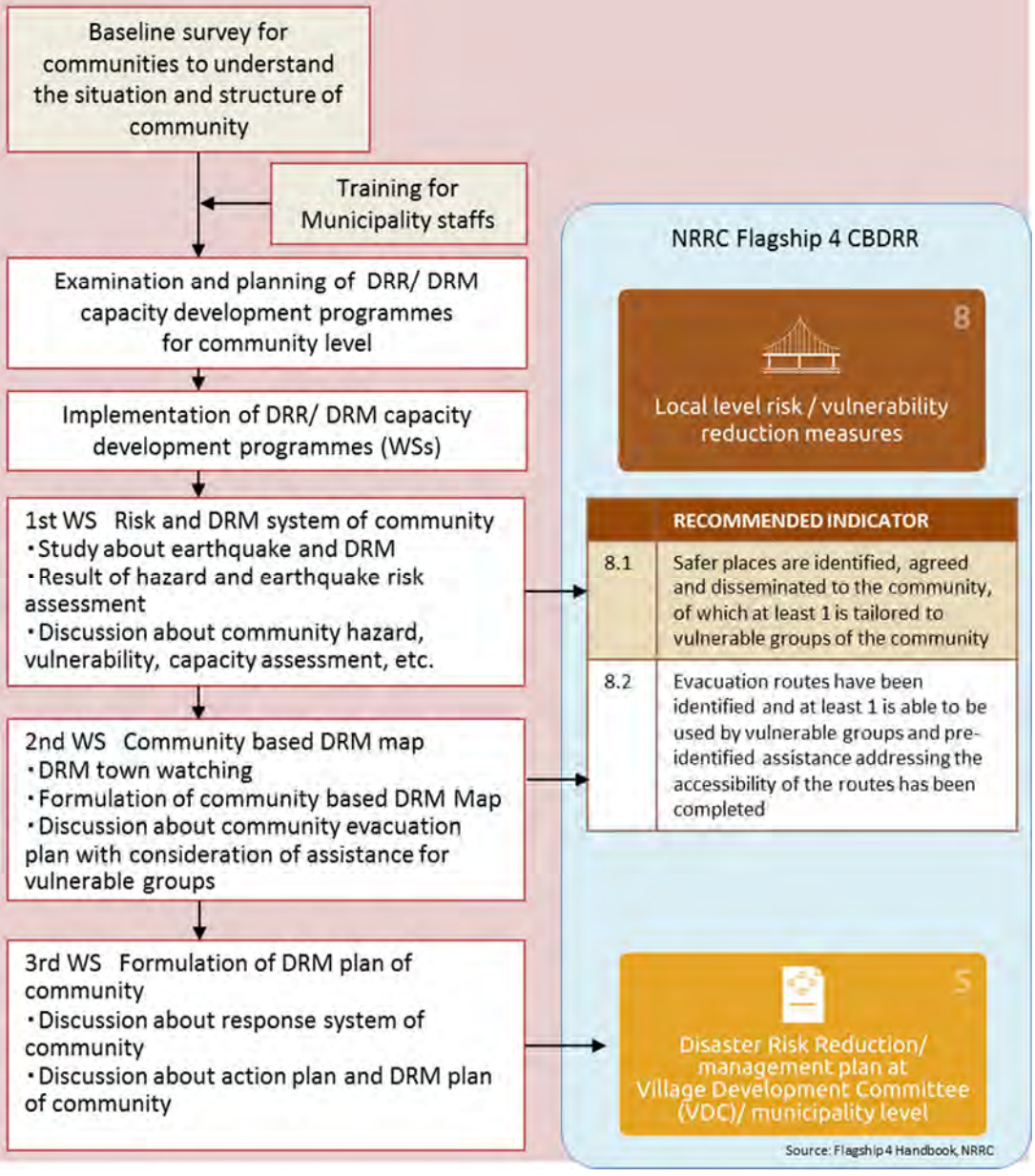
Past development

- Took place in the southern half of the city, where lands are relatively flat
- Liquefiability is the major types of hazard in the developed area

Future development

- Future development is projected to grow towards north
- Development is expected to take place mainly in high liquefiable areas

Title	Formulation of Disaster Management Plan (5-1-1)
Responsible Agency	Responsible Agency: Muni(Administration sec., Building sec.) by the JICA Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley Supporting Agency: MoFALD
Objectives	・To protect the citizen's lives and property ・To set the target to prevent and mitigate the damages by the future earthquake ・To implement the countermeasures effectively among all stakeholders
Contents	・Regional characteristics of geological and social conditions ・Result of the Risk Assessment ・DRR Target based on the Risk Assessment ・DRR Policies ・Roles and Responsibilities of each organization ・Countermeasures for mitigation/preparedness, emergency response and recovery/reconstruction phases ・Action plan prioritized countermeasures by budget, emergency, and necessity ・Legalization and Budget allocation for Implementation, etc.
Schedule	2016.11 – 2017.12
Workflow & Output Image	

Title	Implementation of DRR/ DRM capacity development programmes for community leaders (5-6-4)
Responsible Agency	Responsible Agency: Muni(Administration sec., Building sec.)supported by the JICA Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley Supporting Agency: MoFALD
Objectives	・To develop the capacity on DRR/DRM for communities
Contents	・Establishment of Task forces ・Determination and implementation of DRR/DRM capacity development programmes (Examples of programmes) ・Know risks of own community (Hazard/Risk assessment, Field survey, Risk Mapping) ・Consider disaster preparedness of community (Disaster management planning, Making action plans, etc.)
Schedule	2016.12– 2017.12
Workflow & Output Image	

CHAPTER 4.
MONITORING AND EVALUATION

Monitoring is an activity to observe the progress of the implementation of the action plan and to identify as well as anticipate the emergence of problems, so that they can be prevented or solved as early as possible.

Monitoring is carried out to observe the progress in the achievement of outputs, delivery of funds and emerging problems. Monitoring needs to be done regularly to obtain accurate information on the implementation of the reconstruction actions and the results achieved.

Evaluation of the implementation of the action plan will be done to the outcomes of actions in the form of impact or benefit for the community and/or Budhanilkantha Municipality. In principle, evaluation is a series of activities that compare the realization of action inputs, outputs and outcomes with the plan. Evaluation is done based on the resources used and the indicators and targets of an action.

Monitoring and evaluation are conducted with regard to the following principle and format is shown as follows:

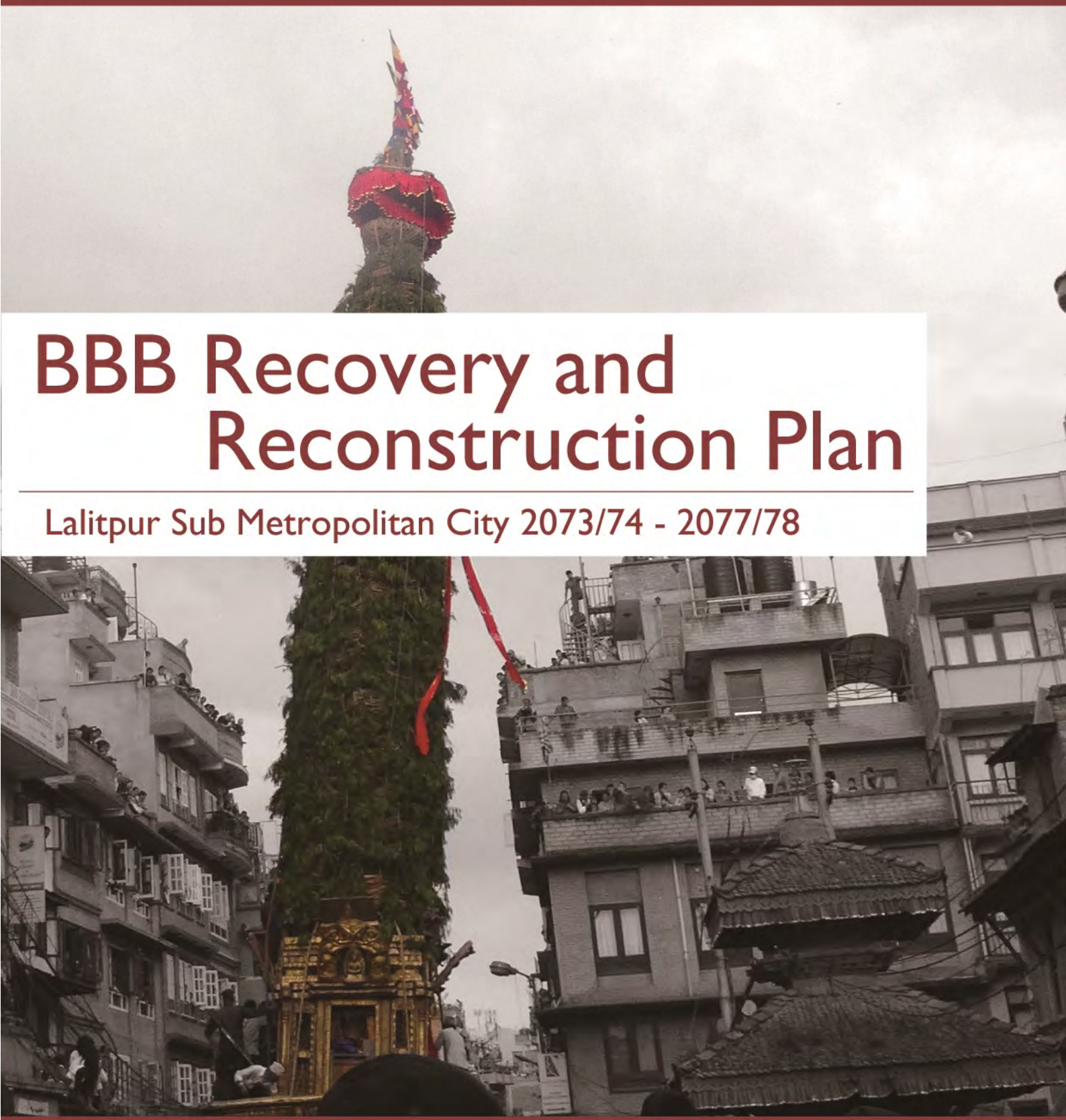
1. Effectiveness	A criterion for considering whether the implementation of action has benefited (or will benefit) and has reached its desired result
2. Efficiency	A criterion for considering how economic resources/inputs are converted to results. The main focus is on the relationship between project cost and effects/output
3. BBB Impact	A criterion for considering the effects of the project with an eye on the longer term effects, positive or negative, intended or unintended with the BBB concept

Format of Monitoring and Evaluation

ACTION	PROGRESS / INDICATOR		BUDGET		EVALUATION (LEVEL OF ACHIEVEMENT)	SOLUTION, NOTES
	PLANNED	**REALIZATION**	**PLANNED**	**REALIZATION**		

Monitoring and Evaluation of the Action plan will be carried out by the responsible agencies of each action. Monitoring and Evaluation will be carried out once every six months.

The Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley in Nepal



BBB Recovery and Reconstruction Plan

Lalitpur Sub Metropolitan City 2073/74 - 2077/78

Government of Nepal
Lalitpur Sub Metropolitan City
Japan International Cooperation Agency

Foreword

A year has passed since the devastating earthquake occurred on 25th April 2015. The earthquake and aftershocks caused massive damage and losses in Lalitur Sub-Metropolitan City, 49 people lost their lives, around 2,300 private houses were completely collapsed, and so many citizens were affected. Lalitur Sub-Metropolitan City is still underway toward full recovery, despite a prompt and extraordinary response in the immediate months by the national, local government and citizens. Furthermore, Lalitur Sub-Metropolitan City has the risk of suffering from more catastrophic earthquakes in the future.

Therefore, this “BBB Recovery and Reconstruction Plan of the Lalitpur Sub-Metropolitan City” has been formulated to build a more resilient society than before the earthquakes. The earthquakes have demonstrated that the recovery, rehabilitation and reconstruction phase, which needs to be prepared ahead of a disaster, is a critical opportunity to “Build Back Better”, including physical restoration of infrastructure, revitalization of livelihood and economy/industry, and the restoration of local culture and environment with integrating disaster risk reduction into development measures. Under the BBB concept, we set up the slogan “Toward Resilient Disaster Management Model City” as the leading municipality for disaster risk management in Nepal.

This BBB Recovery and Reconstruction plan shall be contributed as the Master Plan compiled of the necessary measures and actions in order to smoothly and quickly implement reconstruction for victims of life, industry and economy, urban planning for safety and a resilient city in the future. Furthermore, this plan shall be contributed as the clarification of the roles and responsibilities, and be contributed to the vital implementation with the coordination among all stakeholders.

For reconstruction, the efforts of not only government but also private sectors, communities and citizens are indispensable. It is strongly expected that this plan helps for redoubling our efforts, for accelerating the recovery and reconstruction process.

Bharat Mani Pandy
Executive Officer
Lalitpur Sub-Metorpolitan City

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BASIC PLAN

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Abbreviation

Abbreviation	Official Name (English)
AED	Automated External Defibrillator
BBB	Build Back Better
BCP	Business Continuity Planning
BPS	Building Permit System
CBDRM	Community Based Disaster Risk Management
CBS	Central Bureau of Statistics
CDMC	Community Disaster Management Committee
DDC	District Development Committee
DEOC	District Emergency Operation Centre
DED	Department of Electricity Development
DM	Disaster Management
DMG	Department of Mines and Geology
DRM	Disaster Risk Management
DRR	Disaster Risk Reduction
DoR	Department of Road
DUDBC	Department of Urban Development and Building Construction
DWSS	Department of Water Supply and Sewerage
EQ	Earthquake
GDP	Gross Domestic Product
GIS	Geographic Information System
GoN	Government of Nepal
HFA	Hyogo Framework for Action
IOE	Institute of Engineering
JICA	Japan International Cooperation Agency
KUKL	Kathmandu Upatyaka Khanepani Limited
KV	Kathmandu Valley
KVDA	Kathmandu Valley Development Authority
LSMC	Lalitpur Sub-Metropolitan City
MMI	Modified Mercalli intensity scale
MoE	Ministry of Education
MoF	Ministry of Finance
MoFALD	Ministry of Federal Affairs and Local Development
MoHA	Ministry of Home Affairs
MoHP	Ministry of Health and Population
MoIC	Ministry of Information and Communications
MoTCA	Ministry of Culture, Tourism and Civil Aviation

Abbreviation	Official Name (English)
MoUD	Ministry of Urban Development
Mw	Moment Magnitude
NBC	National Building Code
NGO	Non-Government Organization
NPC	National Planning Commission
NRA	National Reconstruction Authority
NRC	National Reconstruction Committee
NRCS	Nepal Red Cross Society
NRRC	Nepal Risk Reduction Consortium
NSC	National Seismic Centre
NSET	National Society for Earthquake Technology Nepal
PDNA	Post Disaster Needs Assessment
PGA	Peak Ground Acceleration
PGV	Peak Ground Velocity
RC	Reinforced Concrete
RDMP	Regional Disaster Management Plan
RRP	Recovery and Reconstruction Plan
SAR	Search and Rescue
SFDRR	Sendai Framework for Disaster Risk Reduction
SOP	Standard Operation Procedure
TOT	Training-of-Trainers
UNDP	United Nations Development Program
UNISDR	United Nations International Strategy for Disaster Reduction
UNOCHA	United Nations Office for Coordination of Humanitarian Affairs
UNOSAT	United Nations Institute for Training and Research Operational Satellite Applications Programme
USAID	United States Agency for International Development
USGS	United States Geological Survey
VDC	Village Development Committees
WB	World Bank
WCDRR	Third UN World Conference on Disaster Risk Reduction
WG	Working Group
WS	Workshop

BASIC PLAN

CHAPTER 1.

OUTLINE OF PLAN

1-1. Background

Gorkha EQ was occurred on 25th April, 2015

On Saturday, 25 April 2015, at 11:56 local time, a huge 7.8 magnitude (USGS) earthquake (Gorkha EQ) struck Barpak in the historic district of Gorkha, about 76 km northwest of Kathmandu. Nepal had not faced a natural shock of comparable magnitude for over 80 years since the Bihar earthquake in 1934. In addition numerous aftershocks have occurred since the Gorkha EQ, the largest aftershock having a magnitude 7.3 on May 12.

The Gorkha EQ and aftershocks caused massive damage and losses, a lot of vulnerable buildings collapsed, which increased the number of deaths. Remarkable and regrettable damage also affected many historical buildings including World Heritage sites. A latest damage and loss assessment shows that over 8,800 people lost their lives and 22,000 people were injured. In addition, over 602,000 private houses and 2,600 public buildings were completely collapsed and 285,000 private houses and 3,700 public buildings were partially damaged. 19,000 classrooms were completely damaged and more than 11,000 classrooms were damaged partially (Data source: Ministry of Home Affairs, as of Nov, 2015). In addition, the national economy has faced a severe negative impact from this earthquake. On the Post Disaster Needs Assessment (PDNA) prepared by the participation of ministries and agencies, the representatives of international organizations and led by the National Planning Commission (NPC), a preliminary projection has estimated a budget amount of 669 Billion Nepalese rupees for the reconstruction.

Lalitpur Sub-Metropolitan City was affected by the Gorkha EQ

In particular, Lalitpur Sub-Metropolitan City (LSMC) has been affected by the Gorkha EQ, 49 people lost their lives and 128 people were injured. For the building damage, around 2,300 private houses collapsed completely, and around 5,000 buildings were damaged partially. In addition, several public buildings such as governmental buildings, schools and hospitals have collapsed or have been affected. Moreover, several cultural heritages which were designated World Heritage Sites were severely damaged.

Build Back Better Recovery and Reconstruction is necessary toward future

Though LSMC is still in the recovery stage, from now on, the necessary actions must be conducted towards the reconstruction. Residents hope for a quick recovery to normal conditions, however, it will not reduce the vulnerabilities of area for future disasters. Lalitpur Sub-Metropolitan City has the risk of suffering from more catastrophic earthquakes in the future. To build a more resilient society than before the Gorkha EQ, the concept of "Build Back Better (BBB)" is necessary for the policies of recovery, rehabilitation and reconstruction. The concept "BBB" has become one of the priorities for action of the "Sendai Framework for Disaster Risk Reduction (2015-2030) ", adopted in Sendai, Japan 2015. Therefore, a recovery and reconstruction plan with the primary vision of BBB is prerequisite toward a more resilient society.

Reconstruction is required not only for urban development but also for the revitalization of livelihood, industry development, social welfare, education and widely various fields. This BBB Recovery and Reconstruction plan (RRP) of the LSMC shall be contributed as the Master Plan compiled of the necessary measures and actions in order to smoothly and quickly implement reconstruction for victims of life, industry and economy, urban planning for safety and a resilient city in the future through integrating disaster risk reduction into development measures. Furthermore, this plan shall be contributed as the clarification of the roles and responsibilities, and be contributed to the vital implementation with the coordination among all stakeholders.

1-2. Damage Status

1-2-1. Summary of the Gorkha earthquake

A huge earthquake of magnitude 7.8 (USGS) struck Nepal including Kathmandu, the capital city of Nepal, and the vicinity on 25th April 2015, Saturday, at 11:56 a.m. NST, the strongest one since the 1934 Bihar earthquake. The quake is believed to have occurred at the boundary area of the India Plate and Eurasia Plate with the epicentre approximately 80 km to the northwest of Kathmandu and a focal depth of 15 km. The fault plane is estimated as 150 km * 120 km (Yagi, http://www.geol.tsukuba.ac.jp/yagi-y/EQ/20150425). The rupture of the fault started at the hypocentre and transmitted southeast. The maximum slip is around 4m, which happened close to Kathmandu, which in turn caused strong ground motion and then severe damage near Kathmandu. The intensity of MMI at the fault area is mainly VIII with a very limited area of IX (Figure 1-1). There is one strong ground motion record available in KV opened by USGS. There were several great earthquakes which have occurred historically along the thrust boundary of the India Plate and the Eurasia Plate (Figure 1-2).

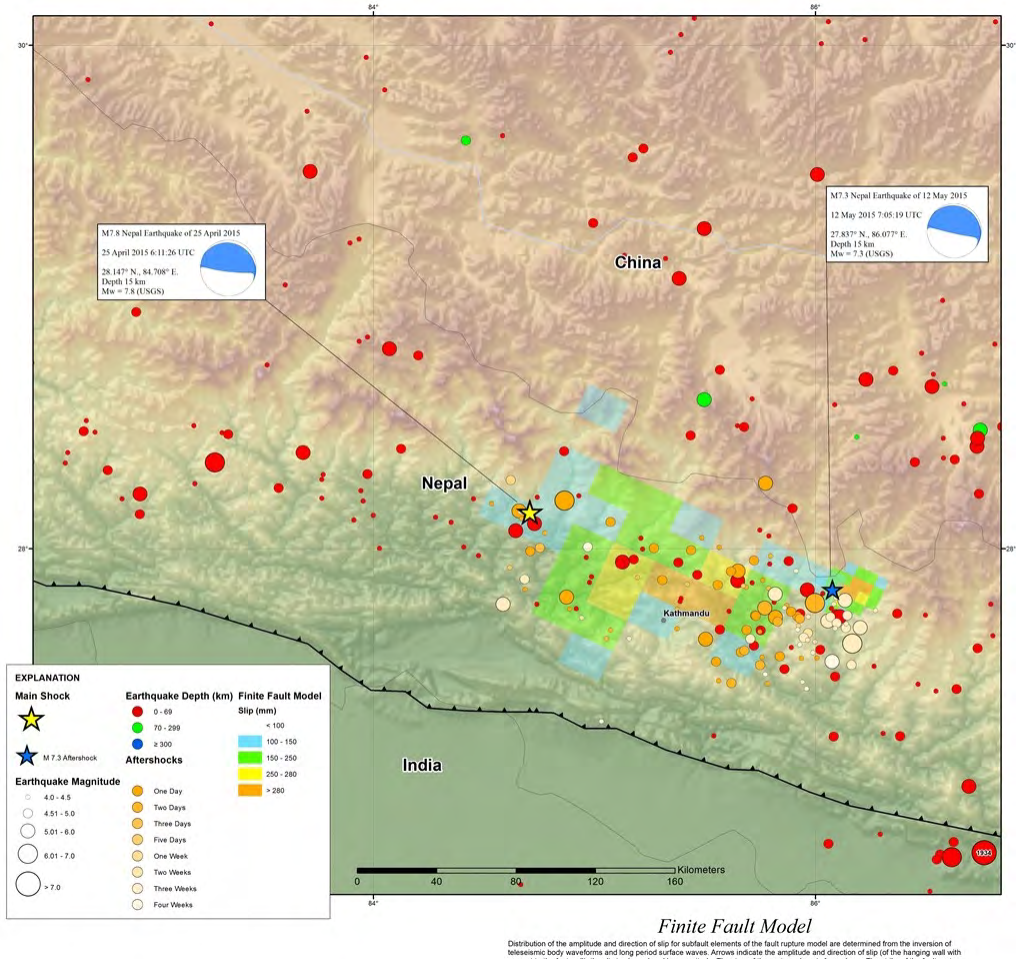


Figure 1-1 Distribution of intensity and estimated fault plane

Source: USGS, http://earthquake.usgs.gov/earthquakes/eqarchives/poster/2015/NepalSummary.php

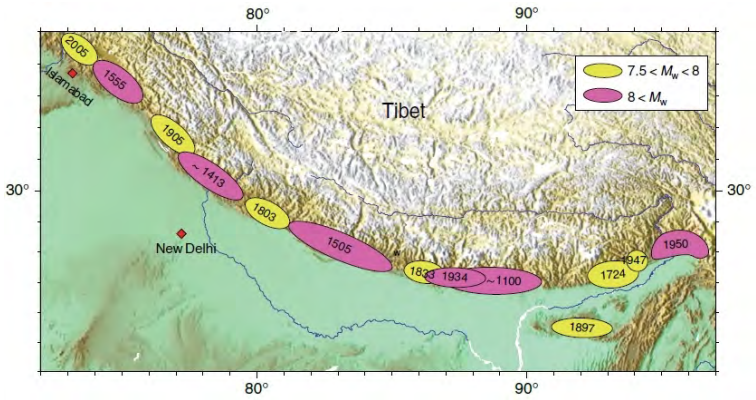


Figure 1-2 Historical earthquakes and central seismic gap

Source: Avouac, Treatise on Geophysics Vol.6, 2007

Hundreds of aftershocks have occurred to date from the Gorkha EQ (Figure 1-3). Three aftershocks larger than M6.0 have happened, and the largest one, with a magnitude of M7.3, happened on 12 May, which caused more than 200 deaths and 2,500 people injured. The large aftershocks are strong enough to cause vulnerable structure damage and it makes the situation worse since the main shock has caused damage for some structures, making them more vulnerable.

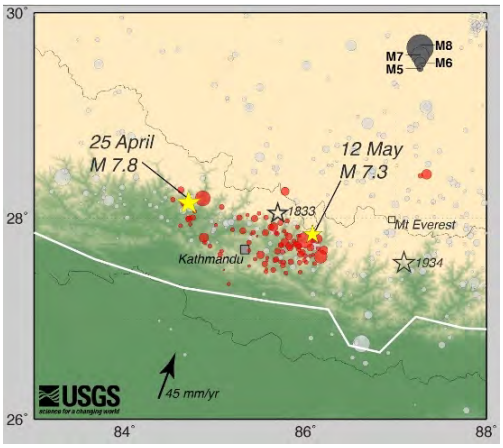


Figure 1-3 Spatial and time distribution of aftershocks more than M5.0

Source: USGS, http://www.usgs.gov/blogs/features/usgs_top_story/magnitude-7-8-earthquake-in-nepal

The seismic intensity of LSMC at the Gorkha EQ is shown in Figure 1-4.

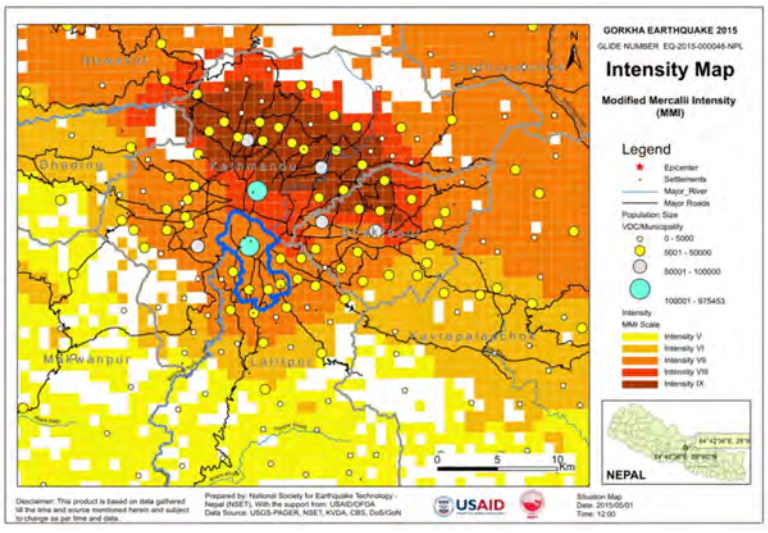


Figure 1-4 Seismic Intensity (MMI) of LSMC

Source: NSET, http://www.nset.org.np/eq2015/

1-2-2. Summary of Damage status

(1) Summary of Human Casualties

The following table shows the summary of damaged buildings from the Gorkha EQ in LSMC.

Table 1-1 Number of Human Casualties

Ward No.	Human Casualties			Census 2011			
	Death	Injured	Affected number of Population	Population			Household
				Male	Female	Total	
1	0	0	483	4,665	3,769	8,434	2,221
2	0	4	1,503	10,369	8,692	19,061	4,839
3	5	10	620	7,315	6,767	14,082	3,528
4	0	3	844	7,580	7,787	15,367	3,913
5	0	2	607	3,152	3,252	6,404	1,516
6	2	1	1,386	3,474	3,306	6,780	1,563
7	5	9	3,866	4,075	3,774	7,849	1,839
8	0	5	3,814	5,958	5,442	11,400	2,816
9	1	18	2,540	7,385	6,523	13,908	3,484
10	0	0	596	3,508	3,046	6,554	1,729
11	8	9	2,667	2,237	2,221	4,458	1,010
12	0	2	2,721	3,064	2,827	5,891	1,342
13	0	0	866	7,400	7,467	14,867	3,772
14	0	0	2,653	10,518	10,714	21,232	5,438
15	4	7	2,723	6,999	6,859	13,858	3,480
16	0	3	2,954	2,156	2,206	4,362	858
17	0	0	1,243	5,551	5,093	10,644	2,678
18	0	0	4,370	2,851	2,926	5,777	1,200
19	0	0	1,428	3,779	3,606	7,385	1,774
20	0	1	1,978	3,958	3,763	7,721	1,978
21	0	2	1,351	2,384	2,275	4,659	1,143
22	0	0	1,821	5,403	4,706	10,109	2,460
23	2	4	5,418	3,645	3,357	7,002	1,854
24	0	12	2,319	1,206	1,218	2,424	571
25	1	0	2,149	1,584	1,668	3,252	753
26	0	0	2,624	2,834	2,979	5,813	1,377
27	4	0	1,961	2,128	2,151	4,279	1,020
28	0	3	1,326	1,432	1,440	2,872	756
29	6	18	1,432	2,063	2,096	4,159	1,070
30	11	15	1,358	1,883	1,822	3,705	911
Total	49	128	61,621	130,556	123,752	254,308	62,893

Source: [Damage data] Laltpur sub-metropolitan city, [Census 2011] CBS

(2) Summary of Damaged Buildings

The following table shows the summary of human casualties from the Gorkha EQ in LSMC.

Table 1-2 Number of Damaged Buildings

Ward No.	Damaged Buildings					Census 2011						
	Fully Damage	Partially Damage Non Functional	Partially Damaged, Functional	Minor Damage	Total	Household by Type of foundation of house						Total
						MBBS	CBBS	RCCpill	Wpiller	Others	NS	
1	38	0	0	61	99	136	384	268	6	5	76	875
2	30	60	0	246	336	287	1,170	671	22	17	35	2,202
3	17	64	233	43	357	266	774	798	22	5	42	1,907
4	53	36	0	150	239	216	723	966	8	4	33	1,950
5	6	32	1	89	128	144	476	236	5	1	23	885
6	8	99	5	136	248	259	246	300	3	0	8	816
7	18	452	111	36	617	420	287	302	10	3	7	1,029
8	410	84	85	63	642	404	478	401	8	4	9	1,304
9	45	243	4	137	429	311	306	870	28	3	27	1,545
10	14	48	0	64	126	80	330	387	5	2	68	872
11	24	391	0	36	451	326	81	214	2	2	2	627
12	223	0	64	189	476	280	308	145	1	0	3	737
13	19	41	61	119	240	213	438	1,006	12	8	37	1,714
14	81	0	61	365	507	213	783	1,423	36	53	103	2,611
15	41	32	90	289	452	160	658	767	10	8	30	1,633
16	242	0	273	69	584	478	85	130	0	0	1	694
17	90	2	107	0	199	221	260	642	3	4	7	1,137
18	40	292	319	57	708	575	85	242	0	0	8	910
19	3	147	56	51	257	314	103	431	3	0	4	855
20	7	151	54	141	353	274	233	265	0	1	13	786
21	24	35	1	216	276	236	106	127	0	0	86	555
22	20	93	207	0	320	418	234	525	3	2	5	1,187
23	28	0	59	488	575	102	529	254	5	5	2	897
24	51	199	0	242	492	220	74	101	0	0	2	397
25	117	110	0	207	434	315	117	126	0	0	7	565
26	139	0	222	114	475	180	276	140	3	1	8	608
27	214	0	66	28	308	216	271	194	0	4	1	686
28	167	0	54	24	245	169	123	236	0	5	0	533
29	84	95	0	112	291	152	195	136	5	0	31	519
30	72	65	83	16	236	167	191	166	2	2	2	530
Total	2,325	2,771	2,216	3,788	11,100	16,604	17,537	21,084	396	192	893	56,706

Source: [Damage data] Laltpur sub-metropolitan city, [Census 2011] CBS
MBBS: Mud bonded bricks/stone
CBBS: Cement bonded bricks/stone
RCCpill: RCC with pillar
Wpiller: Wooden pillar
NS: Not stated

(3) Damage distribution maps

Several damage distribution maps of LSMC from the Gorkha EQ are shown as the following maps: Human Casualties, Damage of Buildings, Governmental Buildings, Schools, Hospitals and Cultural Heritages.

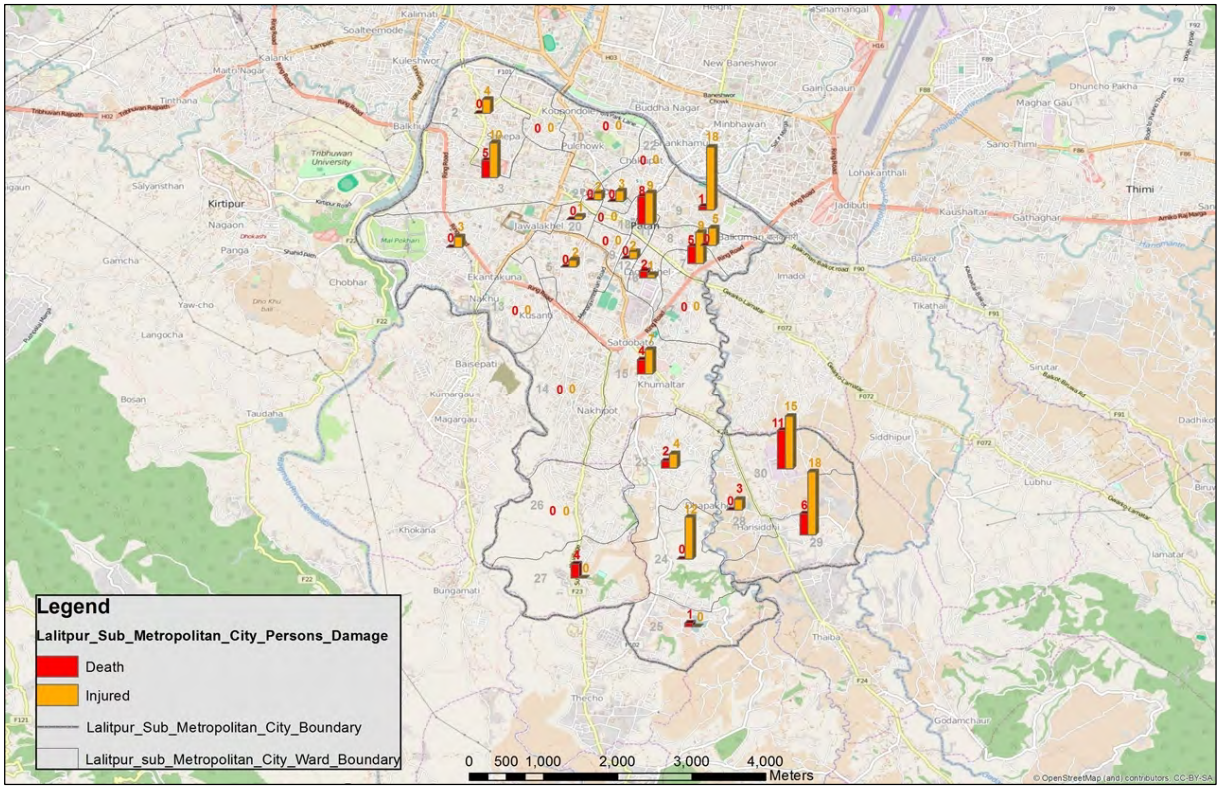


Figure 1-5 Map of Human Casualties

Data Source: Laltpur sub-metropolitan city

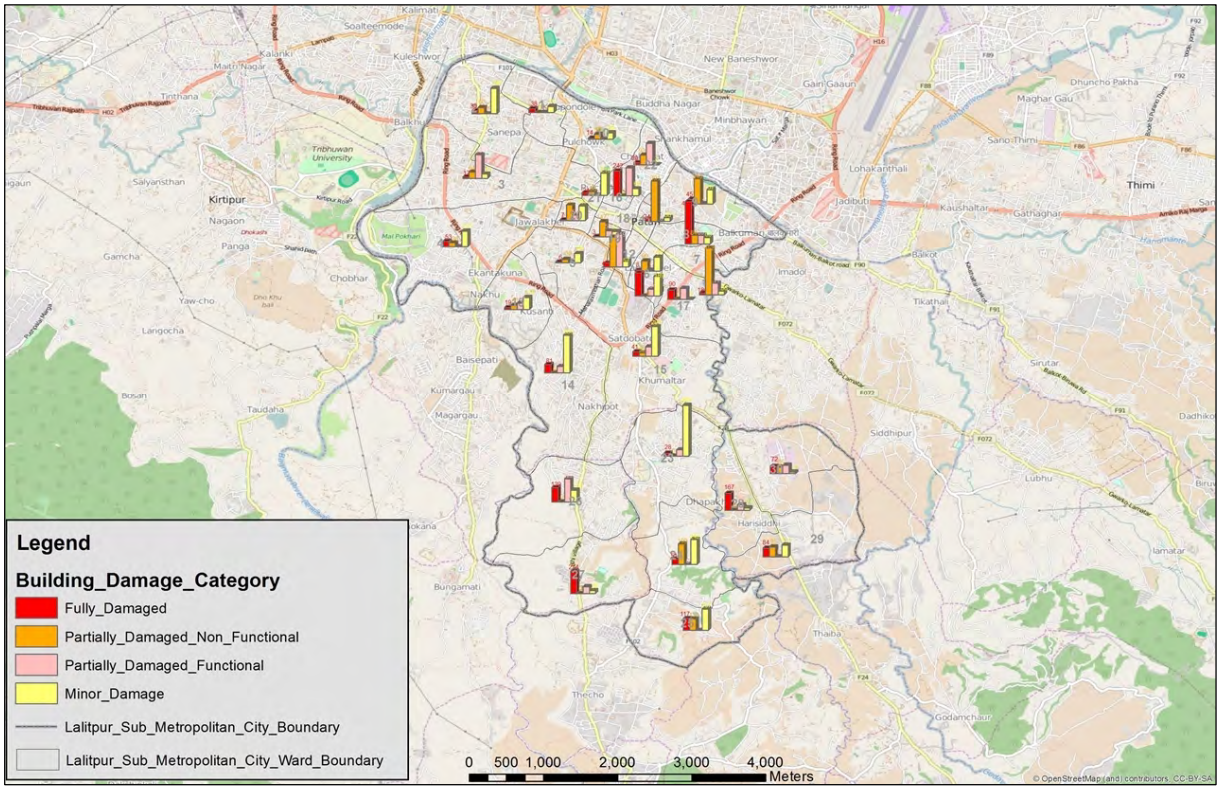


Figure 1-6 Damage Map of Buildings

Data Source: Laltpur sub-metropolitan city

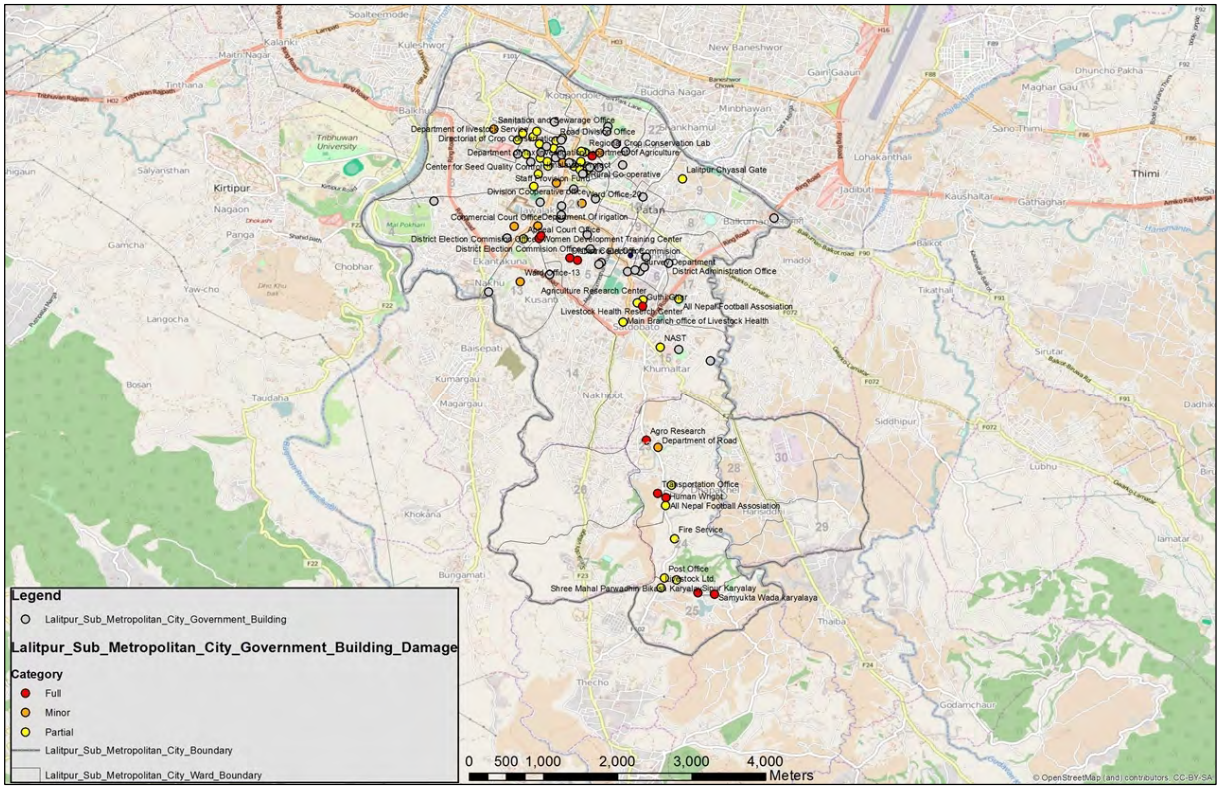


Figure 1-7 Damage Map of Governmental Buildings

Data Source: DUDBC

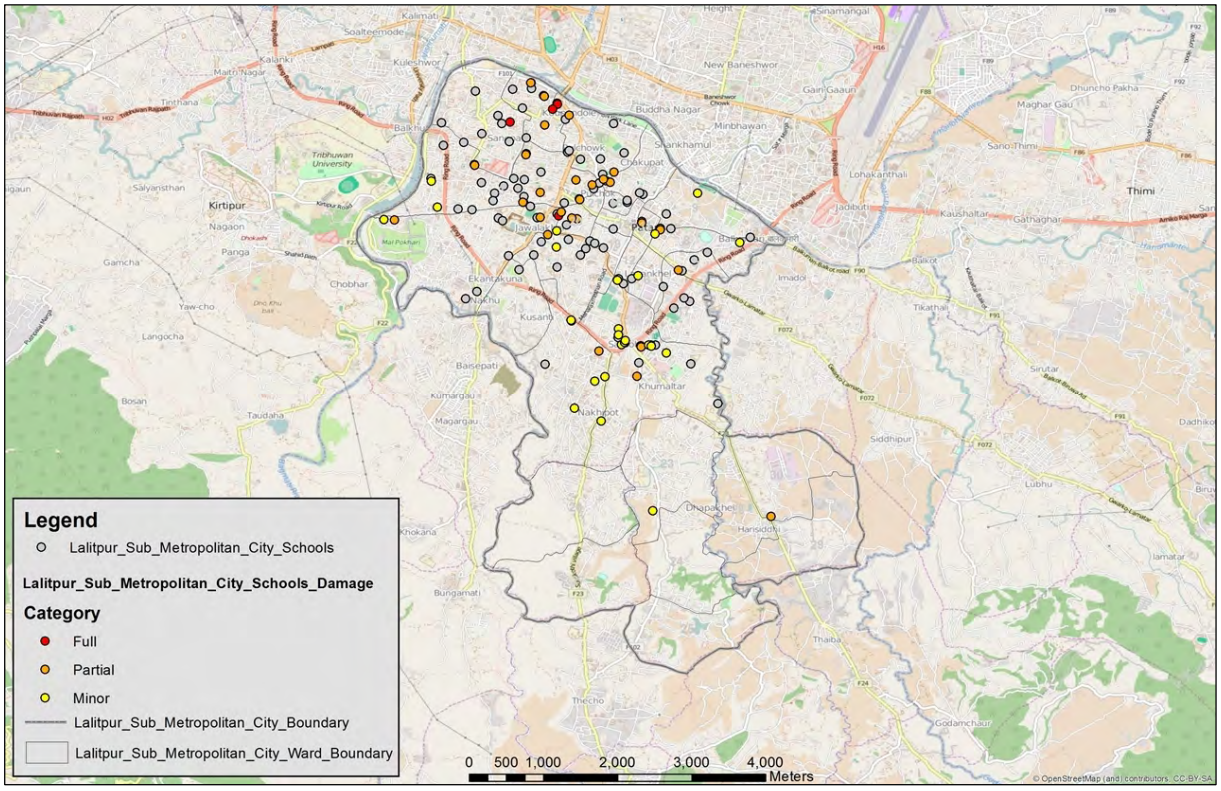


Figure 1-8 Damage Map of Schools

Data Source: Department of Education

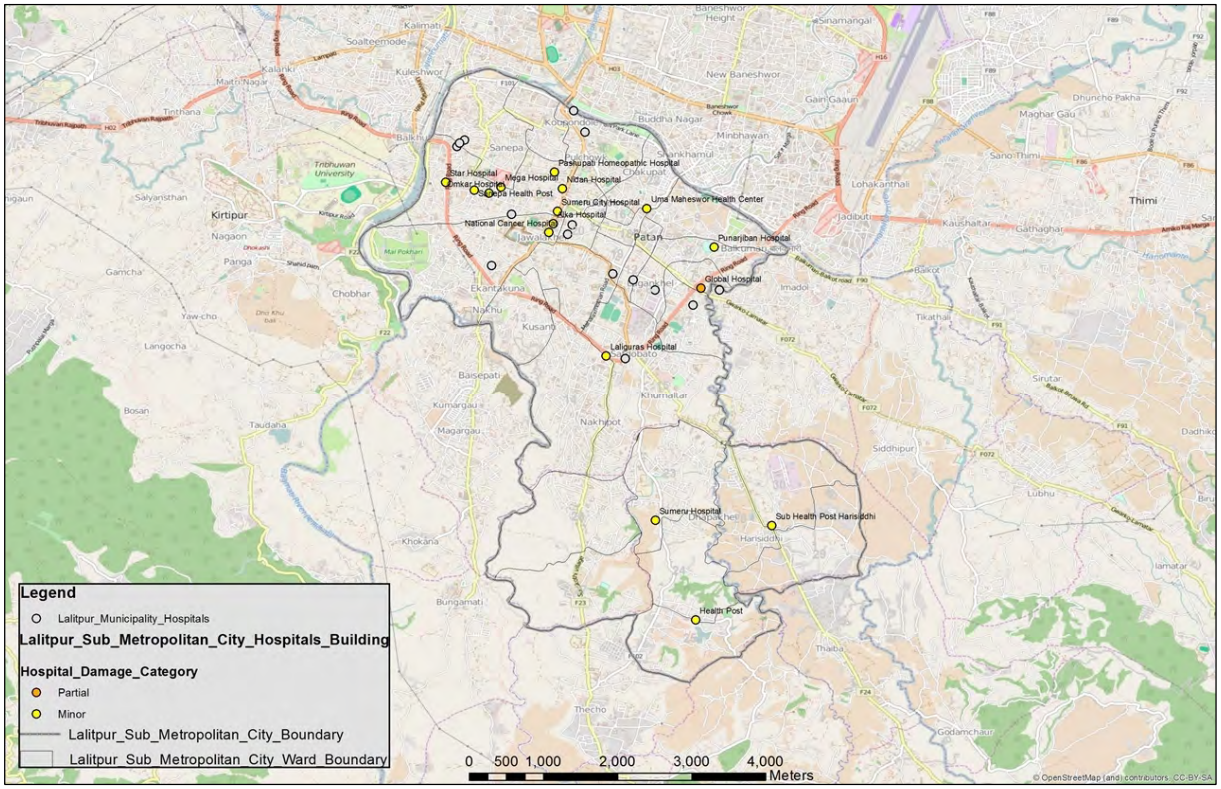


Figure 1-9 Damage Map of Hospitals

Data Source: Ministry of Health and Population

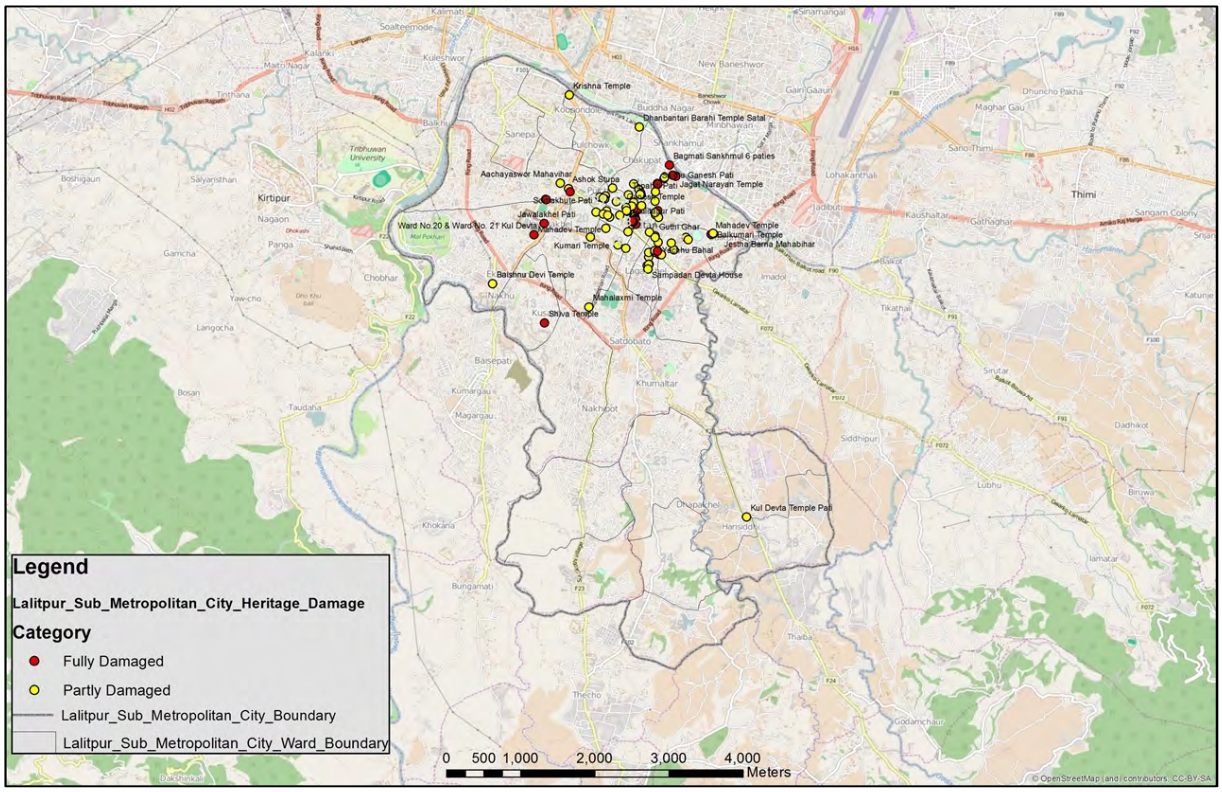


Figure 1-10 Map of Cultural Heritage Sites

Data Source: DUDBC

(4) Damage status from PDNA

Damage statuses of several sectors from PDNA are shown as follows:

1) Housing and human Settlements

Table 1-3 Calculation of Rental Loss

District	Average monthly rent (NPR)	Damaged rental units	Destroyed rental units
Bhaktapur, Lalitpur, Patan	14,850	5,415	13,063

2) Health and Population

Table 1-4 Damage Status of Health Facilities

District	Hospital		Public Health Care Centre		Health Post		Others		Private sector facilities	
	CD	PD	CD	PD	CD	PD	CD	PD	CD	PD
Lalitpur	0	0	0	2	9	20	1	0	0	12

(CD: Completely Damaged, PD: Partially Damaged)

Table 1-5 Estimates of Damages and Losses by District (NPR million)

District	Infra-structure	Medical equipment	Office equipment	Medicines &supplies	Other logistics	Others losses	Total
Lalitpur	148	0	1	-	0	25	174

3) Nutrition

Table 1-6 Estimated Number of Affected Children under Five Years, and Pregnant and Lactating Women

District	Children <2years*	Children 6-23 months	Children< 5 years	Children 6-59 months	Pregnant women	Lactating women
Lalitpur	19,264	14,315	10,635	9,485	2,729	2,314

* Also gives an estimation of the number of mothers breastfeeding children under two years of age

4) Cultural Heritage

Table 1-7 Damages, Losses and Reconstruction Costs

District	Damage USD	Losses USD	Losses USD	Losses USD	Cost of Recovery and Reconstruction USD
	Damage to physical assets and infrastructure	Impact on livelihood estimated at 10% of damage	Losses from tourist ticket sales	Total value	20% added for the cost of retrofitting and improved seismic design of new structures
Lalitpur	$9,190,000	$919,000	$897,649	$1,816,649	$11,028,000

5) Agriculture

Table 1-8 District-wise Summary of Damages and Losses (NPR million)

District	Crop subsector			Livestock subsector			Agriculture total				
	Damage	Losses	Total Effect	Damage	Losses	Total Effect	Damage	Losses	Total Effect	Private (%)	Public (%)
Lalitpur	108.63	113.15	221.78	63.71	110.79	174.51	172.35	223.94	396.29	91.44	8.56

6) Irrigation

Table 1-9 Irrigation Systems in Earthquake-affected Districts with Damages and Losses

District	Number of affected schemes	Total cost of damage on irrigation scheme (NPR million) :*1	Cost of damage to office buildings (NPR million):*2	*1+*2	Total loss in CA (ha)	Total loss in Irrigation Service Fee collection (NPR million @ 20% collection rate)
Lalitpur	1	0.5	0.0	0.5	25	0.001

7) Commerce and Industry

Table 1-10 Estimated Damages and Losses to Commerce and Industry (NPR)

Industry	Micro		Cottage/Small		Medium & Large		District wise consolidated	
District	Damage	Loss	Damage	Loss	Damage	Loss	Damage	Loss
Lalitpur	82,080,000	506,160,000	234,195,521	10,130,542	156,831,500	1,260,065,833	473,107,021	1,776,356,376

Commerce	Micro		Cottage/Small		Medium & Large		District wise consolidated	
District	Damage	Loss	Damage	Loss	Damage	Loss	Damage	Loss
Lalitpur	224,070,000	439,652,500	62,128,438	1,625,778	428,000,670	476,770,592	328,999,108	918,048,870

8) Waste, Sanitation and Hygiene

Table 1-11 Damages and Losses in the 14 Severely-affected Districts

District	Water damages (NPR)	Sanitation damages (NPR)	Losses (NPR)
Lalitpur	131,422,857.1	61,590,450.0	63,391,371.3

Table 1-12 Recovery and Reconstruction Initiatives and Costs (Based on needs, DRM/BBB and recovery and reconstruction strategy)

District	Sanitation (NPR)	Water Systems (NPR)	Build Back Better (NPR)			Total Cost (NPR)	Total Cost, US$
			WSP/ Upgrading water quality	Infrastructure	Institutional capacity development		
Lalitpur	61,590,450.0	131,422,857.0	13,142,285.7	19,713,428.6	2,895,199.6	228,764,220.9	2,287,642.2

District	Budget allocation, US$		
	2015/16 (25%)	2016/17 (40%)	2017/18 (35%)
Lalitpur	571,910.6	915,056.9	800,674.8

9) Employment and Livelihoods

Table 1-13 Employment and Livelihoods Sector: Work Days Lost and Income Lost per District

District	Lost work days	Losses in personal income(in millions)	
		NPR	USD
Lalitpur	3,399,321	614.0	6.1

1-2-3. Result of Detail Building Damage Survey

JICA Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley in Nepal has conducted the detail building damage survey for each building of Gorkha EQ in LSMC. The result is shown as follows.

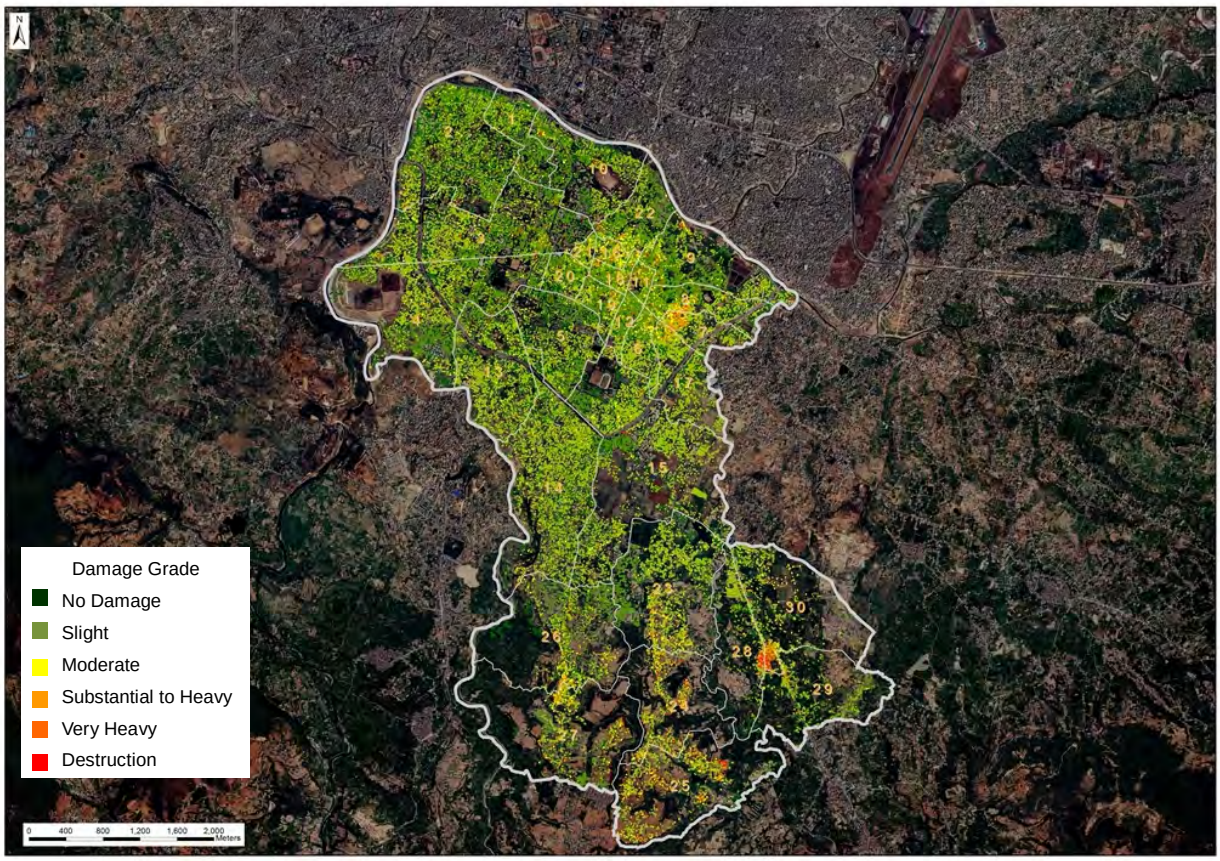


Figure 1-11 Map of distributions of buildings by damage grade

Table 1-14 Ward wise distributions of buildings by damage grade

Ward	ND (DG1)	%	SL (DG1)	%	MO (DG2)	%	SH (DG3)	%	VH (DG4)	%	DS (DG5)	%	Total
1	688	62.95	361	33.03	21	1.92	2	0.18	5	0.46	16	1.46	1093
2	1669	54.63	1231	40.29	72	2.36	23	0.75	16	0.52	44	1.44	3055
3	1538	47.37	1448	44.60	112	3.45	34	1.05	51	1.57	64	1.97	3247
4	1298	44.68	1462	50.33	57	1.96	22	0.76	19	0.65	47	1.62	2905
5	613	43.69	740	52.74	25	1.78	7	0.50	6	0.43	12	0.86	1403
6	484	41.33	521	44.49	94	8.03	48	4.10	16	1.37	8	0.68	1171
7	101	8.89	648	57.04	130	11.44	70	6.16	131	11.53	56	4.93	1136
8	817	42.69	694	36.26	186	9.72	67	3.50	88	4.60	62	3.24	1914
9	1301	59.24	624	28.42	131	5.97	44	2.00	34	1.55	62	2.82	2196
10	785	58.45	476	35.44	30	2.23	12	0.89	12	0.89	28	2.08	1343
11	501	60.65	161	19.49	64	7.75	43	5.21	34	4.12	23	2.78	826
12	685	67.42	220	21.65	38	3.74	41	4.04	18	1.77	14	1.38	1016
13	522	25.08	1470	70.64	44	2.11	19	0.91	15	0.72	11	0.53	2081
14	772	23.15	2476	74.24	49	1.47	10	0.30	12	0.36	16	0.48	3335
15	536	18.12	2299	77.72	70	2.37	21	0.71	10	0.34	22	0.74	2958
16	405	43.45	268	28.76	163	17.49	50	5.36	32	3.43	14	1.50	932
17	186	11.80	1158	73.48	81	5.14	54	3.43	83	5.27	14	0.89	1576
18	766	63.20	237	19.55	112	9.24	51	4.21	25	2.06	21	1.73	1212
19	638	56.16	316	27.82	79	6.95	54	4.75	36	3.17	13	1.14	1136
20	564	58.63	296	30.77	63	6.55	15	1.56	11	1.14	13	1.35	962
21	381	61.75	133	21.56	69	11.18	16	2.59	12	1.94	6	0.97	617
22	991	59.31	451	26.99	141	8.44	32	1.92	39	2.33	17	1.02	1671
23	471	25.38	1202	64.76	101	5.44	18	0.97	35	1.89	29	1.56	1856
24	28	3.93	442	61.99	90	12.62	24	3.37	66	9.26	63	8.84	713
25	65	6.05	662	61.64	105	9.78	45	4.19	110	10.24	87	8.10	1074
26	630	43.54	608	42.02	95	6.57	21	1.45	59	4.08	34	2.35	1447
27	347	30.82	525	46.63	120	10.66	40	3.55	54	4.80	40	3.55	1126
28	82	11.11	445	60.30	39	5.28	12	1.63	73	9.89	87	11.79	738
29	272	41.09	332	50.15	10	1.51	5	0.76	24	3.63	19	2.87	662
30	100	9.23	620	57.25	83	7.66	34	3.14	116	10.71	130	12.00	1083
Total	**18236**		**22526**		**2474**		**934**		**1242**		**1072**		**46484**
%	**39.23**		**48.46**		**5.32**		**2.01**		**2.67**		**2.31**		

ND-No Damage, SL-Slight, MO- Moderate, SH-Substantial to Heavy, VH-Very Heavy, DS- Destruction
Source: JICA Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley

1-3. Objective

Objectives for formulation of RRP of LSMC are shown as follows; RRP is necessary for the setting and sharing of goals and direction, effective coordination of reconstruction projects, and effective implementation of reconstruction actions.

(1) Setting and sharing of goals and direction

- To clarify the goals and direction of the reconstruction.
- To promote more effective reconstruction actions
- To share the vision among all stakeholders such as government, private sectors and residents.
- To public relations of reconstruction measures/actions

(2) Synchronized coordination of reconstruction projects

- To clarify the role and responsibility of each reconstruction action among all stakeholders
- To coordinate the reconstruction actions among all stakeholders

(3) Effective implementation of reconstruction actions

- To implement reconstruction actions for not only urban development but also industry development, welfare, education, and widely various fields
- To clarify the priority of reconstruction actions
- To implement the reconstruction projects efficiently and comprehensively by monitoring consistency and coordinating such widely various reconstruction projects

1-4. Position

National Reconstruction and Rehabilitation Policy

The Nepal Government together with the international community carried out the Post Disaster Needs Assessment, just after the earthquake to identify the damage cost estimation. The report pointed out that the estimation value of disaster effects (damages and losses) caused by the earthquake is NRP 706 billion or its equivalent US$ 7 billion and 76 percent of the total effects represents the value of destroyed physical assets.

The Nepal Government initiated the concept of Build Back Better towards the resilience of the society with emphasis on the improvement of the Disaster Risk Reduction system in Nepal.

The government of Nepal proposed the bill to establish the National Reconstruction Authority (NRA) as the leading agency of the reconstruction from an earthquake. The bill prescribes the establishment of the National Reconstruction Committee (NRC) and Steering Committee both of which are chaired by the Prime Minister. The bill was approved by the

National Congress in January, 2016.

NRA has prepared the National Reconstruction and Rehabilitation Policy to envisage a guideline for reconstruction and recovery. The rehabilitation and recovery plan on the municipal level is expected to fulfil important roles as the basis for appropriately reflecting the national reconstruction policies to local community people.

Table 1-15 Objectives of National Reconstruction and Rehabilitation Policy

1.	To reconstruct, retrofit and restore the partial and completely damaged residential, community and government buildings and heritage sites to make them disaster resistant using local technology according to the need.
2.	To revive (reestablishment) the damaged cities and ancient settlements by maintaining the original shape with improved structure.
3.	To protect and promote the vulnerable individual and community of the quake affected areas.
4.	To develop new alternatives by reestablishing productive sector for economic opportunity and livelihood.
5.	To study and research on earthquake, its damages and effects, reconstruction, resettlement, rehabilitation and disaster risk reduction.
6.	To develop integrated and planned settlements.

Source: National Reconstruction and Rehabilitation Policy, 2072, NRA

Position of BBB Recovery and Reconstruction Plan Lalitpur Sub-Metropolitan City

RRP of LSMC is the Master plan compiled of the necessary measures and actions in order to implement reconstruction smoothly and quickly for the victims.

RRP of LSMC is a municipal document that is owned by LSMC. The contents of RRP are related with the Post-Earthquake Recovery and Reconstruction Policy of the Government of Nepal. RRP is indicated the Role and Responsibilities of all sections of LSMC, agencies and institutions related to the implementation of recovery and reconstruction of LSMC from the Gorkha EQ. According to the concept of BBB and Mainstreaming Disaster Risk Reduction into Development, RRP will be processed to be the integration to the Regional Disaster Management Plan (RDMP).

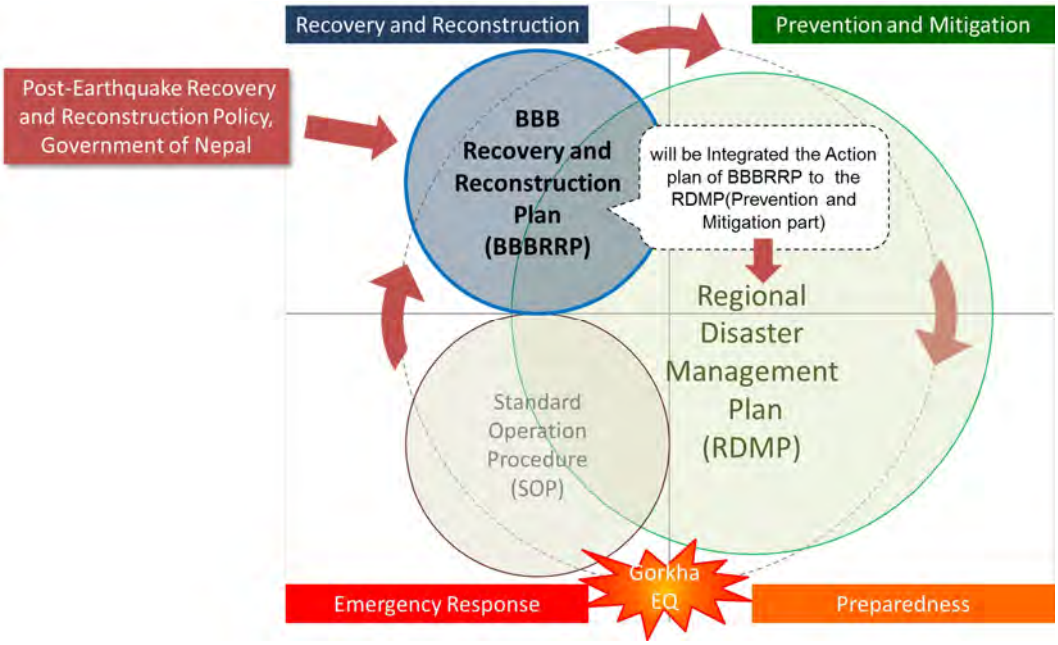


Figure 1-12 Position of BBB Recovery and Reconstruction Plan

The affected area in LSMC by the Gorkha EQ is not whole area, however, in order to move toward a more resilient society than before, the scope area of RRP is the whole area and all residents of LSMC.

1-5. Period

The target period of RRP of LSMC is basically five years and if divided into three phases; Recovery, Revitalization, Development (2073/2074 – 2077/2078). Particularly, in the recovery period, the recovery and reconstruction efforts from the damage of the Gorkha EQ will be conducted intensively. In the revitalization and development period, with the concept of BBB, the efforts leading to the positive reconstruction, restoration and future development will be conducted for the resilient society. The activities of the Revitalization and Development phases are to be integrated into the prevention and mitigation part of the Regional Disaster Management Plan.

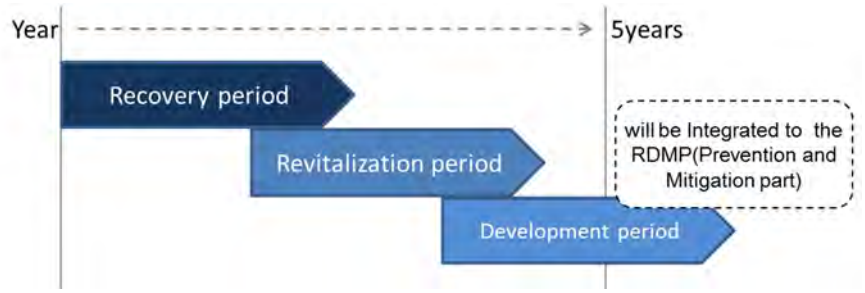


Figure 1-13 Period of BBB Recovery and Reconstruction Plan

1-6. System

Structure of BBB Recovery and Reconstruction Plan

The RRP consists of the basic policy and action plan based on the vision of LSMC as shown in 2-2. The basic plan shows the entire image of the reconstruction such as vision and grand design based on the damage status and direction for the future. Each vision is divided into several policies, and in each policy the list of necessary countermeasures and actions for detail action plans is included. In order to achieve the policies, the action plan includes the responsible organizations in the municipality in consideration with the coordination with the national or district organizations. By considering budget, importance, urgency and time needed, each action plan is sorted into three phases by priority. The structure of RRP is shown as follows.

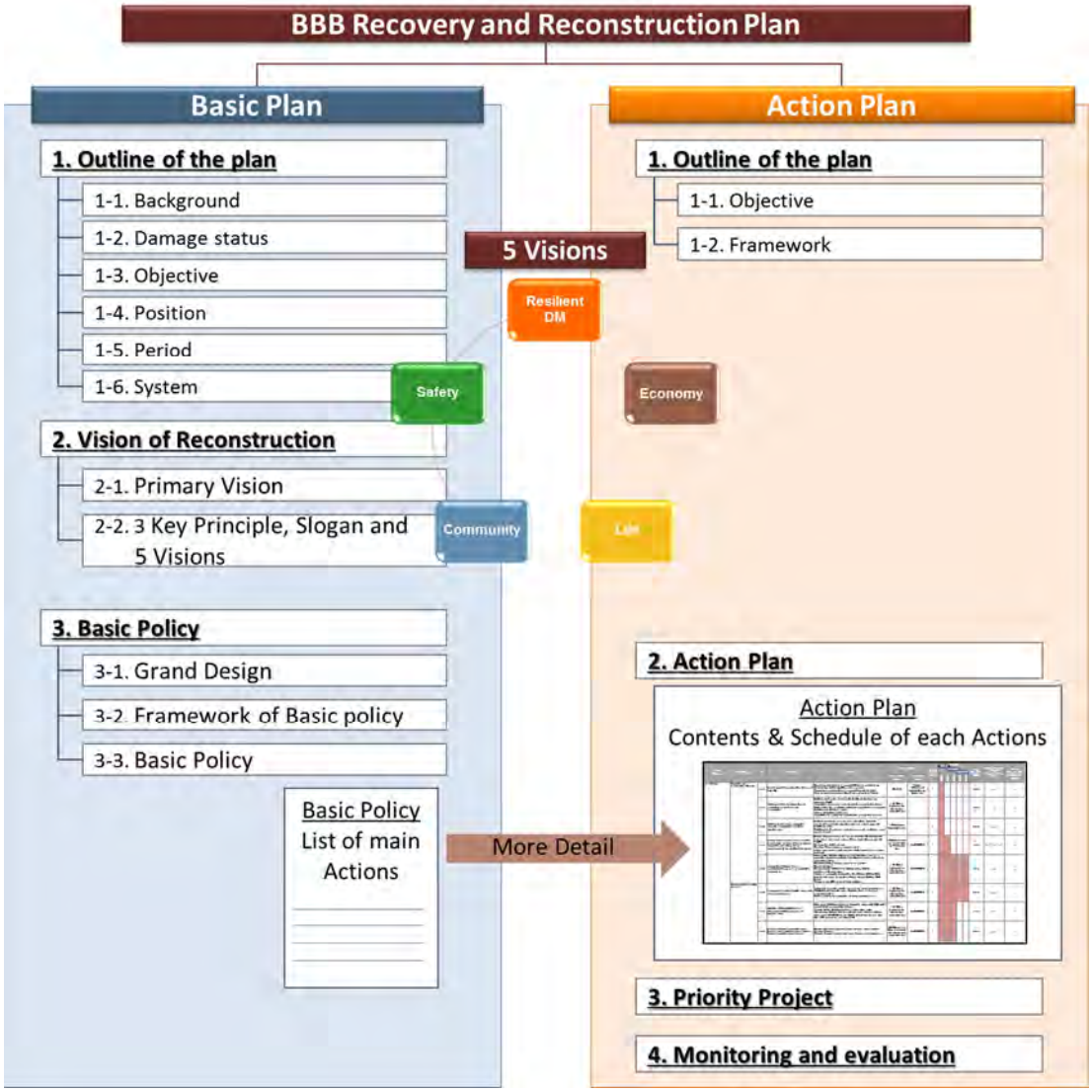


Figure 1-14 Structure of BBB Recovery and Reconstruction Plan

Reconstruction System of Lalitpur Sub-Metropolitan City

According to the National Reconstruction Policy by NRA, the reconstruction system of Lalitpur Sub-Metropolitan City shall be established as the following. Based on this system, the reconstruction project will be implemented systematically.

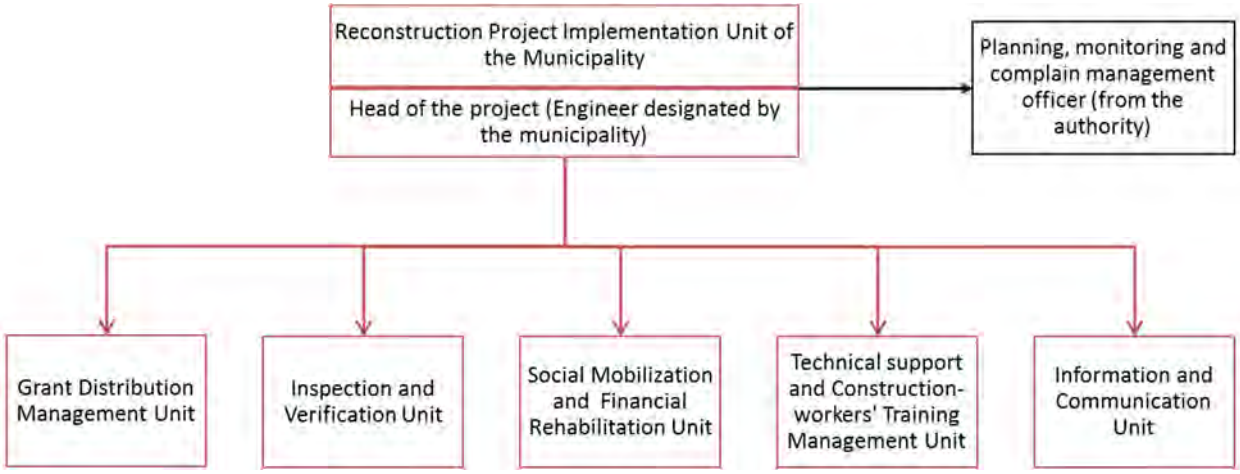


Figure 1-15 Reconstruction System of Lalitpur Sub-Metropolitan City

Source: National Reconstruction Policy, National Reconstruction Authority

CHAPTER 2.
VISION OF RECONSTRUCTION

2-1. Primary Vision

Primary Vision for BBB recovery and reconstruction plan of LSMC is:

Build Back Better (BBB)

toward Seismically Safe and Secure Built Environment

According to the definition of UNISDR, "recovery" after a disaster is "the restoration, and improvement, where appropriate, of facilities, livelihood and living conditions of disaster-affected communities, including efforts to reduce disaster risk factors" (UNISDR, 2009)

The "Build Back Better" concept is an approach to build up a more resilient society during the reconstruction phase, including physical restoration of infrastructure, revitalization of livelihood and economy/industry, and the restoration of local culture and environment, after the disaster has struck. With lessons learned from the disaster experiences, this concept "BBB" has become one of the four priorities for action of the "Sendai Framework for Disaster Risk Reduction (2015-2030, SFDRR) ", adopted in Sendai, Japan 2015.

Priority for Action of SFDRR
Priority 1: Understanding disaster risk
Priority 2: Strengthening disaster risk governance to manage disaster risk
Priority 3: Investing in disaster risk reduction for resilience
Priority 4: Enhancing disaster preparedness for effective response and **"Build Back Better" in recovery, rehabilitation and reconstruction**

Reference: Sendai Framework for Disaster Risk Reduction 2015 - 2030

Chart of the Sendai Framework for Disaster Risk Reduction
2015-2030

Scope and purpose

The present framework will apply to the risk of small-scale and large-scale, frequent and infrequent, sudden and slow-onset disasters, caused by natural or manmade hazards as well as related environmental, technological and biological hazards and risks.
It aims to guide the multi-hazard management of disaster risk in development at all levels as well as within and across all sectors

Expected outcome

The substantial reduction of disaster risk and losses in lives, livelihoods and health and in the economic, physical, social, cultural and environmental assets of persons, businesses, communities and countries

Goal

Prevent new and reduce existing disaster risk through the implementation of integrated and inclusive economic, structural, legal, social, health, cultural, educational, environmental, technological, political and institutional measures that prevent and reduce hazard exposure and vulnerability to disaster, increase preparedness for response and recovery, and thus strengthen resilience

Targets

Substantially reduce global disaster mortality by 2030, aiming to lower average per 100,000 global mortality between 2020-2030 compared to 2005-2015	Substantially reduce the number of affected people globally by 2030, aiming to lower the average global figure per 100,000 between 2020-2030 compared to 2005-2015	Reduce direct disaster economic loss in relation to global gross domestic product (GDP) by 2030	Substantially reduce disaster damage to critical infrastructure and disruption of basic services, among them health and educational facilities, including through developing their resilience by 2030	Substantially increase the number of countries with national and local disaster risk reduction strategies by 2020	Substantially enhance international cooperation to developing countries through adequate and sustainable support to complement their national actions for implementation of this framework by 2030	Substantially increase the availability of and access to multi-hazard early warning systems and disaster risk information and assessments to people by 2030

Priorities for Action

There is a need for focused action within and across sectors by States at local, national, regional and global levels in the following four priority areas.

Priority 1	Priority 2	Priority 3	Priority 4
Understanding disaster risk	Strengthening disaster risk governance to manage disaster risk	Investing in disaster risk reduction for resilience	Enhancing disaster preparedness for effective response, and to «Build Back Better» in recovery, rehabilitation and reconstruction
Disaster risk management needs to be based on an understanding of disaster risk in all its dimensions of vulnerability, capacity, exposure of persons and assets, hazard characteristics and the environment	Disaster risk governance at the national, regional and global levels is vital to the management of disaster risk reduction in all sectors and ensuring the coherence of national and local frameworks of laws, regulations and public policies that, by defining roles and responsibilities, guide, encourage and incentivize the public and private sectors to take action and address disaster risk	Public and private investment in disaster risk prevention and reduction through structural and non-structural measures are essential to enhance the economic, social, health and cultural resilience of persons, communities, countries and their assets, as well as the environment. These can be drivers of innovation, growth and job creation. Such measures are cost-effective and instrumental to save lives, prevent and reduce losses and ensure effective recovery and rehabilitation	Experience indicates that disaster preparedness needs to be strengthened for more effective response and ensure capacities are in place for effective recovery. Disasters have also demonstrated that the recovery, rehabilitation and reconstruction phase, which needs to be prepared ahead of the disaster, is an opportunity to «Build Back Better» through integrating disaster risk reduction measures. Women and persons with disabilities should publicly lead and promote gender-equitable and universally accessible approaches during the response and reconstruction phases

Guiding Principles

Primary responsibility of States to prevent and reduce disaster risk, including through cooperation	Shared responsibility between central Government and national authorities, sectors and stakeholders as appropriate to national circumstances	Protection of persons and their assets while promoting and protecting all human rights including the right to development	Engagement from all of society	Full engagement of all State institutions of an executive and legislative nature at national and local levels	Empowerment of local authorities and communities through resources, incentives and decision-making responsibilities as appropriate	Decision-making to be inclusive and risk-informed while using a multi-hazard approach

Coherence of disaster risk reduction and sustainable development policies, plans, practices and mechanisms, across different sectors	Accounting of local and specific characteristics of disaster risks when determining measures to reduce risk	Addressing underlying risk factors cost-effectively through investment versus relying primarily on post-disaster response and recovery	«Build Back Better» for preventing the creation of, and reducing existing, disaster risk	The quality of global partnership and international cooperation to be effective, meaningful and strong	Support from developed countries and partners to developing countries to be tailored according to needs and priorities as identified by them

www.preventionweb.net/go/sfdrr
www.unisdr.org
isdr@un.org

UNISDR
The United Nations Office for Disaster Risk Reduction

In order to reduce the potential risk of disaster damage, it is necessary to construct houses in the area of lower disaster risk, and to build the urban structure resilient to such disaster. Disasters have demonstrated that the recovery, rehabilitation and reconstruction phase, which needs to be prepared ahead of a disaster, is a critical opportunity to "Build Back Better", including through integrating disaster risk reduction into development measures, making nations and communities resilient to disasters.

Once a serious disaster has occurred in Japan, on each occasion, Japan has revised its building code, design criteria, land use plan, government institutional structure and so on. This is really the sense of "Build Back Better". Therefore, the concept of "Build Back Better (BBB)" is necessary for the policies of recovery, rehabilitation and reconstruction, and BBB was set as the primary vision of RRP.

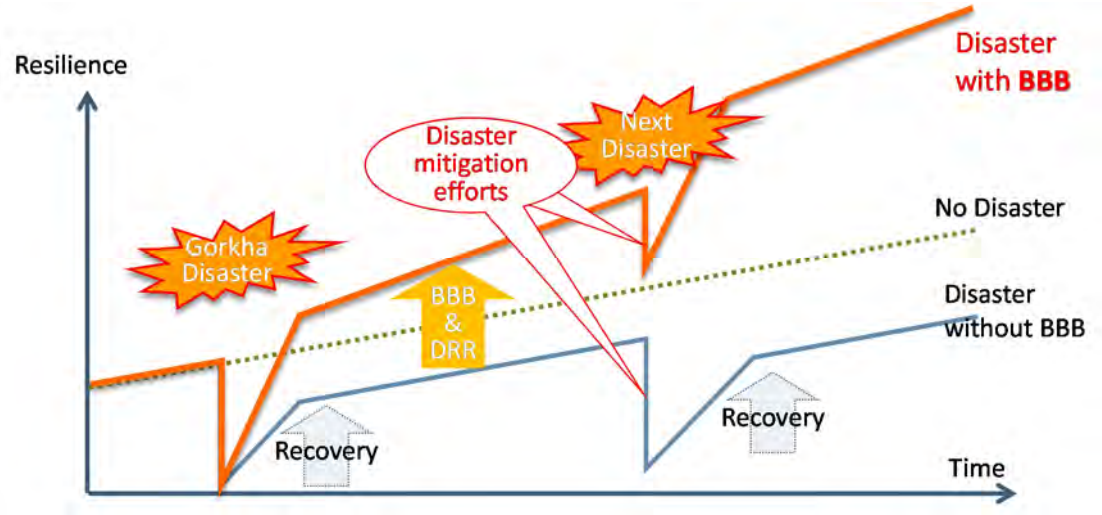


Figure 2-1 Time-sequence concept diagram of Build Back Better

Figure 2-2 Image of Build Back Better (The safety of the town was improved after rebuilding roads as wider ones (Same location in Kobe city))

Left: Before the Great Hanshin-Awaji Earthquake, Right: After the reconstruction from the Great Hanshin-Awaji Earthquake

Source: Disaster Management in Japan, Cabinet Office, Government of Japan

2-2. Three Key Principles, Slogan and Five Visions

2-2-1. Three Key Principles

Based on the primary vision "Build Back Better", in order to move forward with reconstruction, first safety must be ensured. On top of that, it is important to clarify the steps towards reconstruction for life and economy so that residents can continue to live with hope.

Therefore, the three key principles for reconstruction are: safety [Building Resilient Urban Structure, Life [Recovery of Affected People back to Normal] and Economy [Recovery of Regional Economy]. These Key Principles are common principles for recovery and reconstruction of all municipalities.

Figure 2-3 Key Principles for Recovery and Reconstruction

Life

The important subject is to help the affected people by the Gorkha EQ to get back their ordinary life by ensuring housing, educational environment and systems that protect lives and safety, such as health, medical and welfare services. Furthermore, from the BBB's point of view, the recovery and reconstruction plan should be a guide towards a better life with a stable livelihood for the future.

Safety

Ensuring the safety of residents is most important in order to move forward with reconstruction. Early recovery and seismic resistant measures for urban planning, such as public buildings, infrastructures and land use planning, shall be promoted for the safety and security of the people's life.

Economy

Economic activities which have been hampered by an earthquake have to be recovered at an early stage and they would be the vital issue for the city. In addition, the recovery of basic infrastructures, such as road networks, is also necessary to support economic activities. Thus, the recovery and reconstruction plan should aim at the vital regional economy and further development.

2-2-2. Slogan

Under the BBB concept, slogans showing the direction for the recovery and reconstruction of LSMC were set as follows. Damage caused by the Gorkha EQ of LSMC was limited compared with other municipalities. Therefore, not only to recover the damage caused by the Gorkha EQ quickly, but also to prepare for the future earthquakes, LSMC goes toward the city to be a model of resilient disaster management in the Kathmandu Valley and Nepal.

TOWARD RESILIENT

DISASTER MANAGEMENT MODEL CITY

2-2-3. Five Visions

To achieve the objective of the plan, the BBB concept, key principles and slogan, and the visions for the recovery and reconstruction of LSMC were set. Three Visions “Life” “Safety” “Economy” consist of the key principles. In addition, the Gorkha EQ revealed the importance and usefulness of community as the following figure shows. The community helped a large number of victims of the Gorkha EQ because the community volunteer is the first executor for the SAR and Initial response activities. This means that the strengthening of community for disaster management will lead to the reduction of damages against future earthquakes. Therefore, the enhancement of community based disaster management (CBDRM) is set as the one of visions for BBB.

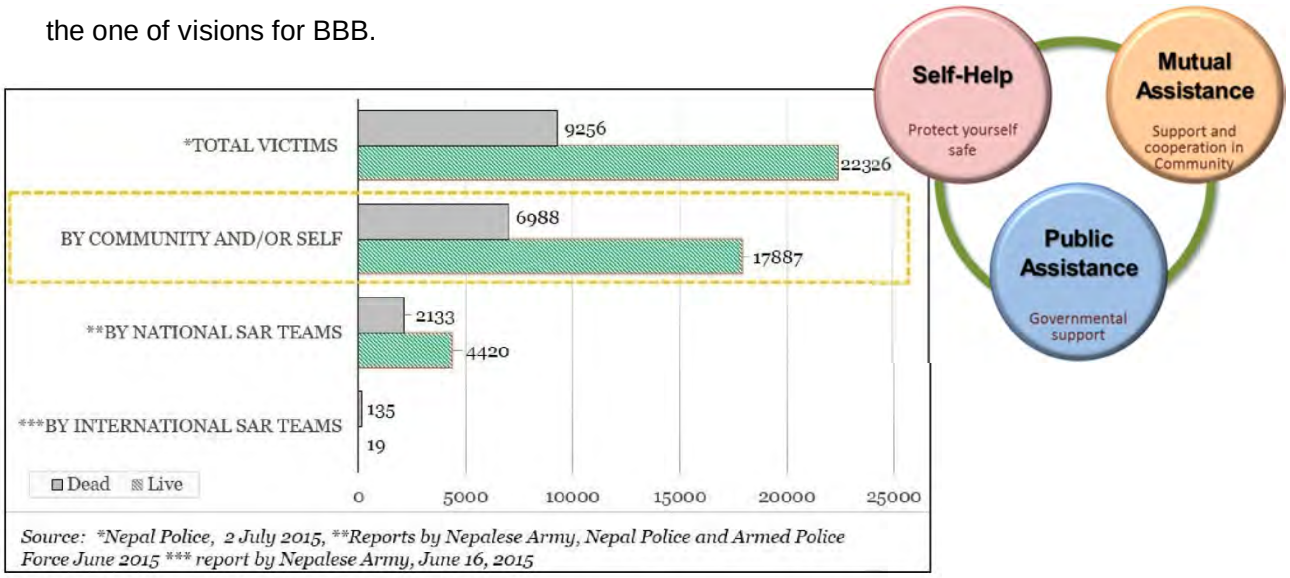


Figure 2-4 Extricated Victims and Recovered Dead Bodies by Different SAR Teams of Gorkha EQ

Source: NSET, Two decades of earthquake risk management actions judged against Gorkha earthquake of Nepal April 2015, New Technologies for Urban Safety of Mega Cities in Asia (USMCA 2015), Kathmandu, October 2015, http://www.nset.org.np/usmca2015/keynote/2_KN2_fullpaper_AmodmaniDixit.pdf

Furthermore, LSMC is an urban city and the population is more than 250,000 people. As the characteristics of the damage of Gorkha EQ, the damage to urban areas was limited compared to other cities as indicated in 2-2-2 Slogan. To reduce and mitigate the damage of the future earthquakes, since the resilience of city and society is required, it is set as one of the visions.

The detailed contents of the five visions set up are as follows. Under these visions, the necessary actions will be implemented.

Figure 2-5 Five Visions of BBB RRP

Table 2-1 Contents of Five Visions of BBB RRP

	Vision	Contents
LIFE	Revitalization and Improvement of Livelihood	From Key Principles (Refer to 2-2-1)
SAFETY	Urban Planning with Sustainable Development for a Safer and Secure City	From Key Principles (Refer to 2-2-1)
ECONOMY	Promotion and Improvement of Industry	From Key Principles (Refer to 2-2-1)
RESILIENT DM	Development of Resilient Disaster Management City	A more resilient society shall be built for the mitigation of future disasters through the enhancement of the ability of systems, governance, facilities and infrastructure for disaster management with the concept of BBB.
COMMUNITY	Strengthening of Community Disaster Risk Management	Public awareness on disaster risk reduction/ management (DRR/DRM) and community based disaster risk management (CBDRM) shall be enhanced for the mitigation of future earthquakes.

CHAPTER 3.
BASIC POLICY

3-1. Grand Design

The grand design of BBB RRP LSMC as the indicated direction for reconstruction is shown in Figure 3-2 (p.26).

3-2. Framework of Basic policy

The overall framework of the basic policy is shown in Figure 3-3 (p.27). For each sub sector, the basic policy and main actions are indicated.

3-3. Basic Policy

The basic policy of each vision of BBB RRP is shown as follows. Each policy is indicated in the main list of actions.

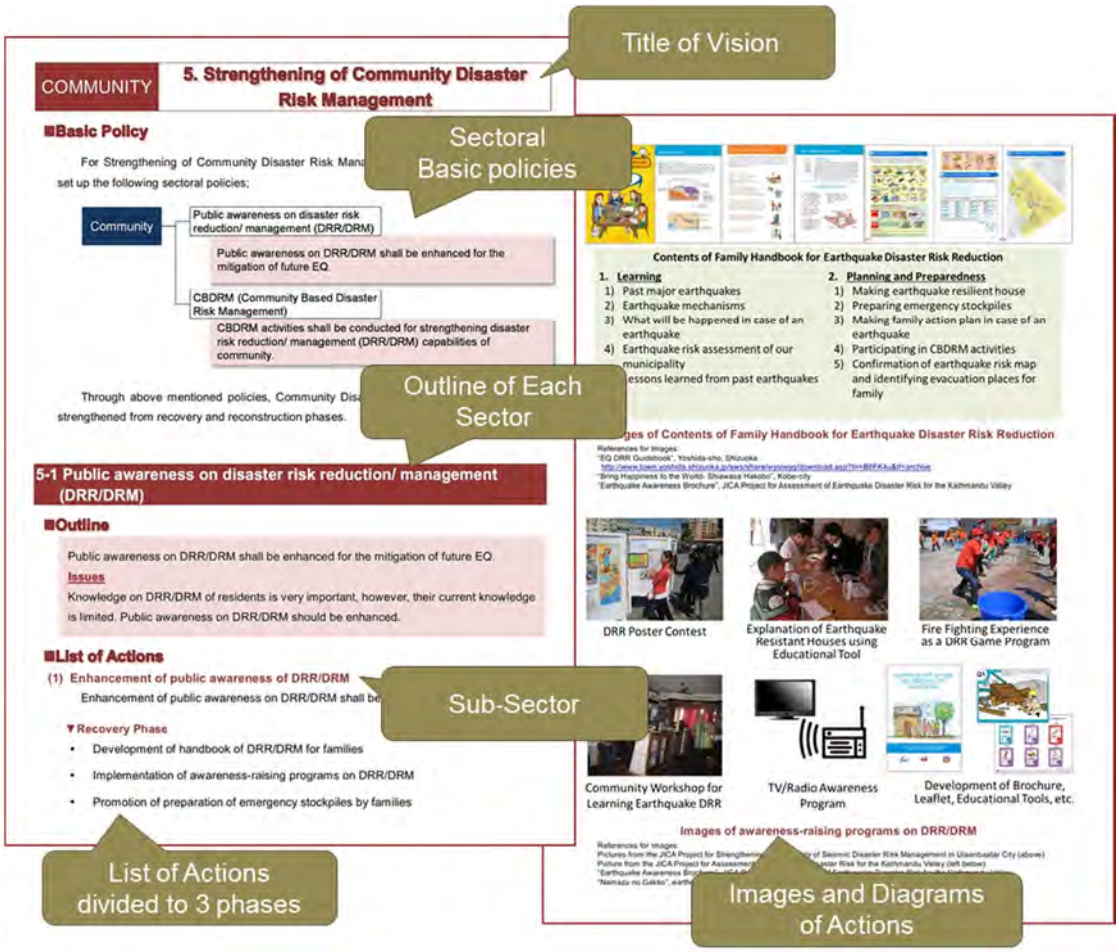


Figure 3-1 Structure of Basic Policy of BBB RRP

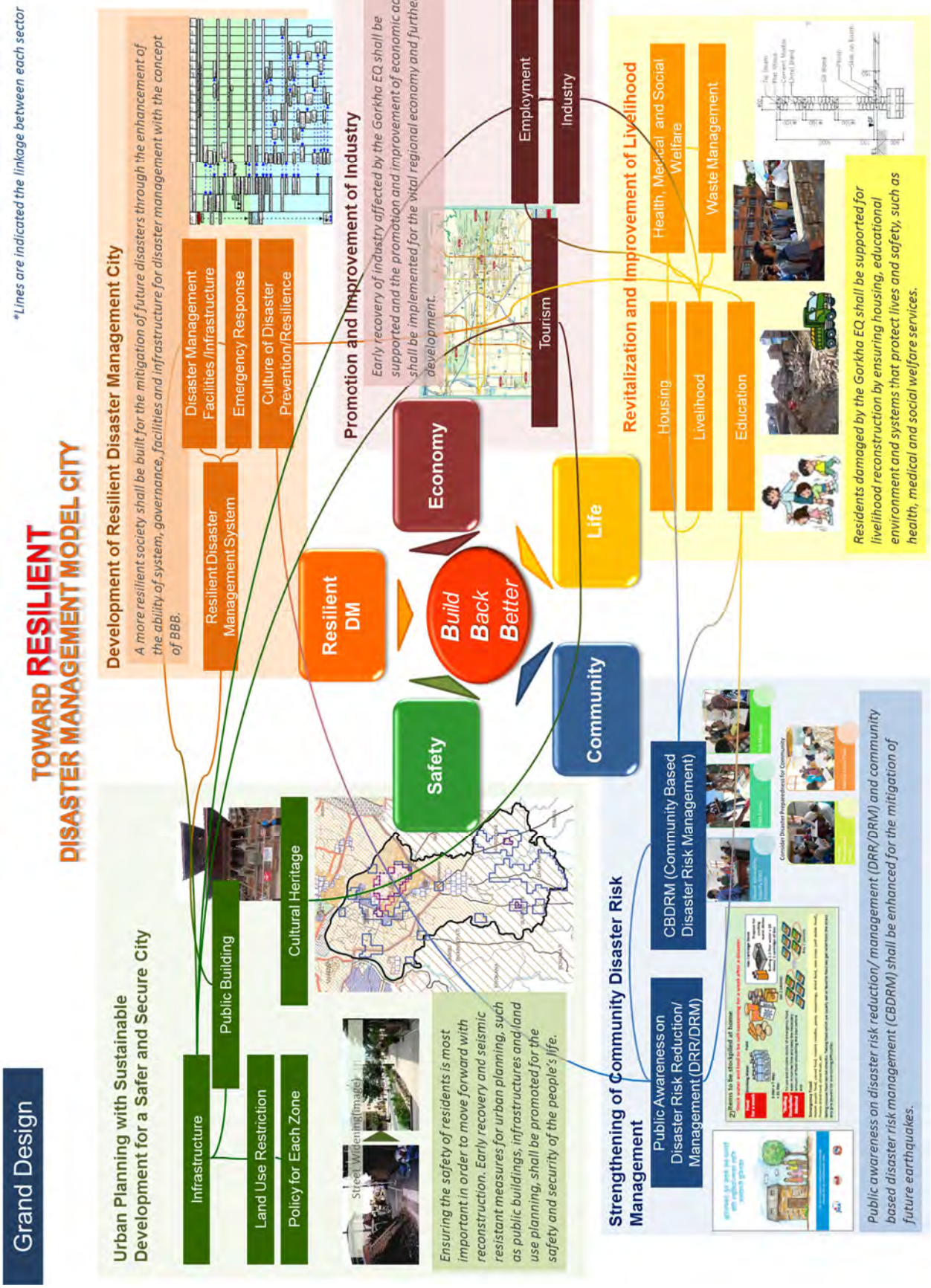


Figure 3-2 Grand Design of BBB RRP LSMC

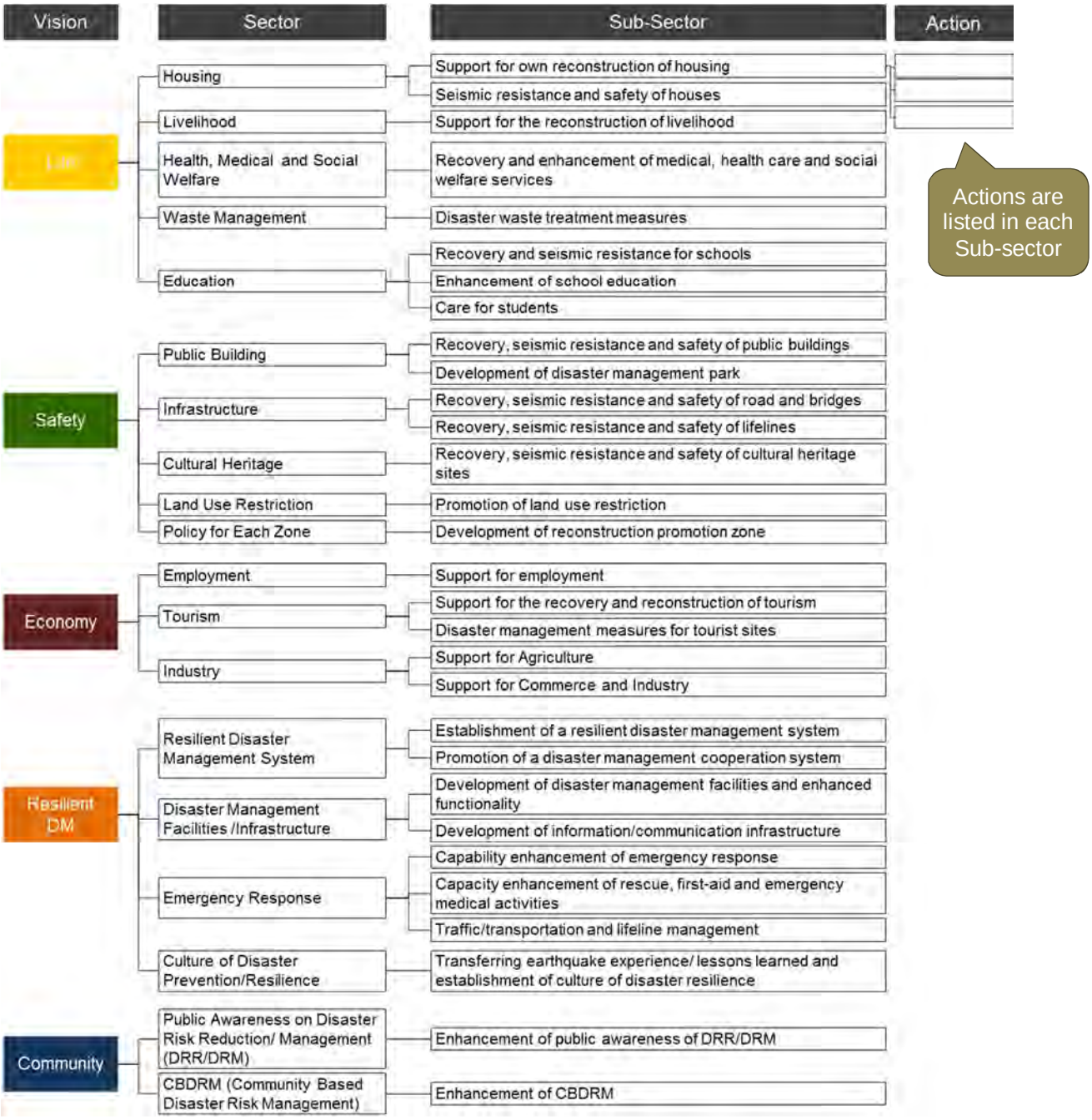


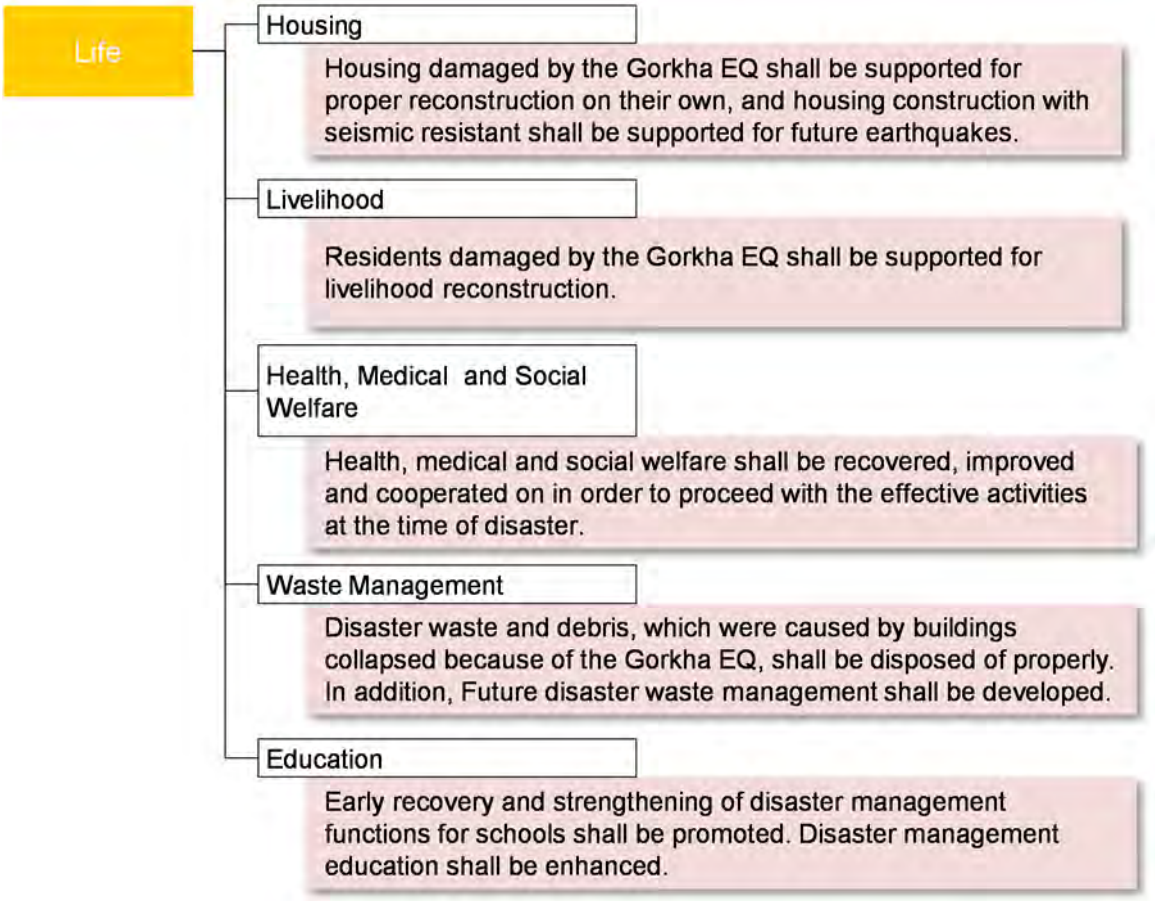
Figure 3-3 Framework of Basic Policy of BBB RRP LSMC

LIFE

1. Revitalization and Improvement of Livelihood

Basic Policy

For the revitalization and improvement of livelihood, the BBB recovery and reconstruction plan set up the following sectoral policies for life:



Through the above mentioned policies, the livelihoods of residents should be revitalized and improved from the recovery and reconstruction phases.

1-1 Housing

■Outline

Housing damaged by the Gorkha EQ shall be supported for proper reconstruction on their own, and housing construction with seismic resistant shall be supported for future earthquakes.

Issues

Many houses collapsed in the Gorkha EQ. Proper reconstruction and seismic resistant measures are essential and important for the mitigation of human damages from future earthquakes.

■List of Actions

(1) Support for own reconstruction of housing

Housing damaged by the Gorkha EQ shall be supported for proper reconstruction by the owner with information provision and financial support.

Recovery Phase

- Financial support for the reconstruction of houses damaged by the Gorkha EQ
- Establishment of housing information and consultation bases for the housing reconstruction
- Establishment of housing reconstruction communities, reconstruction support for vulnerable people
- Provision of temporary houses in consideration of social welfare (provision of temporary houses separately for vulnerable people and deprived/marginalized people(Pichadiyeko barga))
- Implementation of training of house reconstruction for masons, local communities, technicians, etc.

Images of Seismic resistant and safety of houses

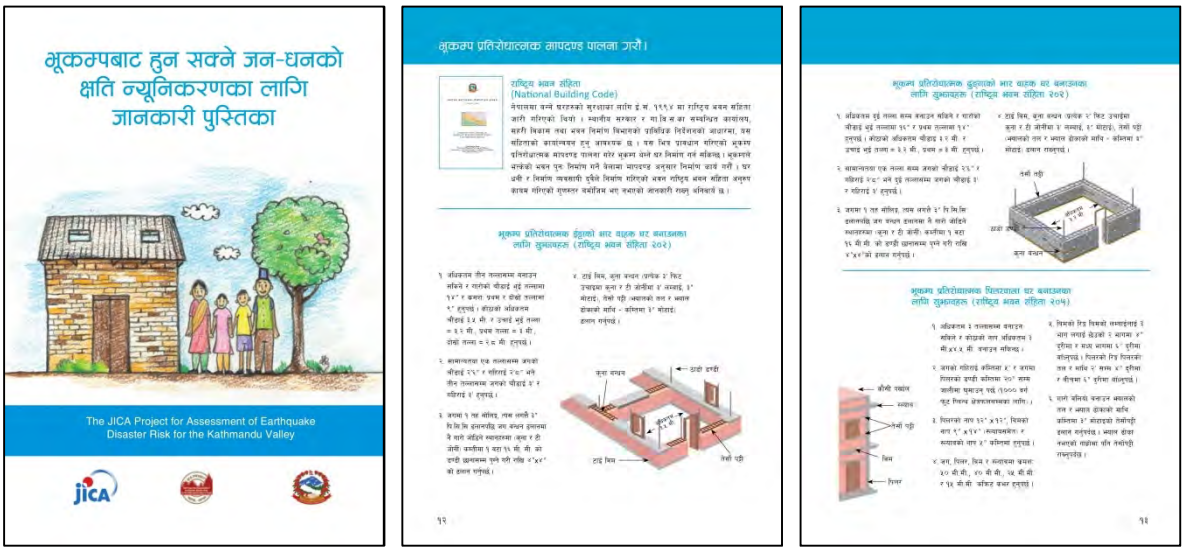
Source: JICA Project for the Transitional Project Implementation Support for Emergency Reconstruction Projects

(2) Seismic resistance and safety of houses

Housing construction with seismic resistance shall be supported for future earthquakes.

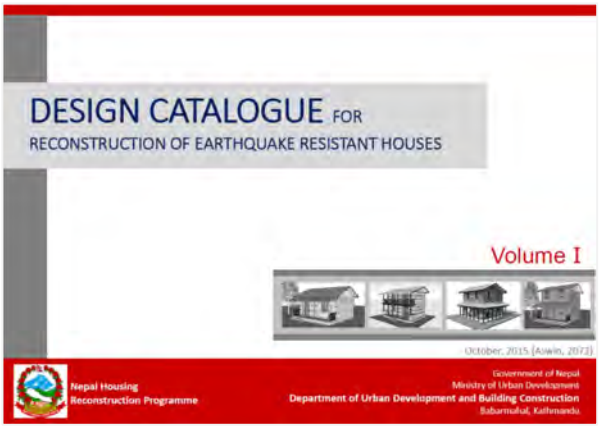
Recovery Phase

- Development of capacity and public awareness for seismic resistant houses
- Application of National Building Codes(NBC), enforcement of the building permission and inspection system
- Financial and technical support for seismic diagnosis, seismic resistant measures of houses, and the dispatch of experts for seismic diagnosis



Images of Brochure for construction of seismic resistant houses

Source: JICA Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley



Structural Type	No. of Floor	Model No.	Designed by
Stone masonry in cement mortar, P5- SMC	1	SMC-1.1	JICA
	1	SMC-1.2	JICA
	2	SMC-2.1	JICA
	2	SMC-2.2	DUDBC
	2	SMC-2.3	DUDBC
	2	SMC-2.4	DUDBC
	2+ATTIC	SMC-2.5	DUDBC
	2+TERRACE	SMC-2.6	DUDBC
		Technical details	
		Flexible design	
Brick masonry in cement mortar P71- BMC	1	BMC-1.1	JICA
	1	BMC-1.2	JICA
	2	BMC-2.1	JICA
	2	BMC-2.2	DUDBC
	2	BMC-2.3	DUDBC
	2+ATTIC	BMC-2.4	DUDBC
	2+TERRACE	BMC-2.5	DUDBC
		Technical details	
		Flexible design	
Stone masonry in mud mortar, P129- SMM	1	SMM-1.1	DUDBC
		Technical details	
		Flexible design	
Brick masonry in mud mortar, P147- BMM	1	BMM-1.1	DUDBC
		Technical details	
		Flexible design	

Design Catalogue for reconstruction of earthquake resistant houses

Source: DUDBC

1-2 Livelihood

■Outline

Residents damaged by the Gorkha EQ shall be supported for livelihood reconstruction.

Issues

Many people were affected and have difficulty in daily life because of the Gorkha EQ. Support for livelihood reconstruction is required.

■List of Actions

(1) Support for the reconstruction of livelihood

Residents damaged by Gorkha EQ shall be supported for livelihood reconstruction.

Recovery Phase

- Financial support for the livelihood reconstruction of victims
- Establishment of a livelihood help desk
- Dissemination of reconstruction information

Help desk(Consultation service) for;	
1. Housing	6. Management and Labor
2. Nuclear radiation	7. Health, Child rearing and mother's milk
3. Nuclear Damage Compensation	8. Volunteer
4. Living expenses	9. Missing
5. Agricultural forestry industries and fishers	10. Prefectural administration

Examples of various help desk (Example of Fukushima prefecture (Damaged area of the Great East Japan EQ), Japan)

Source: Website on Fukushima prefecture, http://www.pref.fukushima.lg.jp/sec/01010d/shinsai-sodanmadoguchi.html#08 (Edited by JICA Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley)

1-3 Health, Medical and Social Welfare

■Outline

Health, medical and social welfare shall be recovered, improved and cooperated on in order to proceed with the effective activities at the time of disaster.

Issues

Several facilities, for health, medical and social welfare, were damaged by the Gorkha EQ. In particular, for vulnerable people and deprived/marginalized people (Pichadiyeko barga), health, medical and social welfare should be improved and cooperated.

List of Actions

(1) Recovery and enhancement of medical, health care and social welfare services

Safer medical, health care and social welfare services shall be promoted in order to improve the services including the disaster phase.

Recovery Phase

- Recovery for hospitals on the municipal level, health centres and health posts
- Seismic diagnosis and seismic resistant measures of hospitals on the municipal level, health centres and health posts
- Establishment of a mental health care help desk for victims

List of Damaged Hospitals

Hospital Name	Tole	Damage
Global Hospital Pvt. Ltd.	Gwarko	Partial
Star Hospital	Sanepa	Minor
Alka Hospital Pvt. Ltd	Jawalakhel	Minor
Sumeru Hospital Pvt. Ltd.	Dhapakhel	Minor
National Hospital and Cancer Research Centre	Jawalakhel	Minor
Laliguras Hospital Pvt. Ltd	Satdobato	Minor
Sumeru City Hospital	Pulchowk	Minor
Pashupati Homeopathy Hospital	Pulchowk	Minor
Nidan Hospital Pvt. Ltd	Pulchowk	Minor
Omkar Hospital Pvt. Ltd	Ekantakuna	Minor
Mega Hospital Pvt. Ltd	Dhobighat	Minor

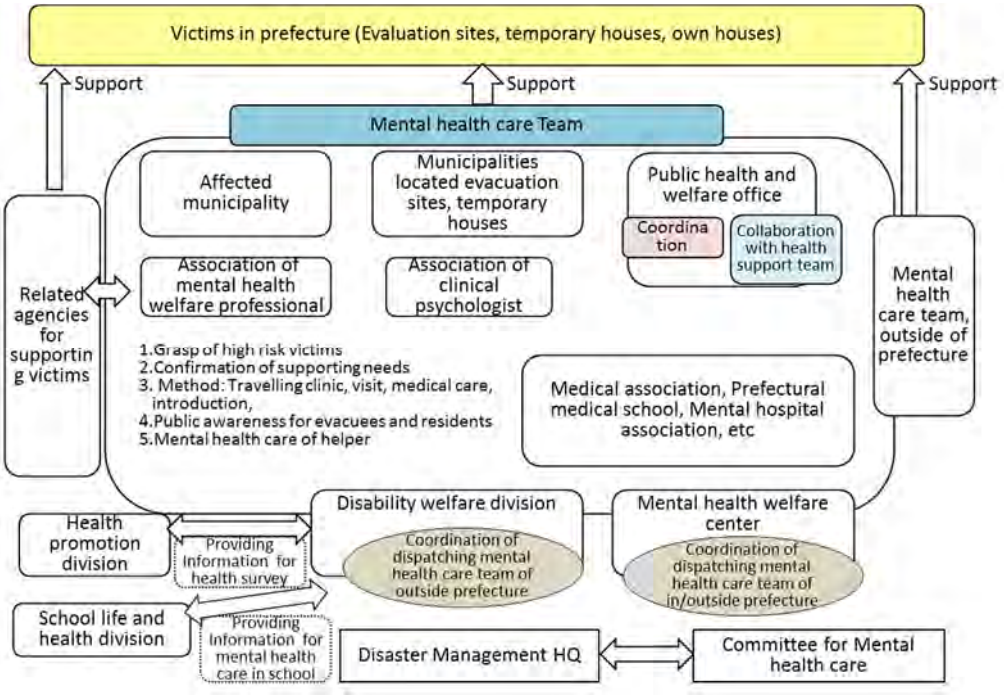


Image of countermeasures for mental health care (Example of Japan, Measures of Fukushima prefecture after the Great East Japan EQ 2011)

Source: Whitepaper on suicide prevention in Japan 2012, Cabinet office, government of Japan, http://www8.cao.go.jp/jisatsutaisaku/whitepaper/w-2012/html/honpen/column/clm6.html
(Edited by JICA Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley)

Revitalization Phase

- Formulation of a plan for vulnerable people

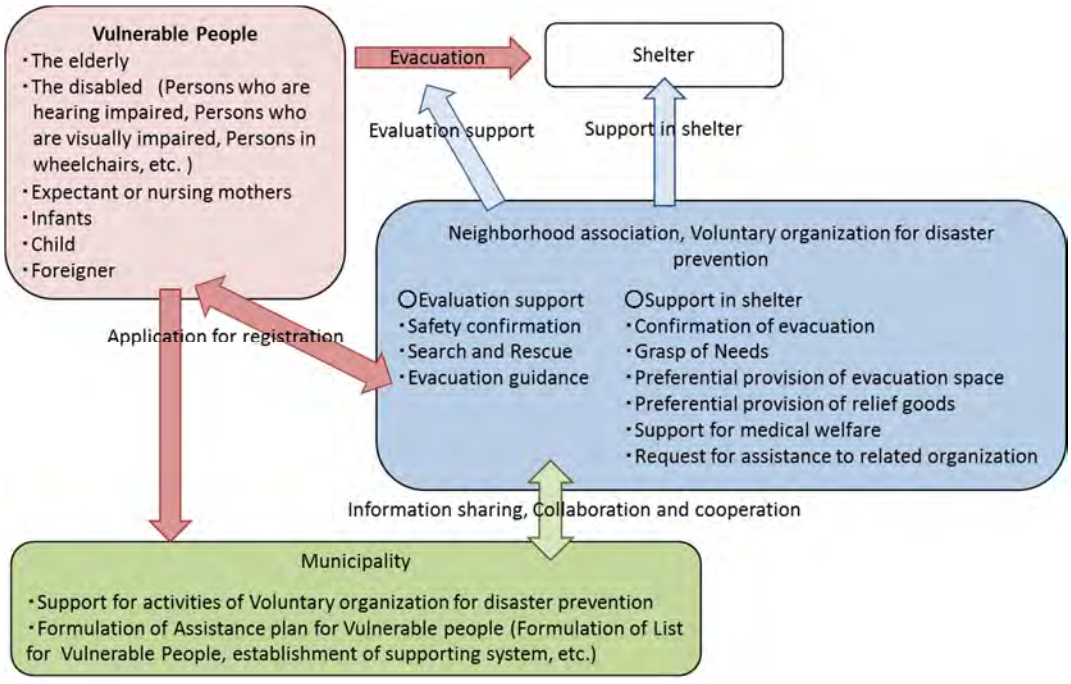


Image of Support for Vulnerable people (Example of Japan)

Source: General plan of evacuation support for vulnerable people in Ogori city, Japan (Edited by JICA Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley)

1-4 Waste Management

Outline

Disaster waste and debris, which were caused by buildings collapsed because of the Gorkha EQ, shall be disposed of properly. In addition, Future disaster waste management shall be developed.

Issues

Because of the Gorkha EQ, large amounts of disaster waste and debris from many collapsed buildings and it is necessary to dispose of the waste quickly for reconstruction.

List of Actions

(1) Disaster waste treatment measures

Disaster waste and debris caused by the Gorkha EQ shall be disposed of properly and immediately. Disaster waste management plan indicated treatment policies and procedures shall be formulated for future earthquakes.

Recovery Phase

- Disposal of disaster waste and debris properly (implementation of collection and disposal)

Revitalization Phase

- Formulation of a disaster waste management plan
- Ensuring of temporary stock places for disaster waste

	PREPAREDNESS	Disaster	EMERGENCY RESPONSE	RECOVERY/RECONSTRUCTION
PLAN	Formulation of Disaster waste management plan		Formulation of Disaster waste treatment implementation plan	Revision of Disaster waste treatment implementation plan
ORGANIZATION	(Normal phase) Implementation of exercises, Conclusion of agreement for Wide area support		(Emergency phase) Grasp of damage status, Establishment of Initial system Initial response	
DISPOSAL	Grasp of equipment for the collection and transportation of waste		Setting up the collection route for the waste and excretion of evacuation sites	
	Ensure the temporary stock places for disaster waste (formulation of candidate sites)		Setting up the temporary stock places for disaster waste and management	Return of temporary stock places
	Estimation of amount of disaster waste by Risk assessment		Estimation of amount of disaster waste Estimation of possible amount of treatment	Revision of amount of disaster waste
	Flow of treatment Method of recycling		Waste separation and keeping Ensure the disposal site	Recycling and Disposal
FACILITY	Preparedness for the facility		Damage investigation, and Emergency recovery	Repair, recovery and reconstruction

Image for contents of Disaster waste management plan (Example of Japan)

Source: Guideline for formulation of disaster waste management plan in municipal level in Mie prefecture, Platform of disaster waster information, National Institute for Environmental Studies, Japan, ttps://dwasteinfo.nies.go.jp/topic/project_man.html#listarea
(Edited by JICA Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley)

1-5 Education

■Outline

Early recovery and strengthening of disaster management functions for schools shall be promoted. Disaster management education shall be enhanced.

Issues

Several schools were damaged by the Gorkha EQ. it is necessary to recover damaged schools and implement disaster management education for students.

■List of Actions

(1) Recovery and seismic resistance for schools

Early recovery and strengthening of disaster management functions for Schools shall be promoted.

Recovery Phase

- Recovery and reconstruction of schools

Revitalization Phase

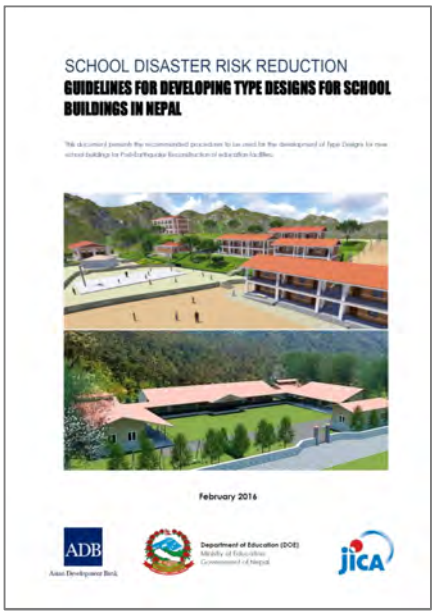
- Seismic diagnosis and seismic resistant measures of schools

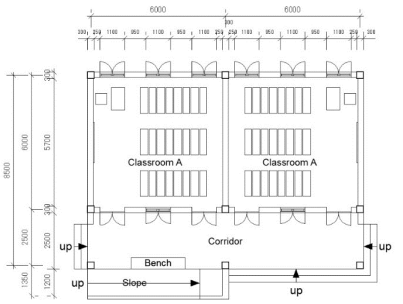
List of Damaged public schools

Name	Block	Stories	Structure	Damage Grade
Krishna Higher Secondary School	1	3	Load Bearing	1
	2	1	Truss Block	4
	3	2	Load Bearing	3
Mahendra Bhrikuti Ma. V	1	1	Truss Block	1
	2	2	Load Bearing/Retrofitted	1
	3	2	Framed Set	1
	4	1	Load Bearing	4
Namuna Machindra Higher Secondary School	1	2	Load Bearing	3
	2	2	Load Bearing	4
	3	2	Load Bearing	2
	4	2	RC Frame	3
	5	2	RC Frame	1
	6	2	Load Bearing	3
	7	2	Load Bearing	4
Padhma Prakash Secondary School	1	3.5	RC Frame	3
	2	1	Load Bearing	2
	3	2.5	Load Bearing	4
Pragati sikshya Sadan H.S.School	1	4	RC Frame	1
	2	3	Load Bearing	4
	3	3	Load Bearing	4
Shree Adharsha Kanya Niketan H.S.School	1	2	Load Bearing	3
	2	2	Load Bearing	1
	3	2	Load Bearing	1
	4	3	Load Bearing	3
	5	1	Load Bearing	2
	6	1	RC Frame	1
	7	3	Load Bearing	4
Shree Bal Vidhyashram School	1	3	Load Bearing	4
Shree Minnath Adarsha Sikshya Sadan	1	1	RC Frame	1
	2	3	Load Bearing	3
	3	1	Load Bearing	4
Shree Panchakumari Primary School	1	2	Load Bearing	3
Shree Patan H.S.School	1	2	Load Bearing	4
	2	2	Load Bearing	4
	3	2	Load Bearing	4
	4	2	RC Frame	2
	5	3	Load Bearing	3
	6	1	Load Bearing	4
	7	1	Load Bearing	1
	8	2	RC Frame	2
	9	1	Load Bearing	1
	10	1	Load Bearing	1
	11	1	Load Bearing	1
	12	1	Load Bearing	1
Shree Sramik Bal Bigyan L.S.School	1	1	Load Bearing	4
	2	1	Steel Frame	2
	3	2	RC Frame	1
Shree Yasodhara Boudha S.School	1	1	RC Frame	1
	2	3	Load Bearing	1
	3	2	RC Frame	1
	4	3	RC Frame	4
	5	2	RC Frame	3
	6	1	Load Bearing	3
	7	3	Load Bearing	3
Tika Vidhyashram H.S.School	1	3	Load Bearing	4

Name	Block	Stories	Structure	Damage Grade
	2	2	Load Bearing	2
	3	2	Load Bearing	1
	4	1	Steel Frame	1
	5	1	Steel Frame	1
Madan Smarak H.S.School	1	2	Load Bearing	3
	2	1	Load Bearing	3
	3	2	RC Frame	1
	4	1	Load Bearing	2
	5	1	Load Bearing	2
	6	1	Load Bearing	2
Moti binayak LowerSecondary School	1	2	RC Frame	1
	2	2	Load Bearing	3
	3	1	Load Bearing	3
Prabhat Higher Secondary School	1	1	Load Bearing	3
	2	4	RC Frame	NA
	3	3	Load Bearing/Retrofitted	2
	4	1	Truss	2
	5	2	Load Bearing	2
	6	4	RC Frame	2
Shree BalBinod S.School	1	2	RC Frame	3
	2	2	Load Bearing	2
Shree Balkumari Higher Secondary School	1	2	RC Frame	2
	2	2	Load Bearing	3
	3	1	Load Bearing	1
	4	1	Load Bearing	1
	5	2	RC Frame	1
	6	1	Load Bearing	1
Shree Shramjeet Secondary School	1	2	RC Frame	2
	2	2	Load Bearing/Retrofitted	2
	3	1	Load Bearing	3
Shree Tri Padam Vidhyashram H.S.School	1	2	Load Bearing	NA
	2	3	RC Frame	NA
	3	1	Load Bearing	NA
	4	2	Load Bearing	3
	5	2	Load Bearing	2
Choina Binyak Guru Ganesh School	1	1	Truss	1
	2	1	Truss	1
	3	1	Load Bearing/Retrofitted	1
	4	1	Load Bearing	2
Jassya Secondary School	1	1	Truss	2
	2	3	RC Frame	2
	3	2	Load Bearing	2
Khumveswor Preprimary S.School	1	4	Load Bearing	2
Lalit kalyan kendra P.S.School	1	3	RC Frame	2
	2	3	RC Frame	2
Lalitbikash Preprimary S.School	1	3	RC Frame	2
	2	1	Load Bearing	2
Shree Chandi Saral S.School	1	2.5	RC Frame	2
	2	1	Steel Frame	1
Shree MahaLaxmi Lower Secondary School	1	1	Truss Block	1
	2	1	Load Bearing	2
	3	1	Load Bearing	1
Shree Sanchetana P.School	1	3	RC Frame	2
Shree Shanti Vidhyashram H.S.School	1	3	Load Bearing	1
	2	3	RC Frame	2
	3	1	Load Bearing	2

Name	Block	Stories	Structure	Damage Grade
Shree Shramik Shanti H.S.School	1	2	Load Bearing	1
	2	2	RC Frame	1
	3	2	Load Bearing	2
	4	2	RC Frame	2
	5	3	RC Frame	1
	6	3	RC Frame	2
	7	3	RC Frame	2
Balodaye Primary School	1	2	Load Bearing	1
	2	2	Load Bearing	1
Harisiddhi Higher Secondary School	1	4	Steel Frame/Load Bearing	1
	2	1	JICA Block	1
	3	4	Steel Frame	1
Krisi udaya Primary School	1	5	RC Frame	1





Ground Floor Plan 1:200

Seismic Resistant Building Guidelines of School

Source: Prepared by JICA and ADB for DOE
Left: GUIDELINES FOR DEVELOPING TYPE DESIGNS FOR SCHOOL BUILDINGS IN NEPAL
Center: INTERIM STRUCTURAL DESIGN CRITERIA FOR TYPE DESIGN OF SCHOOL BUILDINGS
Right: Design of New School Prototypes (Example of single story)

(2) Enhancement of school education

Disaster management education shall be enhanced based on the experiences and lessons from the Gorkha EQ.

Recovery Phase

- Education for disaster management

	Target	Examples of school curriculum		
		1st semester	2nd semester	3rd semester
11-12 years old	・To be able to understand the characteristics of the disaster in area and disaster management system ・To be able to estimate the risk caused by the disaster, to be able to take actions to avoid own risk in the event of a disaster ・To be able to take useful action in consideration of safety of family, friends and the surrounding people in the event of a disaster	◇Natural disasters in our region ◇Comfortable houses and clothes ◇What you can do ◇Evacuation drill(Earthquake)	◇Changes of weather ◇Let's know about the dangers of Flood ◇Our lives and the volcano ◇What would you do when you feel shaking in the town? ◇Evacuation drill(Tsunami)	◇Relevance between information industry and people's lives ◇Various activities in order to protect the safety of the people ◇To be able to prevent injury and simple medical care ◇Political effects of country ◇Preparation for emergency ◇Evacuation drill(Fire)
9-10 years old	・To be able to understand basic knowledge of disaster, to be able to think of contrivance to prevent disasters. ・To be able to have an interest about the dangers caused by the disaster, to be able to consider a way to avoid own risk ・To be able to avoid the risk in cooperation with family, friends and the surrounding people in the event of a disaster.	◇Live safely and town development ◇What would you do when heavy rain, strong wind, thunder happened? ◇Evacuation drill(Earthquake)	◇What would you do when the earthquake happened in the rest time? ◇Evacuation drill(Tsunami)	◇Let's make the original disaster management map ◇Specific examples of our predecessors who committed to the development of the region such as traditional tools, cultural assets and annual events, ◇Evacuation drill(Fire)
7-8 years old	・To be able to have an interest in disaster, to be able to think about safe behavior during disasters. ・To be able to feel danger caused by the disaster, to be able to take the appropriate action by following the adult instruction ・To be able to avoid the danger on own in the event of a disaster, to be able to contact with adults.	◇What would you do when fire happened? ◇Want to know your town more (Involvement of own, people and society) ◇Evacuation drill(Earthquake)	◇What to do when the earthquake happened? ◇Let's try to be able to do by your own ◇Let's go, let's use ◇Evacuation drill(Tsunami)	◇Town exploration ◇Evacuation drill(Fire)

Example of school curriculum for disaster management education in Japan

Source: Ministry of Education, Culture, Sports, Science and Technology, Deployment of disaster management education (Edited by JICA Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley)

(3) Care for students

Health care and mental health care for students shall be enhanced.

Recovery Phase

- Training for teachers
- Establishment of a mental care counselling room

(1)Training in school
a. Workshop by researchers and experts of the region b. Workshop on sharing experiences by those who have experienced a disaster c. Workshop on planning and practices of disaster management education d. Briefing of planning and manual formulation of the school disaster management education e. Training by the school disaster management committee f. Workshop of treatment method for injury (cardiopulmonary resuscitation, AED, etc.) by the fire department, etc. g. Comprehensive disaster management drills (including the context confirmation of stockpile warehouse, and training for using the disaster prevention equipment) h. Workshop to understand the importance of life and history of disaster in Japan i. Training on mental health care
(2) Training in external institutions (Expert)
a. Training on school safety performed by the Ministry of Education, Culture, Sports, Science and Technology , Teacher Training Center b. Training for leader by local governments c. Training in disaster prevention experience facilities, etc. d. Holding planning committee for disaster management manual e. Training on emergency life-saving (including AED) f. Participation of comprehensive disaster management drill in region g. Training for fire protection manager h. Experience learning session on disaster volunteer
(3) Joint training with students and parents
a. Handing over the students b. Setting up of shelter c. Creation of disaster management maps d. Facility tours to study the history of past disasters e. Session to listen to the experiences of people who have experienced a disaster f. Training on knowing the business content of the people to protect the safety in the area such as fire department, etc.

Examples of training for teachers in Japan

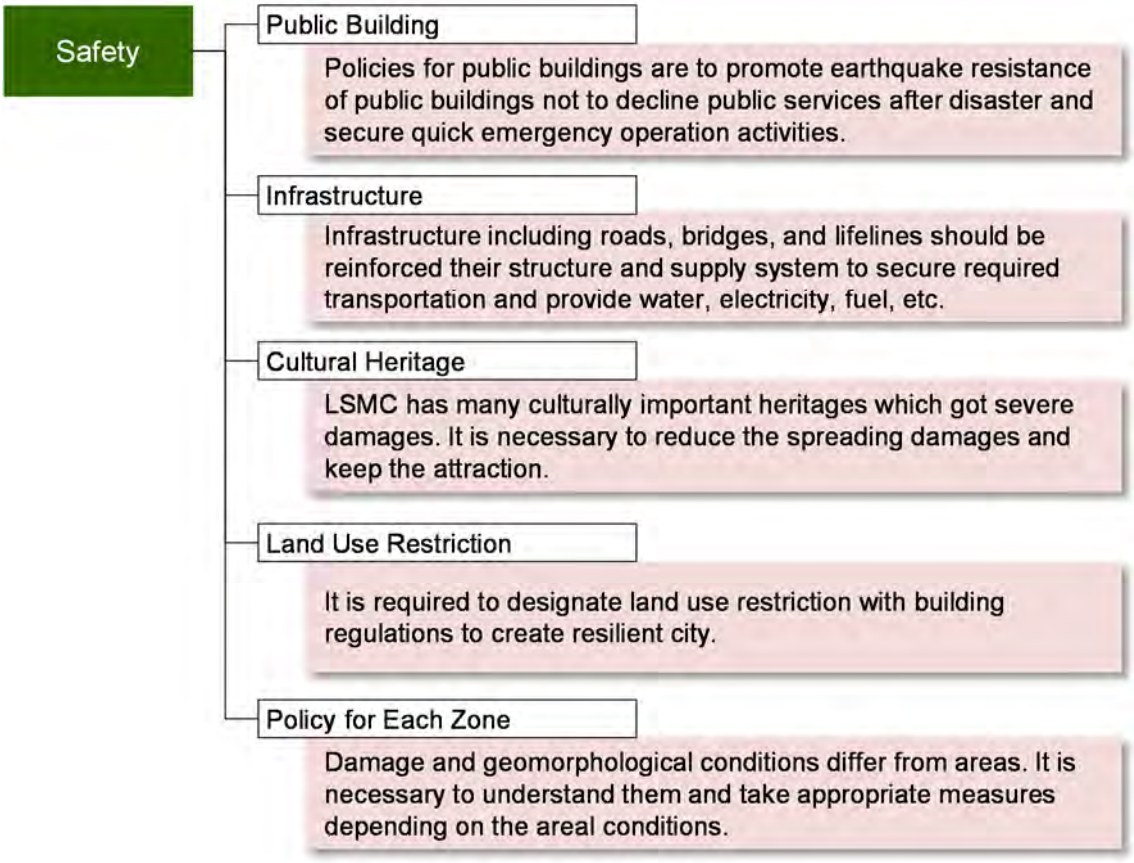
Source: Ministry of Education, Culture, Sports, Science and Technology, Deployment of disaster management education (Edited by JICA Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley)

SAFETY

2. Urban Planning with Sustainable Development for a Safer and Secure City

■Basic Policy

For safe, secure and sustainable urban development, the BBB recovery and reconstruction plan set up the following sectoral policies for urban planning:



Through the above mentioned policies, a resilient and safe city should be built from the recovery and reconstruction phases.

2-1 Public Building

■Outline

Early recovery and seismic resistance measures for public buildings shall be prompt as to not cause the delay of public services.

Issues

In the Gorkha EQ, several public buildings were damaged. It is necessary to recover immediately and conduct the seismic resistance measures since public buildings are the most important facilities for disaster management and public services.

List of Actions

(1) Recovery, seismic resistance and safety of public buildings

Damage Status of various public buildings, such as governmental offices and facilities, etc. (Especially actions for hospitals and schools are indicated in Livelihood), shall be clarified in an early phase after a disaster. Recovery and reconstruction measures shall be taken as necessary to ensure public services. In addition, seismic resistant buildings shall be promoted to prepare another disaster.

Recovery Phase

- Immediate damage investigation of public buildings
- Emergency repair of damaged public buildings to secure safety and the construction of temporary public buildings for the operation of emergency relief, medical treatment, and evacuation of life under safe conditions

Images of Immediate Damage Investigation in Recovery Phase

Source: JICA Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley
Note: the Photos taken in Bhaktapur

Revitalization Phase

- Damage diagnosis of all public buildings and the reinforcement of public buildings (taking care of historical importance in case a public building is located in a historical area)
- Prioritization and examination of possible unification and rearrangement of public buildings to rebuild and repair public buildings
- Recovery and reconstruction of aseismic public buildings on the basis of the National Building Code (NBC)

Development Phase

- Capacity building and the establishment of a permit process for new public building construction in order to enforce the NBC and land use zoning, as a leading municipality
- Promotion of aseismic public buildings by unification and rearrangement of public buildings, including construction of common building for government offices, as a part of highly-urbanized area in the Kathmandu Valley

(2) Development of Disaster Management Park

Disaster management parks shall be developed for strengthening disaster management functions and providing public services; such as a "disaster management base" for the operation of recovery and reconstruction activities and "evacuation site" for securing people's lives.

Recovery Phase

- Using open spaces (parks) for the operation of emergency relief activities and providing public services

Revitalization Phase

- Designation of open spaces for reconstruction operation and long-term evacuation
- Development of open spaces as evacuation sites and disaster management bases

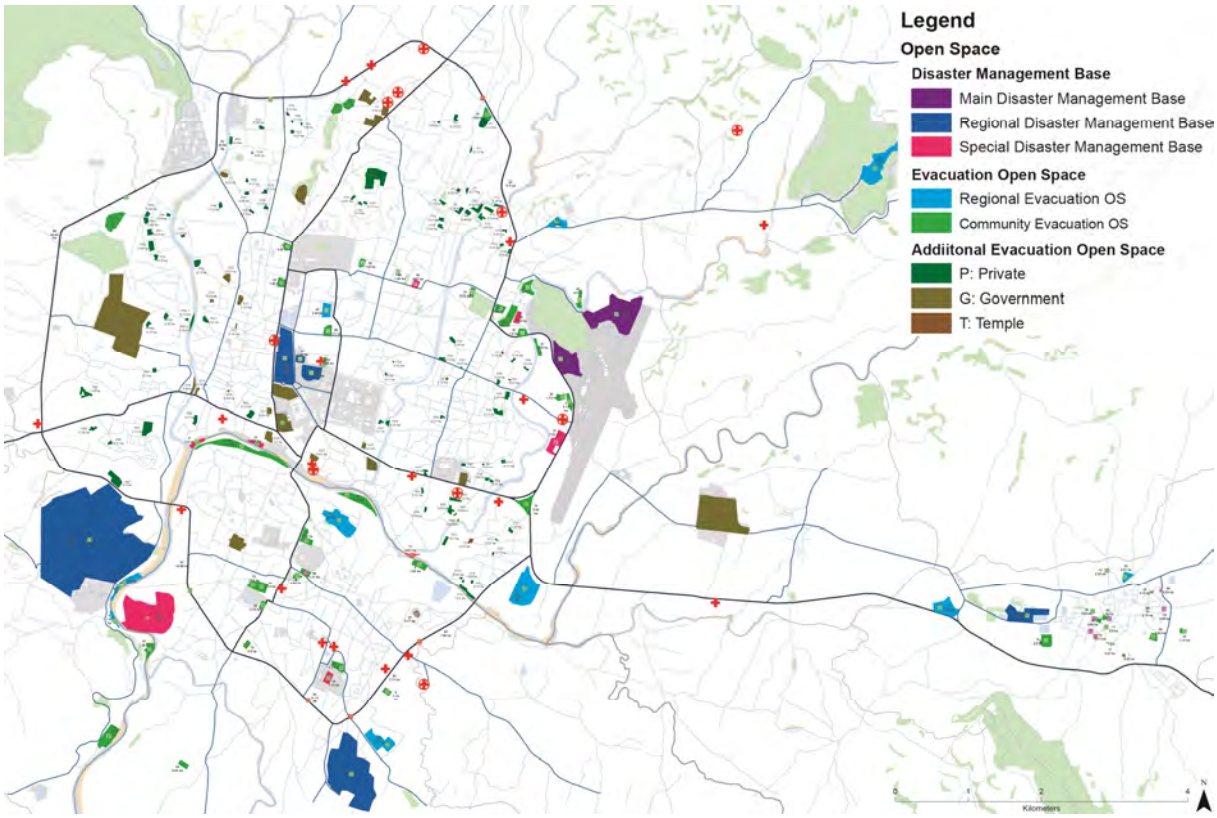
Development Phase

- Promotion of the construction of evacuation sites and disaster management bases, and the establishment of an institutional system for implementation, operation and management
- Establishment of a legal system to secure open spaces as evacuation sites and disaster management bases in newly developing areas (land pooling project, etc.)

	Classification	Description
Disaster Management Base	**Main Disaster Management Base**	Multiple Usage: Dealing with an extensive disaster required for smooth and accurate operation of recovery for the nation
	Regional Disaster Management Base	Multiple usage for emergency responses and supporting evacuation life for the region
	Special Disaster Management Base	Single or multiple usage for specific functions (Not appropriate with camp/settlement) (Logistics, Debris Collection, Military Installation, Dead-body Management, etc.)
Evacuation Site	**Regional Evacuation Open Space**	"Camp/Settlement" with some required facilities for evacuation life (Medical Care, Vulnerable Assistance, Storage and Distribution, etc.)
	Community Evacuation Open Space	Single usage for "Camp/Settlement" (with originally suggested function or/and minimum required facilities (Rescue tools, First-aid kit, etc.)

Classification of Disaster Management Park

Source: JICA Project on Rehabilitation and Recovery from Nepal Earthquake



Location of Disaster Management Park

Source: JICA Project on Rehabilitation and Recovery from Nepal Earthquake

Example of Facilities Required for Disaster Management Park

Source: JICA Project on Rehabilitation and Recovery from Nepal Earthquake

2-2 Infrastructure

■Outline

Early recovery and seismic resistance of infrastructure shall be promoted for the development of safer infrastructure and lifelines.

Issues

Infrastructure was less damaged in the Gorkha EQ. However, because of the low development ratio from the time before the earthquake, problems occurred more for the livelihood at the time of the Gorkha EQ. In addition to early restoration, new development is required.

■List of Actions

(1) Recovery, seismic resistance and safety of road and bridges

Road recovery for accelerating reconstruction process shall be implemented and new road and bridges shall be constructed for safe urban development. After an emergency situation, it is necessary to secure safe road for transportation and evacuation. Therefore, continuous efforts are also required in rehabilitation and development phase to prepare a next disaster.

Recovery Phase

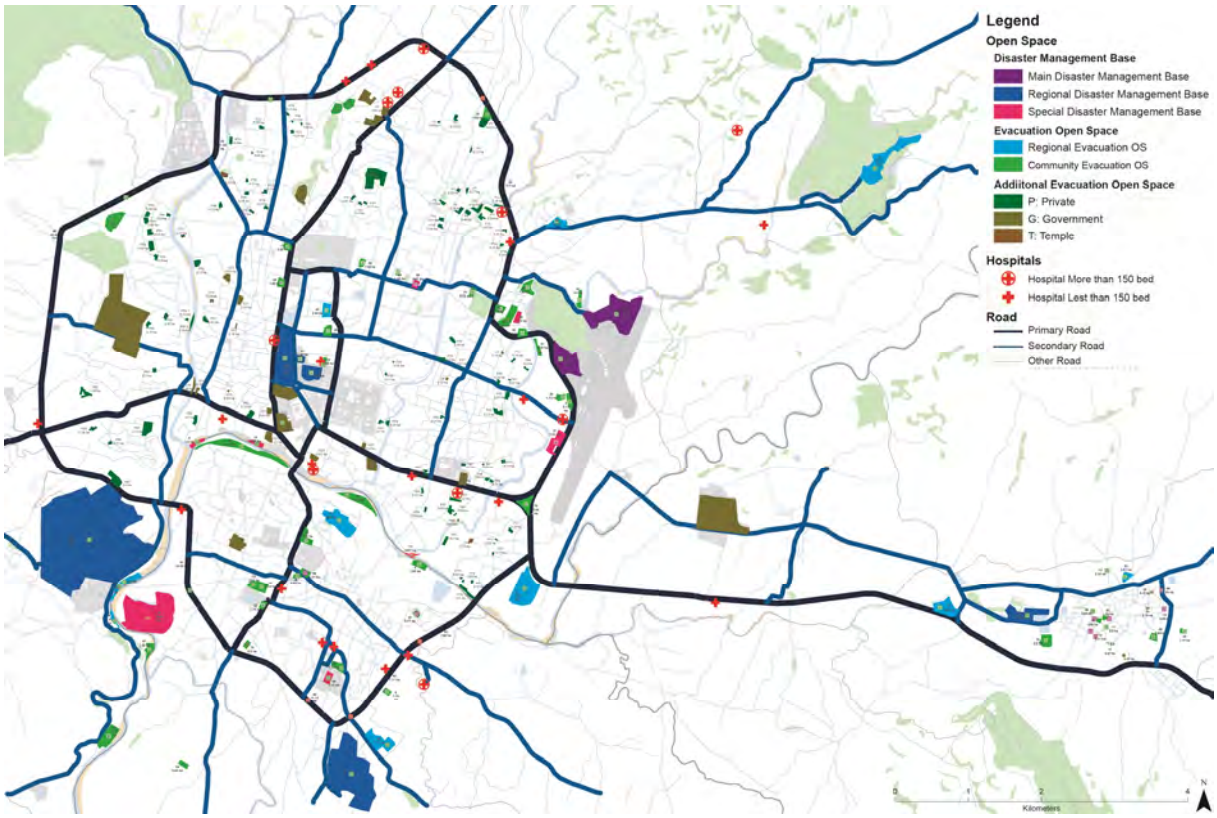
- Recovery of roads and bridges to accelerate the recovery process for regional and municipal areas

Revitalization Phase

- Improvement of earthquake resistant roads for smooth transportation and evacuation, especially for designated emergency transportation roads and evacuation routes

Development Phase

- Continues efforts for improvement and construction of roads, including cooperation with the nation, Kathmandu Valley, districts, and adjacent municipalities/VDCs
- Promotion of road construction together with urban development projects, such as land pooling
- Examination of road standards for municipal roads in consideration of the characteristics of the municipality



Proposed Emergency Transportation Roads (Draft)

Source: JICA Project on Rehabilitation and Recovery from Nepal Earthquake
Note: This road network will be finalized by JICA Project on Urban Transport Improvement for Kathmandu Valley

(2) Recovery, seismic resistance and safety of lifelines

Early recovery and seismic resistance of lifelines shall be implemented for safer infrastructure. After a disaster, to secure water is important for evacuees, and electricity is necessary for emergency response operation. For the revitalization and development phases, continuous efforts to make safe infrastructure are required.

Recovery Phase

- Early recovery of supply lines and other related facilities and sanitation management

Revitalization Phase

- Taking seismic resistant measures for supply lines and other related facilities, and improve their supply systems
- Development of sustainable stockpiling of water and fuel for emergency use stored in earthquake resistant and safe facilities, and consideration of their distribution and supply system
- Improvement of the sanitation management system

Development Phase

- Continuous development of the expansion of the supplying area and upgrading of

existing facilities to be aseismic resistance and with a stable water, sewage, and electricity supply system

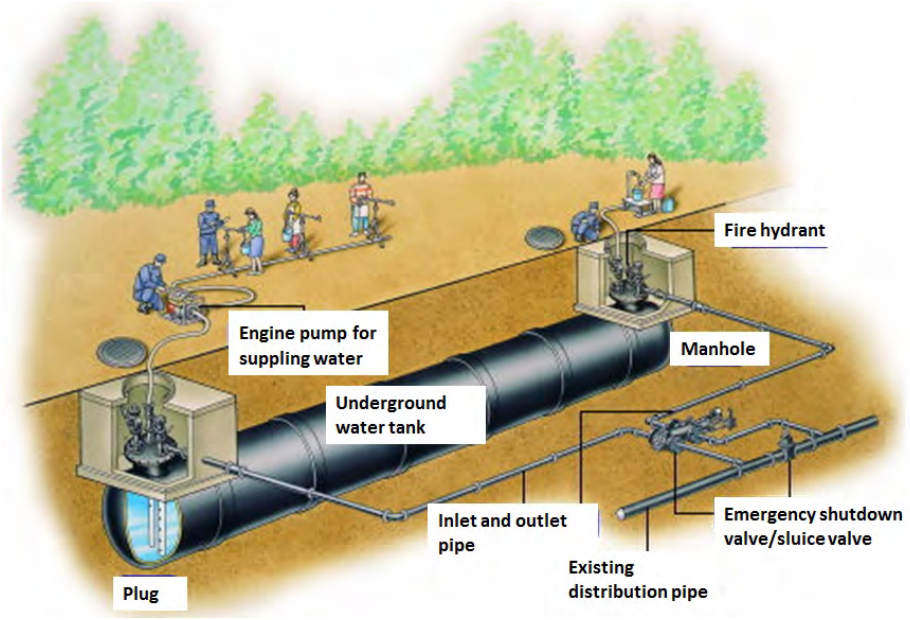
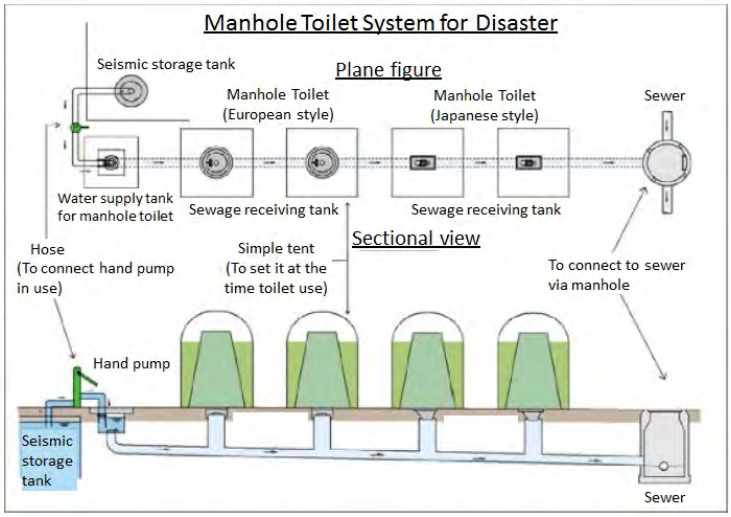


Image of Emergency Water Tank at Evacuation Site in Japan

Source: Saga City Waterworks and Sewerage Bureau (Edited by JICA Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley)



Manhole Toilet System for Disaster in Japan

Source: Ministry of Land, Infrastructure, Transportation and Tourism in Japan (Edited by JICA Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley)

2-3 Cultural Heritage

■Outline

Cultural Heritage, which is an important resource of a municipality, shall be restored to reduce the spreading damages, and recovered to regain the attraction.

Issues

Several cultural heritages were damaged in the Gorkha EQ and tourism was damaged. It is necessary to recover or reconstruct immediately and necessary to conduct the seismic resistant measures since the cultural heritages are the important facilities for tourism in a municipality.

■List of Actions

Many historically and culturally important buildings and monuments were damaged. 1) Temporary restoration is required to reduce spreading damage in the recovery phase. 2) Full restoration is required to get back to the original values and attract tourists. 3) Seismic resistance is required to prepare for another disaster in future. The prioritization of restoration is recommended as full recovery requires a long-term process.

Recovery Phase

- Debris removal and temporary restoration of the cultural heritage sites while not increase the disaster damages

Revitalization Phase

- Prioritizing recovery through the judgement of urgency from seismic diagnosis and historical importance
- Recovery of the prioritized cultural heritage sites in consideration of seismic resistance and their original value

Development Phase

- Long-term vision for reinforcement: (Re)evaluation of the value of historical heritage sites and vulnerability of heritage monuments
- Promotion of the restoration of the important cultural heritage sites to improve seismic resistance and keep their historical value

Damages by Gorkha EQ in Lalitpur Sub-Metropolitan City

LEFT: Damaged of a historical town in suburb (Sunakothi)
RIGHT: After debris removal in Durbar Square. Buildings are temporary supported by props
Source: JICA Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley

2-4 Land Use Restriction

■Outline

Land use restriction, in consideration of the disaster prone areas based on the classification of geomorphology and soil model, hazard analysis shall be considered for future development.

Issues

In the current situation, land use restriction is not considered as a part of the disaster vulnerability. For urban planning, multiple approaches are required to ensure the reconstruction process based on the land use policies in every stage of planning and implementation.

■List of Actions

Overall urban planning measures are necessary towards the development of municipal areas. Land use planning is one of the major items for this purpose. From the recovery phase, appropriate measures should be taken for a smooth reconstruction process.

Recovery Phase

- Designation of hazardous areas

Revitalization Phase

- Revision of the land use zoning and building regulations based on geomorphology map, hazard assessment, and actual building damage (risk sensitive land use)
- Considering the location of open spaces and public buildings (administrative facilities, schools, and hospitals), which can be utilized as emergency response bases, and emergency medical treatment facilities, and evacuation sites in safer and accessible areas

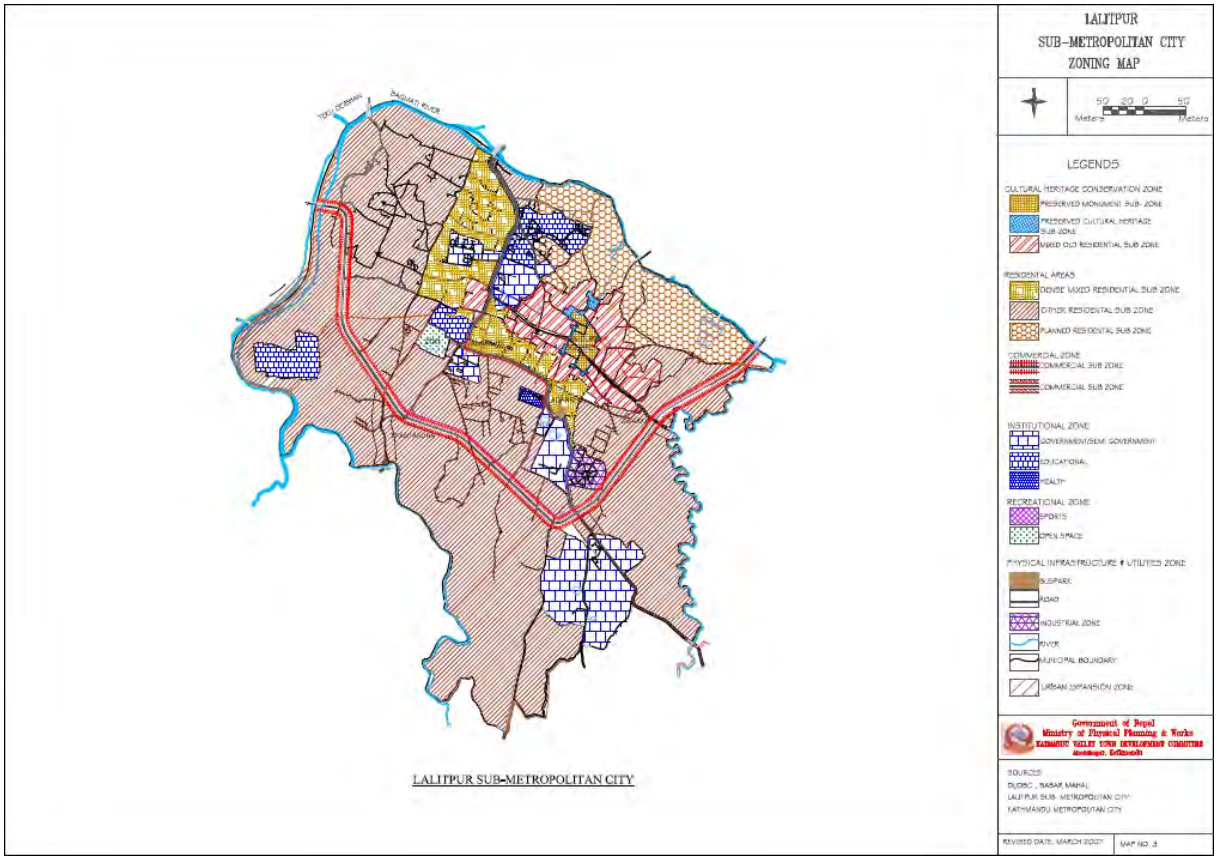
Development Phase

- Institutionalization of the land use zoning and building regulation and appropriate enforcement by municipality, as a leading municipality
- Promotion of the land use zoning and urban development for the improvement of regional economies and create new industry to accelerate the development

type	Description
Residential	Residential area should be designated after considering geomorphology and soil condition, and safety. It is also important to set evacuation open spaces and routes which should be carefully designed for safer evacuation. Catchment of hospital and public services, transportation convenience should be also considered.
Commercial /Business	Securing safety is important due to the high density of commercial/business areas. In addition to confirming ground condition, building regulations should be enforced. The areas also attract people for commercial centres, public facilities, and events and festivals held on open spaces in this area. Evacuation routes are also necessary to secure safe evacuation from these dense areas.
Industry	Designation of industrial area aims to enhance regional industry which supports the economy of the area and reconstruction. Appropriate designation with disaster management and facilities are also required.
Agriculture	It can be a buffer zone in urbanized areas. Marsh or lower lands should be designated as agricultural use especially for paddy fields. Buildings should not be built on those lands due to soft ground conditions. However, rapid urbanization would require those lands. In this case, more severe building regulations should be applied.

Direction for zoning revision by type of exiting land use

Source: The Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley in Nepal



Land Use Zoning Map in Lalitpur Sub-Metropolitan City (2007)

Source: Building By-laws Related to Construction in Municipalities and Urbanizing VDCs of Kathmandu Valley, Government of Nepal, Ministry of Physical Planning and Construction, and Kathmandu Valley Municipal Development Committee
Note: Southern part of the municipal area was not included in 2007. Those areas are designated as "Urban Expansion Area"

2-5 Policy for Each Zone

Outline

Safety urban planning and development shall be promoted for disaster affected areas. Especially, disaster stricken areas, high-dense areas, and geomorphological vulnerable areas need an overall approach to overcome the weaknesses against disaster.

Issues

Historical buildings in the centre of the municipality were severe damaged. Building density in the centre is also very high. Therefore, intensive reconstruction measures should be taken. There are some cliffs in the municipality. It is necessary to take care of those topographic features for reconstruction.

List of Actions

Recovery Phase

- Prior emergency relief operation for hazardous areas and areas which were severely damaged

Revitalization Phase

- Designation of disaster stricken areas where intensive measures should be focused on urban planning, and high-dense areas and vulnerable areas which need disaster management for second disasters and other possible disasters
- Revision of land use planning for those designated areas and taking actions as priority

Development Phase

- Overall approach of urban planning for the designated area in order to make the municipality resilient

Priority Area	Priority Measures	
	Developed Area	Future Development Area
High-dense Area / Disaster Stricken Area	**Historical city centre and rural town with high building density** > Comprehensive reconstruction measures and appropriate rezoning	N/A
Vulnerable Area	**1) Measures against liquefaction** > Improve soil and land **2) Measures against shakability** > Improve seismic resistance	**1) Measures against liquefaction** > Minimize development **2) Measures against slope-instability** > Avoid development

Indication for Land Use Policy

Source: The Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley in Nepal

Development type	Type of hazard	Development strategy	Procedure	Programs/actions
Developed area	Slope-instability	Mitigate future disaster impacts by: 1) preventing slope failure and 2) identify area with high slope-instability, especially for **areas with larger population**	Designate: 1) high slope-instability areas; and 2) areas to prevent slope failure	1) **Invest on preventive construction measures** (for slope failure); 2) community/household relocation (small scale)
	Liquefiability	Mitigate future disaster impacts by improving (stabilizing) soil and land	Designate: 1) high liquefiable areas in **urbanized areas**	1) **Invest on preventive construction measures** (for liquefaction) especially for public buildings on urbanized land
	Shakability	Mitigate future disaster impacts by: 1) preventing building collapse in high shakability areas	Understand: 1) high shakable areas to strengthen buildings in the area	1) Improve **building earthquake resistant** (Public and important facilities have higher priorities)
	(active faults)	2) moving buildings (esp. public facilities) off from the active faults	Identify: 2) active faults and designate "fault zone" as hazardous area	2) Move high valuable facilities away from the faults when reconstructing
Future development area	Slope-instability	**Avoid**/minimize development of areas susceptible for slope failure	Designate high slope-instability areas	1) Designate high slope-instability areas as **urbanization controlled area in land use zoning** (to prevent any development); 2) minimize development on slope failure susceptible areas
	Liquefiability	Avoid/minimize future disaster impacts by minimizing vulnerable development in high liquefiable area	1) Understand high liquefiable areas, and 2) minimize development in the high liquefiable areas	1) include **preventive construction measures** (for liquefaction) esp. for new public buildings; 2) educate residents about liquefaction for stabilizing land upon new building construction
	Shakability	Avoid/minimize future disaster impacts by minimizing vulnerable development in high shakability area	1) understand high shakable areas to promote constructing more earthquake resilient buildings	1) **make new buildings earthquake resistant** upon construction (public and important facilities have higher priorities); 2) inform residents on shakability and **preventive measures upon new building construction**
	(active faults)	Avoid future earthquake impacts by controlling "fault zones"	2) Identify active faults and designate area hazardous as "fault zone"	3) Include the designated **"fault zone" to urbanization controlled area** in future land use zoning

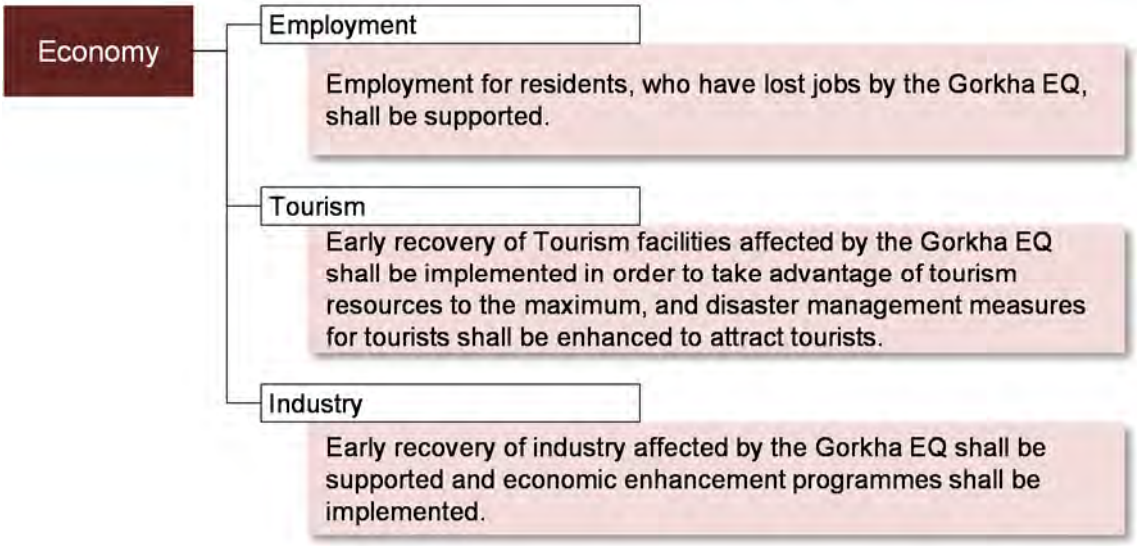
Details of policies and programs for Vulnerable Area

Source: The Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley in Nepal

ECONOMY 3. Promotion and Improvement of Industry

■Basic Policy

For the promotion and improvement of industry, the BBB recovery and reconstruction plan set up the following sectoral policies for economy:



Through the above mentioned policies, industry and economic activities should be promoted and improved from the recovery and reconstruction phases.

3-1 Employment

■Outline

Employment for residents, who have lost jobs by the Gorkha EQ, shall be supported.

Issues

Many people were affected by the Gorkha EQ including works.

■List of Actions

(1) Support for employment

Employment support shall be implemented such as cash for work, and arrangement of employment opportunities for reconstruction work.

Recovery Phase

- Support for the employment of victims who have lost work (financial support)
- Support for employment, employment training in consideration of vulnerable people and deprived/marginalized people (Pichadiyeko barga)

- Support and introduction of cash or food for work
- Human resource development for reconstruction and arrangement of employment opportunities for reconstruction work

3-2 Tourism

■Outline

Early recovery of Tourism facilities affected by the Gorkha EQ shall be implemented in order to take advantage of tourism resources to the maximum, and disaster management measures for tourists shall be enhanced to attract tourists.

Issues

Tourism is an important resource in municipality, but the number of tourists is decreasing after the Gorkha EQ. In order to recover the vitality of the municipality, tourism should be recovered and be safer.

■List of Actions

(1) Support for the recovery and reconstruction of tourism

Early recovery and reconstruction of tourism facilities damaged by the Gorkha EQ shall be promoted in order to attract tourists.

Recovery Phase

- Dissemination of reconstruction information for tourism

(2) Disaster management measures for tourist sites

Disaster management measures for tourists shall be implemented so that tourists can be safe after a disaster.

Revitalization Phase

- Designation and development of evacuation sites adjacent to tourist sites
- Creation and distribution of guide maps and sign boards indicating emergency response actions and evacuation sites
- Establishment of a guidance system for tourists in the event of a disaster
- Enhancement of stockpiles for tourists

Image of Shelter Map for Tourist (Example of Japan, prepared in Japanese, English, Korean, Chinese)

Source: City of Nara, Japan, http://www.city.nara.lg.jp/www/contents/1334138826602/index.html

Example of Mobile application for providing disaster information for tourists

Source: Japan Tourism Agency, http://www.mlit.go.jp/kankocho/news03_000111.html

3-3 Industry

■Outline

Early recovery of industry affected by the Gorkha EQ shall be supported and an economic enhancement programme shall be implemented.

Issues

Because of the Gorkha EQ, industry was damaged, thus should be recovered.

■List of Actions

(1) Support for Agriculture

Agricultural support shall be implemented such as the recovery and development of irrigation.

Recovery Phase

- Recovery support for agriculture
- Recovery and development of irrigation facilities

(2) Support for Commerce and Industry

The commerce and industry of residents shall be supported by the economic enhancement programmes.

Recovery Phase

- Recovery support for stores, shops and cottage industries

Revitalization Phase

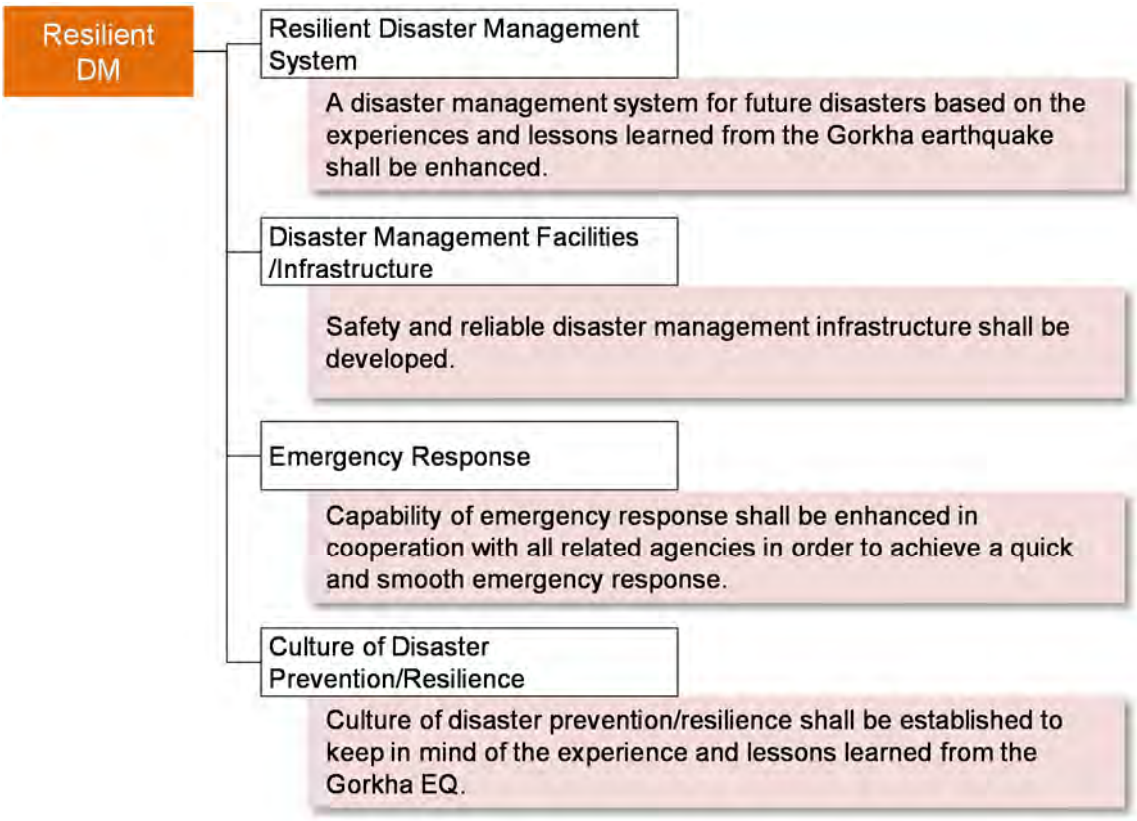
- Support for expanding sales channels, trade

RESILIENT DM

4. Development of Resilient Disaster Management City

■Basic Policy

For the development of a resilient disaster management city, the BBB recovery and reconstruction plan are set up the following sectoral policies:



Through the above mentioned policies, the resilient disaster management should be built from the recovery and reconstruction phases.

4-1 Resilient Disaster Management System

■Outline

A disaster management system for future disasters based on the experiences and lessons learned from the Gorkha EQ shall be enhanced.

Issues

In the current situation, it is necessary to enhance the disaster management capabilities for future disasters, for resilience.

List of Actions

(1) Establishment of a resilient disaster management system

A disaster management system shall be established for the enhancement of DRR for future disasters. A disaster management plan shall be formulated to implement projects aimed at DRR. In addition, disaster management administrative governance shall be enhanced.

Recovery Phase

- Accumulation of disaster data for the Gorkha EQ and historical disasters
- Enhancement of disaster management organization
- Establishment and enhancement of ward level disaster management organization
- Human resource development for disaster management administration
- Understanding and dissemination of risk areas

Revitalization Phase

- Formulation of disaster management plan
- Formulation and dissemination of evacuation plan

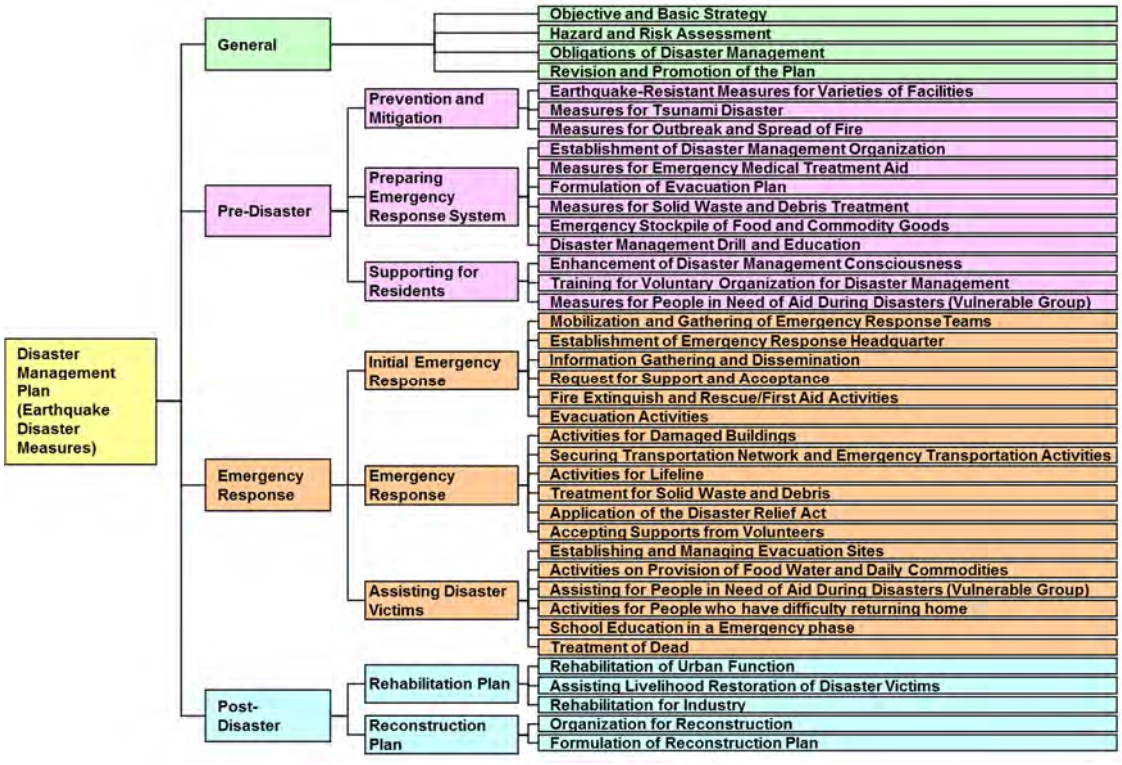


Image of Disaster Management Plan (Example of Japan)

(2) Promotion of disaster management cooperation system

A disaster management cooperation framework and support-acceptance system with other municipalities and institutions shall be enhanced in order to proceed emergency

response and recovery smoothly.

Revitalization Phase

- Strengthening cooperation with other municipalities, the establishment of a support and acceptance system, and conclusion of agreements
- Strengthening cooperation with other agencies (Police, Army, Red Cross), the establishment of a support and acceptance system, and conclusion of agreements
- Strengthening cooperation with private enterprises, and conclusion of agreements
- Development of an acceptance system for volunteers

Development Phase

- Support for the formulation of BCP for private enterprises

Images of Agreement with related agencies (Example of Japan)

Title	Partner of Agreement
Agreement on Broadcast request	Several broadcasting companies
Agreement on News report request	Several newspaper publishing companies
Agreement on mutual support	1 metropolitan and 9 prefectures 16 large cities Nine-prefecture/city
Agreement on wide area support	Association of Prefectural Governors
Agreement on Post	Post bureau
Agreement on emergency response	Several Contractors Associations (Ex. Japan Road Contractors Association)
Agreement on support for stranded commuter	Oil business association Several convenient store company Several restaurant company
Agreement on procurement of drinking	Japan Soft Drink Association
Agreement on support for reconstruction of community development	Bar association, Engineering association
Agreement on information gathering by Amateur radio	Amateur radio association
Agreement on providing cars	Several rental car company
Agreement on providing emergency goods	Japan Life Co-operation League
Agreement on support by volunteer	Social welfare council
Agreement on using Facilities	Board of Education
Agreement on providing Privately-rented housing	Association of apartment house, etc.
Agreement on cooperation for housing reconstruction	The Housing Loan Corporation
Agreement on providing Foods	Instant food Association
Agreement on disaster relief and rescue	Red Cross
Agreement on medical activities	Tokyo medical association
Agreement on dental activities	Tokyo dental association
Agreement on medical relief activities	Tokyo Pharmacist Association
Agreement on emergency relief activities	Japan bonesetter association

Source: Disaster Management Plan, Tokyo Metropolitan Government (Edited by JICA Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley)

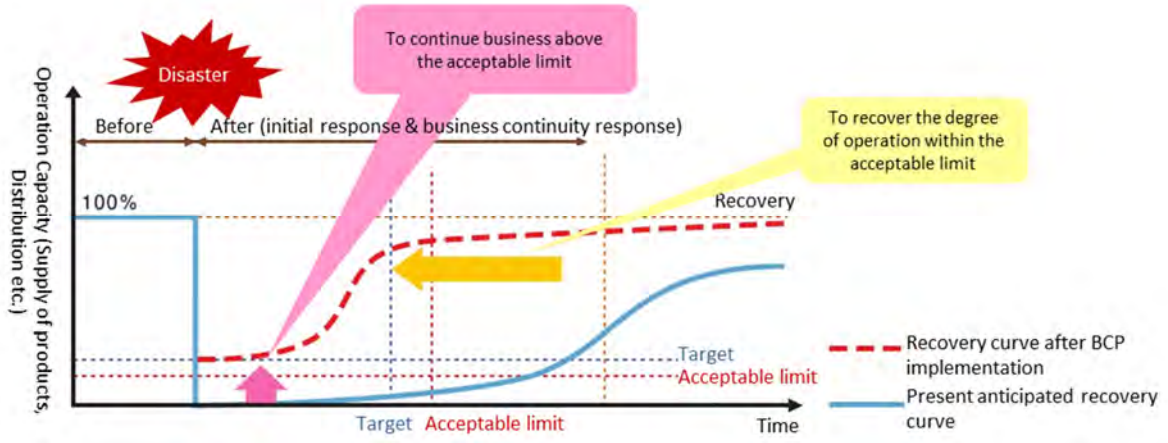


Image of BCP concept chart

Source: Disaster Management in Japan, Cabinet Office, Government of Japan (Edited by JICA Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley)

4-2 Disaster Management Facilities /Infrastructure

■Outline

Safety and reliable disaster management facilities and infrastructure shall be developed.

Issues

In the current situation, facilities and infrastructure specialized for disaster management are lacking.

■List of Actions

(1) Development of disaster management facilities and enhanced functionality

A disaster management base shall be developed and disaster management functions shall be enhanced.

Revitalization Phase

- Designation, development, improvement and enhancement of disaster management base facilities
- Development of stockpile warehouses, and ensuring disaster stockpiles
- Construction and management of disaster management training centre

Development Phase

- Enhancement of the disaster management functions of schools

[Food]	[Daily necessities]	[Rescue equipment]
Hardtack	Feeding bottle	Water filter
Pregelatinized rice	Blanket	Assembled Water Tank
Modified milk powder	Carpet	Battery Floodlight
Mineral water	Plastic container	Cord reel
Canned rice porridge	Paper cup	Generator
Canned bread	Disposable diaper	Rice cooker
	Portable radio	Tent
[Medical equipment]	Med kit	Temporary toilet
Disaster medical kit	Sanitary goods	STRETCHER
	Underwear	Cot
[Fuel]	Blue plastic sheet	Trolley
Gasoline	Wet Towel (Wet Tissue)	Carpenter's tool
Kerosene		Rescue kit
		Partition panel

Images of stockpile warehouse and stockpile list (Example of Japan)

Source: Photo; Miyako city website http://www.city.miyako.iwate.jp/kikikanri/hinanjyobitiku_kateibitiku.html
List; Disaster Management Plan of Minato city
(Edited by JICA Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley)

Images of disaster management training centre (Example of Japan)

Source: Hyogo Prefectural Emergency Management and Training Centre (Edited by JICA Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley)

(2) Development of information/communication infrastructure

Multiplexed disaster communication system and information sharing system shall be promoted in order to be able to execute the emergency response activities

Revitalization Phase

- Development of an information database for disaster management
- Establishment of an information sharing system
- Development of an information sharing system for vulnerable people and deprived/marginalized people (Pichadiyeko barga)

Development Phase

- Multiplexing means of communication
- Development of disaster management administrative radio

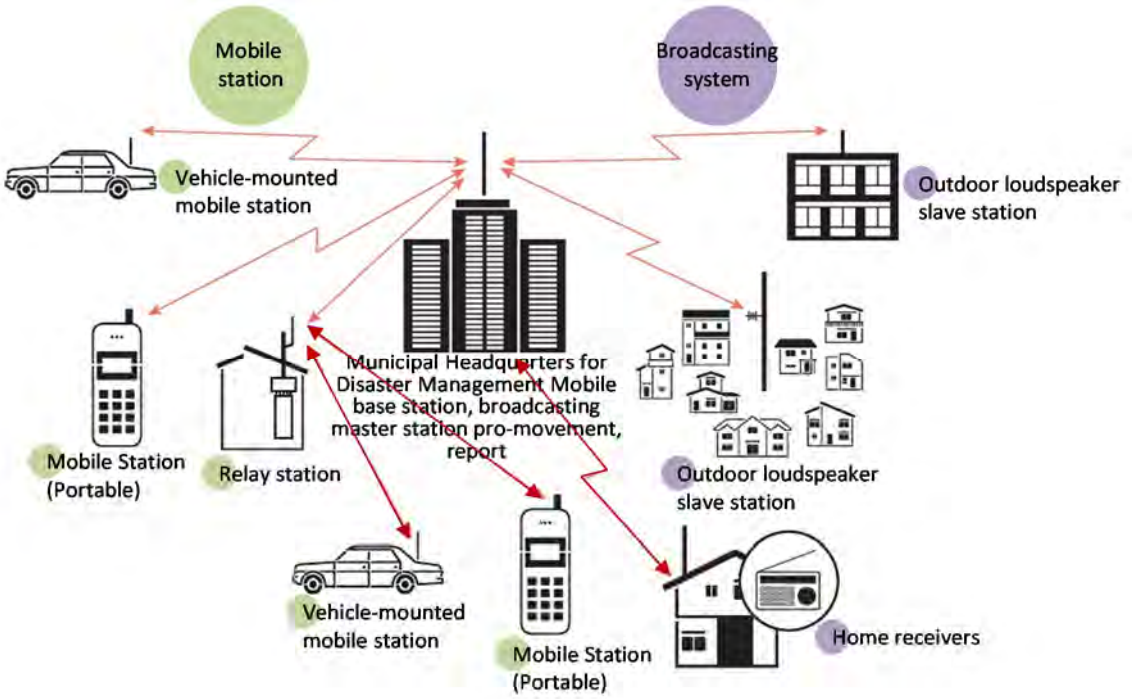


Image of disaster management administrative radio system (Example of Japan)

Source: Disaster Management in Japan, Cabinet Office, Government of Japan (Edited by JICA Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley)

4-3 Emergency Response

■Outline

Capability of emergency response shall be enhanced in cooperation with all related agencies in order to achieve a quick and smooth emergency response.

Issues

In the current situation, it is necessary to enhance the disaster response capabilities for future disasters

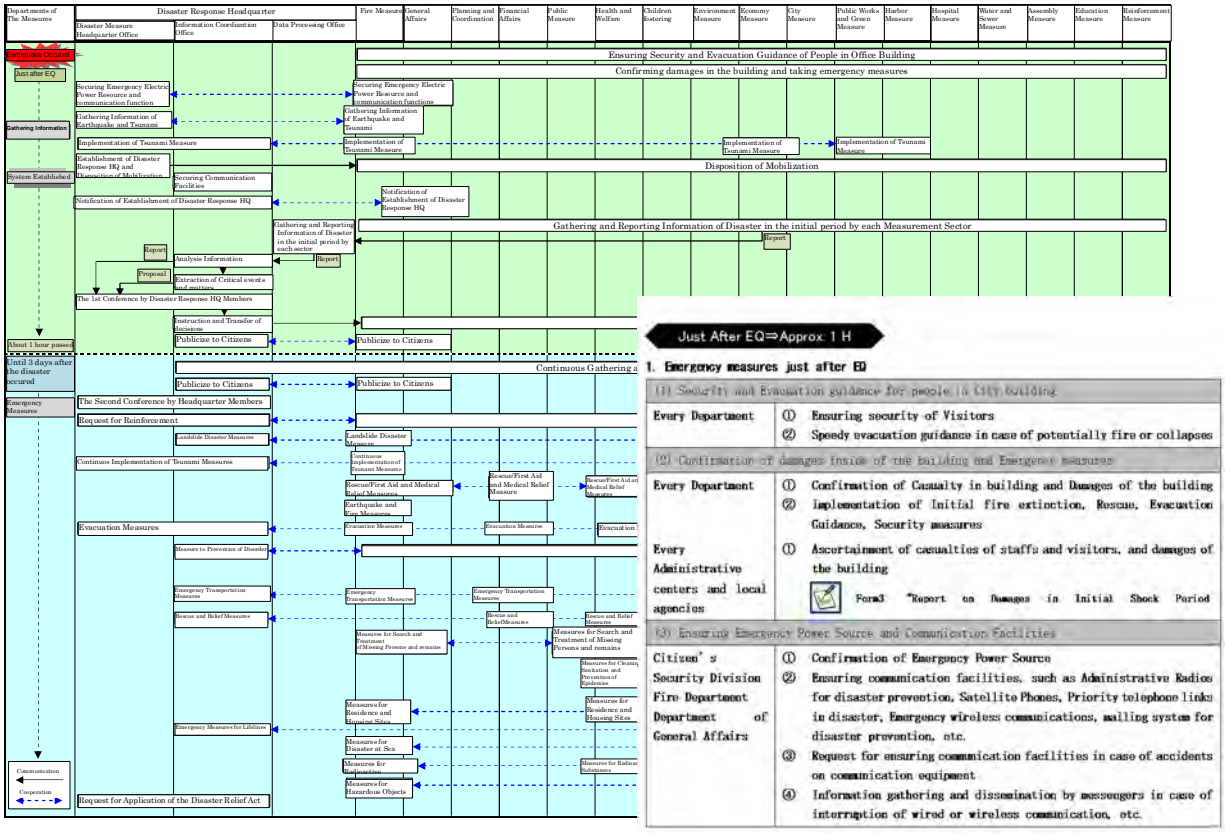
■List of Actions

(1) Capability enhancement of emergency response

The capability of a quick and smooth emergency response shall be enhanced such as the formulation of a manual for emergency response.

Revitalization Phase

- Establishment of an information collection and dissemination system
- Establishment of the initial system and mobilization system for emergency response
- Formulation of a disaster emergency response manual（SOP）
- Implementation of disaster management exercises for emergency response



Images of SOP (Flow chart and Checklist)

Source：SOP of Yokosuka city, Japan (Edited by JICA Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley)

Type		Contents (Example)
Classroom learning	Seminar Lecture	Basic knowledge of disaster, Hazard Mapping, Disaster management plan, Lessons learned from past disasters, etc.
	Self Learning	Basic learning from documents/books, e-learning, game etc.
Table Top Exercise (TTX)	Non-discussion style	Self Learning of story simulation, computer game, Training of situation estimated by Instructor-led (Image training)
	Discussion style	DIG, Workshop/Group work ,Discussion, Case method, etc.
CPX(Command Post Exercise)		Simulation of Emergency Response
Field Training Exercise (FTX)		Actual Exercise for emergency response in field such as Fire extinguish, Emergency medical, Traffic Control, Evacuation, Gathering to HQ, Establishment of Emergency Response HQ
Comprehensive Exercise		Full scale exercise (combined TTX & FTX), etc.

Types of Disaster management exercise

Images of Disaster management exercise (Example of Japan)

Source: Disaster Management in Japan, Cabinet Office, Government of Japan (Edited by JICA Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley)

(2) Capacity enhancement of rescue, first-aid and emergency medical activities

In order to rapidly execute the rescue and emergency medical activities in the event of a disaster, cooperation with each institution shall be strengthened. Emergency search and rescue and first-aid and emergency medical service is directly connected to damage mitigation in the event of a disaster.

Recovery Phase

- Designation of disaster base hospitals, medical centres

Revitalization Phase

- Establishment of an emergency medical transportation system
- Promotion of cooperation with disaster wide-area hospitals (district or national level) and disaster base hospitals

(3) Traffic/transportation and Lifeline management

A traffic and transportation management system shall be developed. Elimination of road obstacles, after a disaster occurs, is required to execute smooth relief and recovery activities.

An emergency recovery system for lifelines shall be established in order to carry out smooth relief and recovery efforts after the disaster.

Revitalization Phase

- Development of a plan/manual for the elimination of road obstacles, strengthening of elimination of road obstacles system, strengthen cooperation with the police
- Conclusion of agreements related to emergency recovery for roads with the construction companies
- Strengthening of emergency response capacities in cooperation with lifeline operators

4-4 Culture of Disaster Prevention/Resilience

■Outline

Culture of disaster prevention/resilience shall be established to keep in mind of the experience and lessons learned from the Gorkha EQ.

Issues

It is necessary to take over the experiences and lessons for prevention/mitigation of damages from next earthquake.

■List of Actions

(1) Transferring earthquake experiences/ lessons learned and establishment of culture of disaster resilience

Education based on the earthquake experiences shall be promoted. A culture of disaster prevention/resilience shall be established for mitigating damages from future disasters.

Recovery Phase

- Development of bases for culture of disaster prevention/ resilience
- Implementation of events for promoting the establishment of culture of disaster prevention/ resilience

Revitalization Phase

- Enhancement of disaster risk reduction education (education based on the earthquake experiences, learning for disaster risk reduction)

Images of monument of disaster

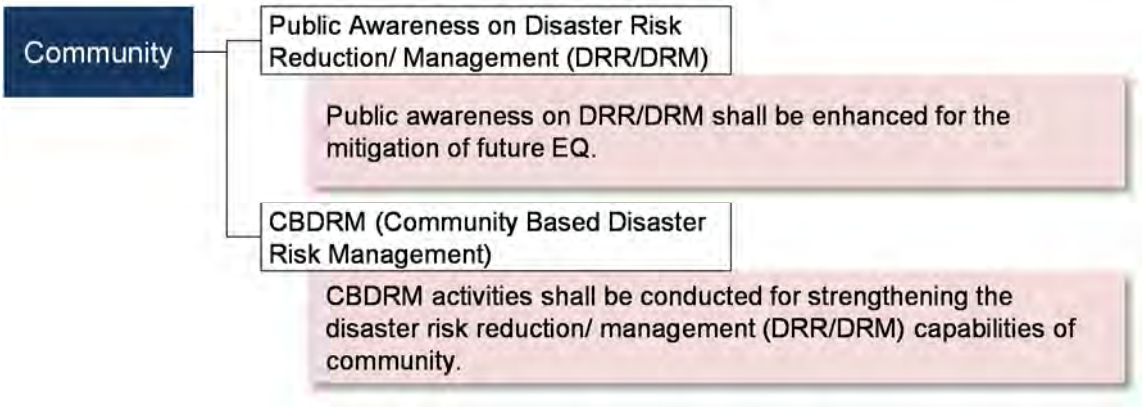
Left: Tsunami warning stone tablet in Aneyoshi, Miyako city, Japan, Right: Pier with the bared steel frame by the Great Hanshin-Awaji EQ
Source: Left photo; Disaster Management in Japan, Cabinet Office, Government of Japan, Right photo; JICA Study Team

COMMUNITY

5. Strengthening of Community Disaster Risk Management

■Basic Policy

For the strengthening of community disaster risk management, the BBB recovery and reconstruction plan set up the following sectoral policies:



Through above mentioned policies, community disaster risk management should be strengthened from the recovery and reconstruction phases.

5-1 Public Awareness on Disaster Risk Reduction/ Management (DRR/DRM)

■Outline

Public awareness on DRR/DRM shall be enhanced for the mitigation of future earthquakes.

Issues

Knowledge on DRR/DRM of residents is very important, however, their current knowledge is limited. Public awareness on DRR/DRM should be enhanced.

■List of Actions

(1) **Enhancement of public awareness of DRR/DRM**

Enhancement of public awareness on DRR/DRM shall be promoted.

Recovery Phase

- Development of a handbook on DRR/DRM for families
- Implementation of awareness-raising programmes on DRR/DRM
- Promotion of the preparation of emergency stockpiles by families

Contents of Family Handbook for Earthquake Disaster Risk Reduction

1. **Learning**
   1) Past major earthquakes
   2) Earthquake mechanisms
   3) What will be happened in case of an earthquake
   4) Earthquake risk assessment of our municipality
   5) Lessons learned from past earthquakes
2. **Planning and Preparedness**
   1) Making earthquake resilient house
   2) Preparing emergency stockpiles
   3) Making family action plan in case of an earthquake
   4) Participating in CBDRM activities
   5) Confirmation of earthquake risk map and identifying evacuation places for family

Images of Contents of Family Handbook for Earthquake Disaster Risk Reduction

References for Images:
"EQ DRR Guidebook", Yoshida-sho, Shizuoka
http://www.town.yoshida.shizuoka.jp/sws/share/wysiwyg/download.asp?fn=B8FK4u&tf=archive
"Bring Happiness to the World- Shiawase Hakobo", Kobe-city
"Earthquake Awareness Brochure", JICA Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley

DRR Poster Contest

Explanation of Earthquake Resistant Houses using Educational Tool

Fire Fighting Experience as a DRR Game Program

Community Workshop for Learning Earthquake DRR

TV/Radio Awareness Program

Development of Brochure, Leaflet, Educational Tools, etc.

Images of awareness-raising programs on DRR/DRM

References for Images:
Pictures from the JICA Project for Strengthening the Capacity of Seismic Disaster Risk Management in Ulaanbaatar City (above)
Picture from the JICA Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley (left below)
"Earthquake Awareness Brochure", JICA Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley
"Namazu no Gakko", earthquake DRR educational tool developed by PlusArts

DRR Goods Exhibition

Handkerchief printed how to use emergency stockpiles

Workshop on how to effectively use emergency stockpiles

Images of preparation of emergency stockpiles by families

References for Images:
"EQ DRR Guidebook", Yoshida-sho, Shizuoka
http://www.town.yoshida.shizuoka.jp/sws/share/wysiwyg/download.asp?fn=B8FK4u&tf=archive
Pictures from the JICA Project for Strengthening the Capacity of Seismic Disaster Risk Management in Ulaanbaatar City
"EQ Itsumo Handkerchief", developed by PlusArt

5-2 CBDRM (Community Based Disaster Risk Management)

Outline

CBDRM activities shall be conducted for strengthening the disaster risk reduction/ management (DRR/DRM) capabilities of community.

Issues

Importance of community roles for disaster risk management has been learned again from the Gorkha EQ. Community is the one of the most important elements for mitigation/prevention of disaster damages and initial emergency response to disasters, however, the community's DRR knowledge and capacity are limited. CBDRM should be enhanced for future disasters.

For the CBDRR/M, NRRC Flagship 4 has developed the nine minimum characteristics as the baseline components of a disaster resilient community in Nepal. Each action of the BBB RRP will be integrated to the following components:

9 Minimum Characteristics for a Disaster Resilient Community in Nepal

Source: Flagship 4 Handbook, NRRC

■List of Actions

(1) Enhancement of CBDRM

CBDRM activities shall be conducted for strengthening the DRR/DRM capabilities of the community.

Recovery Phase

- Establishment of "Community Disaster Management Committees (CDMCs)" as organizations for disaster preparedness, response, and rehabilitation at the community level

Revitalization Phase

- Formulation of community DRR/DRM plans
- Formulation of "community carte" for summarized information of current conditions on disaster management at the community level
- Implementation of DRR/ DRM capacity development programmes for community leaders
- Carrying out of community disaster management exercises

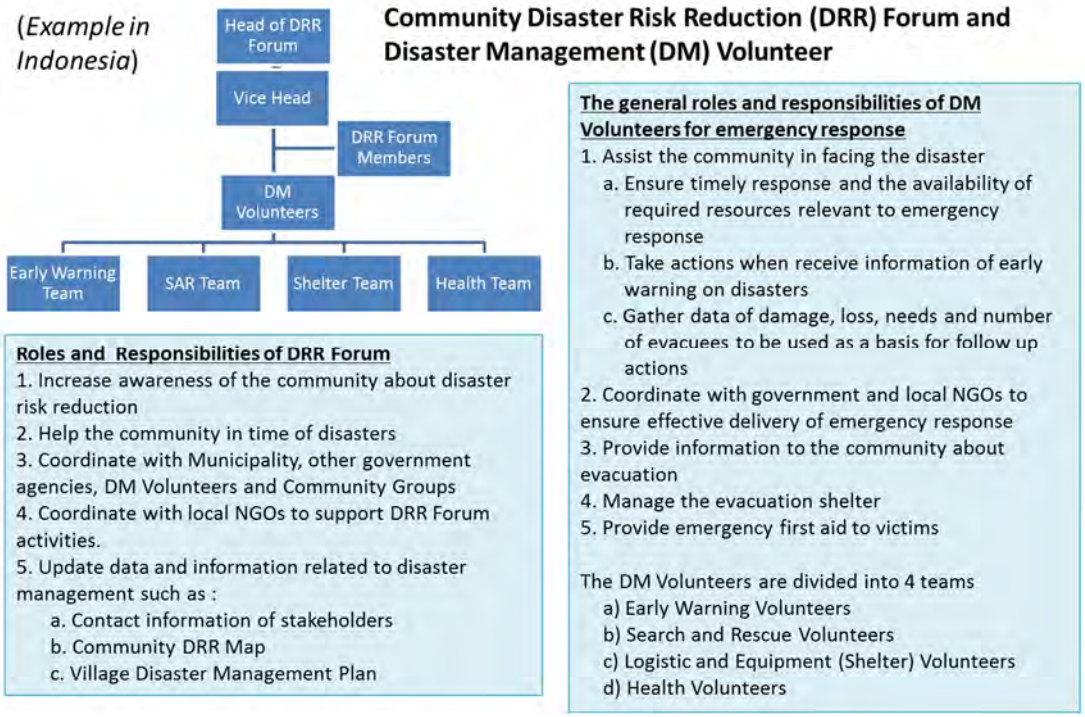
CHARACTERISTIC 1

Organisational base at Village Development Committee/ward and community level

1	A functional organisational base at VDC/ward and community level for the implementation and sustainability of DRR, which addresses the issues of protection, social inclusion (including gender balance), community ownership and participation and follows DRR initiatives.	
	KEY EXAMPLE INDICATORS	**VERIFICATION**
1.1*	VDC/municipality DM committee (LDMC) exists with roles and responsibilities in accordance with the LDRMP guidelines	Minutes of Meeting, ToR of the committee, VDC council minutes of meeting
1.2	Community DM committees(CDMC) or designated local level disaster management body, exists with roles and responsibilities	Minutes of Meeting, ToR of the committee
1.3	Decisions by the committees are fed back to all VDC/ municipality / community groups and who have rights to modify decisions	Social audit, Posting meeting minutes in public areas
1.4	33% Committee membership at VDC / community levels are represented by vulnerable groups, and discussion include issues specifically related to vulnerable groups	Minutes of Meeting
1.5	Coaching and support is given to vulnerable groups representatives in the committees, like community leadership training	Minutes of Meeting
1.6	% of other established community groups that have disaster risk management as regular agenda item	Minutes of meeting
	OTHER EXAMPLE INDICATORS	
	Protection issues are discussed in committee meetings at all levels	Minutes of Meeting
	Community is aware of budget and expenditure of DRM/DRR projects	Public audit, KAP

Indicators of Organizational base at ward and community level in Flagship4 of NRRC

Source: Flagship4 Handbook, NRRC



Images of Community Disaster Risk Reduction (DRR) Forum and Disaster Management (DM) Volunteer (Example in Indonesia)

Reference: JICA Project for Enhancement of the Disaster Management Capacity of BNPB and BPBD in Indonesia

Images of DRR/ DRM capacity development programmes

Reference: JICA Project for Enhancement of the Disaster Management Capacity of BNPB and BPBD in Indonesia

Example in Indonesia

Contents of DM Plan

Chapter 1: General
1.1 Concept and Mechanism of Village DM Plan
1.2 Background
1.3 Purpose and Objectives
1.4 Target
1.5 Scope
1.6 Position, Time Frame and Accountability
1.7 Legal Foundation
1.8 Definition
1.9 Structure of DM Plan

Chapter 2: General Description of Disaster
2.1 General Description of Village
2.2 General Description of Disaster
2.3 Tendency Analysis

Chapter 3: Disaster Risk Assessment
3.1 Hazards in the Area
3.2 Vulnerability
3.3 Capacity in the Area
3.4 Risk Assessment
3.5 Disaster Priority

Chapter 4: Disaster Management Policy
4.1 Vision and Mission
4.2 Disaster Management Policy
4.3 Disaster Management Institutions
4.4 Strategy of Disaster Management

Chapter 5: Disaster Management Activities
5.1 Focus, Programs, Activities for Disaster Management
5.2 Allocation of Tasks and Resources

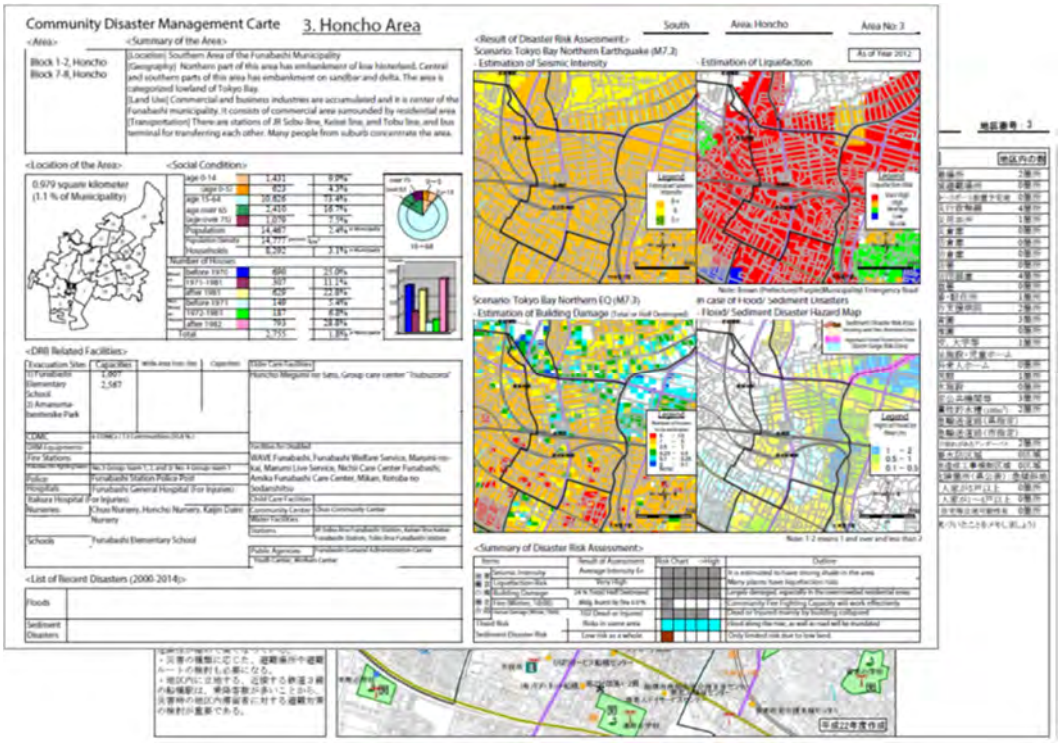
Chapter 6: Community Action Plan for Disaster Risk Reduction
6.1 Action Plan Identified for Village
6.2 Mainstreaming Strategy
6.3 Roles and Function of institution in village

Chapter 7: Monitoring, Evaluation, and Reporting
7.1 Monitoring
7.2 Evaluation
7.3 Reporting (Annual Report)

Chapter 8: Closing

Images of Community DRR/DRM plans (Example in Indonesia)

Reference: JICA Project for Enhancement of the Disaster Management Capacity of BNPB and BPBD in Indonesia



[Contents]

- Community Profiles (Population, Geography, Location)
- DRR related information (Status of preparedness, Vulnerable people, Evacuation places, etc.)
- Disaster Risk Assessment (maps and outlines)
- Community DRR Map, etc.

Images of Community carte (Example in Japan)

Reference: “Bosai Carte”, Funabashi-city, http://www.city.funabashi.chiba.jp/kurashi/bousai/0010/p015641.html

Images of Community disaster management exercise (Example in Indonesia)

Reference: JICA Project for Enhancement of the Disaster Management Capacity of BNPB and BPBD in Indonesia

ACTION PLAN

CHAPTER 1.
OUTLINE OF PLAN

1-1. Objective

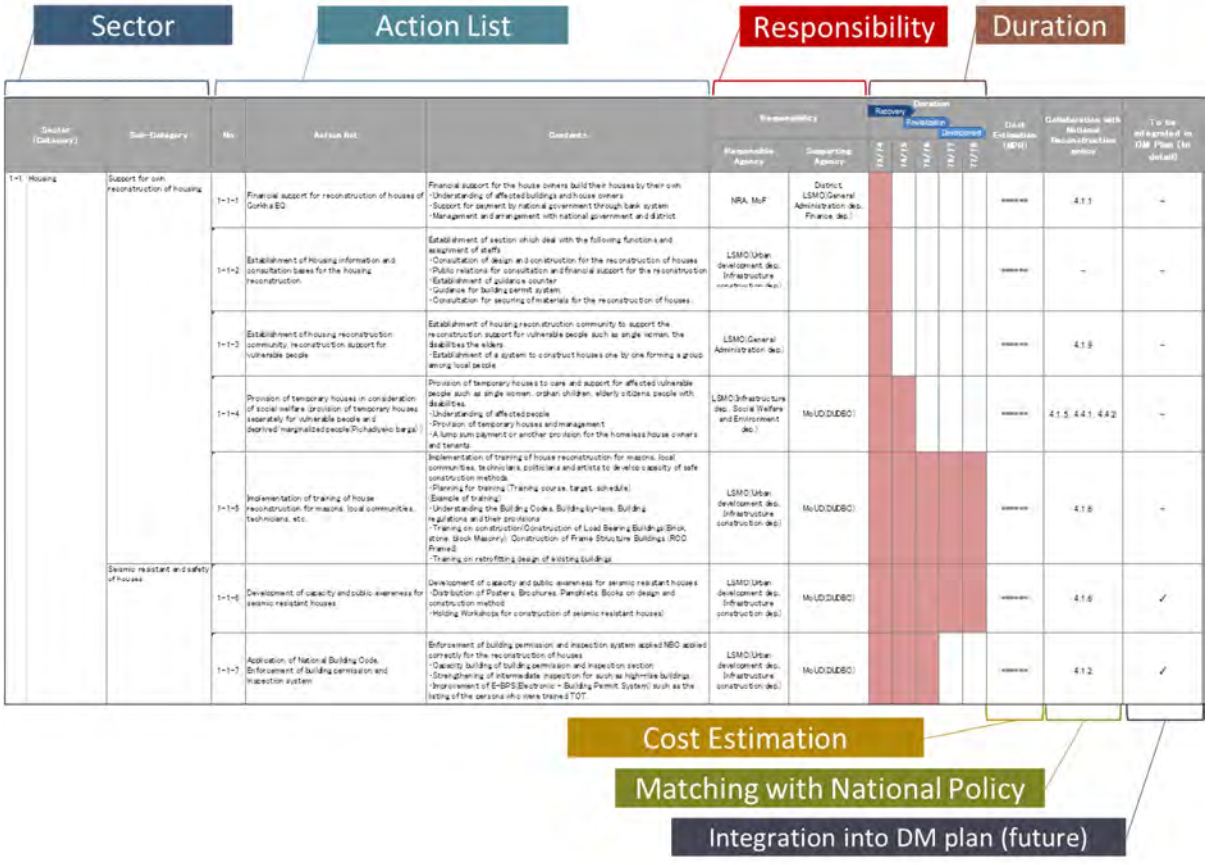
The action plan for BBB recovery and reconstruction of LSMC is arranged in a programme framework that emphasizes the implementation.

The action plan is indicated in the programmes by all reconstruction related agencies, considering the sustainability aspect, participative and strong commitment to promote actions that needs to be prioritized.

The action plan is prepared in the form of tables to make it more concise and easily understood at the time of implementation, monitoring and evaluation. This plan is divided into each vision.

1-2. Framework

Framework of Action plan is shown as follows. The action plan is indicated in the detailed contents of actions, duration (schedule), responsibilities, cost estimation, etc.



Framework of Action plan

CHAPTER 2.
ACTION PLAN

Sector (Category)	Sub-Category	No	Action list	Contents	Responsibility		Duration (Recovery / Revitalizatio / Developmen)					Cost Estimation (NPR (Million))	Collaboration with National Reconstruction policy (Strategy)	To be integrated in DM Plan (to detail)
					Responsible Agency	Supporting Agency	73/74	74/75	75/76	76/77	77/78			
1. Revitalization and Improvement of Livelihood														
1-1 Housing	Support for own reconstruction of housing	1-1-1	Financial support for the reconstruction of houses damaged by the Gorkha EQ	Financial support for the house owners building their houses by their own power ・Understanding of affected buildings and house owners ・Support for payment by the national government through the bank system ・Management and arrangement with national government and districts	NRA, MoF	District, LSMC(General Administration dep., Finance dep.)						6691.0	6.1.1	–
		1-1-2	Establishment of housing information and consultation bases for the housing reconstruction	Establishment of a section which deals with the following functions and assignment of staff ・Consultation of design and construction for the reconstruction of houses ・Public relations for consultation and financial support for the reconstruction ・Establishment of guidance counter ・Guidance for the building permit system ・Consultation for the securing of materials for the reconstruction of houses	LSMC(Urban development dep., Infrastructure construction dep.)							5.0	6.1.4	–
		1-1-3	Establishment of housing reconstruction communities, reconstruction support for vulnerable people	Establishment of housing reconstruction communities to support the reconstruction support for vulnerable people such as single women, those with disabilities and the elderly. ・Establishment of a system to construct houses one by one by forming a group among local people.	LSMC(General Administration dep.)							50.0	6.1.1	–
		1-1-4	Provision of temporary houses in consideration of social welfare (provision of temporary houses separately for vulnerable people and deprived/marginalized people(Pichadiyeko barga))	Provision of temporary houses to care for and support affected vulnerable people such as single women, orphaned children, elderly. citizens, and people with disabilities. ・Understanding the affected people ・Provision of temporary houses and management. ・A lump sum payment or other provisions for the homeless house owners and tenants.	LSMC(Infrastructure dep., Social Welfare and Environment dep.)	MoUD(DUDBC)						100.0	6.1.7	–
		1-1-5	Implementation of training of house reconstruction for masons, local communities, technicians, etc.	Implementation of training of house reconstruction for masons, local communities, technicians, politicians and artists to develop the capacity of safe construction methods. ・Planning for training (training course, target, schedule). (Example of training) ・Understanding the building codes, building by-laws, building regulations and their provisions. ・Training on construction (construction of load bearing buildings (brick, stone, block masonry)), construction of frame structure buildings (RCC Framed). ・Training on the retrofitting design of existing buildings.	LSMC(Urban development dep., Infrastructure construction dep.)	MoUD(DUDBC)						10.0	6.1.4	–
	Seismic resistance and safety of houses	1-1-6	Development of capacity and public awareness for seismic resistant houses	Development of capacity and public awareness for seismic resistant houses. ・Distribution of posters, brochures, pamphlets, books on design and construction methods. ・Holding workshops for the construction of seismic resistant houses.	LSMC(Urban development dep., Infrastructure construction dep.)	MoUD(DUDBC)						2.0	6.1.4	✓
		1-1-7	Application of National Building Codes(NBC), enforcement of the building permission and inspection system	Enforcement of the building permission and inspection system applied to NBC correctly for the reconstruction of houses. ・Capacity development of the building permission and inspection section. ・Strengthening of intermediate inspection for such as high-rise buildings. ・Improvement of E-BPS(Electronic – Building Permit System) such as the listing of the persons who were trained TOT.	LSMC(Urban development dep., Infrastructure construction dep.)	MoUD(DUDBC)						3.0	6.1.2	✓
		1-1-8	Financial and technical support for seismic diagnosis, seismic resistant measures of houses, and the dispatch of experts for seismic diagnosis	Financial and technical support for seismic diagnosis, and seismic resistant measures of houses. ・Dispatch of experts, technicians for seismic diagnosis and checking houses.	LSMC(Finance dep., Urban development dep., Infrastructure construction dep.)	MoUD(DUDBC)						2.0	6.1.2, 6.1.3	✓
1-2 Livelihood	Support for the reconstruction of livelihood	1-2-1	Financial support for the livelihood reconstruction of victims	Financial support for the affected families, such as there is a death in the family, except the residential homes damaged by the earthquake.・Understanding of affected families ・Support for payment by the national government through the bank system ・Management and arrangement with the national government and district.	NRA, MoF	District, LSMC(General Administration dep., Finance dep.)						100.0	6.1.3	–
		1-2-2	Establishment of a livelihood help desk	Establishment of a livelihood help desk (consultation service) for livelihood reconstruction. ・Assignment of staff in charge (examples of services:) Support for Housing, Living Expenses, Agriculture, Industry, Labour, Health, Child Rearing and Mother's Milk, Volunteer, Administration	LSMC(General Administration dep.)							5.0	–	–

Sector (Category)	Sub-Category	No	Action list	Contents	Responsibility		Duration (Recovery / Revitalizatio / Developmen)					Cost Estimation (NPR (Million))	Collaboration with National Reconstruction policy (Strategy)	To be integrated in DM Plan (to detail)
					Responsible Agency	Supporting Agency	73/74	74/75	75/76	76/77	77/78			
		1-2-3	Dissemination of reconstruction information	Dissemination of reconstruction information ・Gathering and summarizing of reconstruction information. ・Dissemination of reconstruction information periodically by utilizing public information papers, websites, etc.	LSMC(General Administration dep.)							2.0	–	✓
1-3 Health, Medical and Social Welfare	Recovery and enhancement of medical, health care and social welfare services	1-3-1	Recovery for hospitals on the municipal level, health centres and health posts	Recovery for hospitals at the municipal level, health centres and health posts ・Damage investigation at each hospital, health centre and health post ・Consideration of priority for reconstruction ・Reconstruction of each hospital, health centre and health post ・Provision and ensuring of medicines, equipment and health professionals.	MoHP, MoUD(DUDBC)	LSMC(Social Welfare and Environment dep.)						100.0	6.1.7	✓
		1-3-2	Seismic diagnosis and seismic resistant measures of hospitals on the municipal level, health centres and health posts	Seismic diagnosis and seismic resistant measures of hospitals on the municipal level, health centres and health posts ・Dispatch of experts, or technicians for seismic diagnosis and checking hospitals. ・(If necessary) Seismic resistant measures and retrofitting or reconstruction shall be implemented. ・Fund assistance to promote the reconstruction of private hospitals. ・Establishment of a legal system in order to ensure seismic resistance of private hospitals.	MoHP, MoUD(DUDBC)	LSMC(Social Welfare and Environment dep.)						2.0	6.1.7	✓
		1-3-3	Establishment of a mental health care help desk for victims	Establishment of a mental health care help desk for victims. ・Establishment of mental health care system/group by health technician. (Assignment of staff in charge, support/visit and care for victims)	LSMC(Social Welfare and Environment dep.)							2.0	–	–
		1-3-4	Formulation of a plan for vulnerable people	Formulation of the plan for vulnerable people. ・Information collection of vulnerable people such as single women, orphaned children, elderly citizens, people with disabilities (Name, Address, Condition) ・Establishment of a support system (establishment of assistant group, etc.). ・Consideration of support for evacuation (evacuation guidance, safety confirmation) and support in shelter (preferential provision of goods).	LSMC(Social Welfare and Environment dep.)	MoHP						20.0	6.3.1, 6.3.3	–
1-4 Waste Management	Disaster waste treatment measures	1-4-1	Disposal of disaster waste and debris properly (implementation of collection and disposal)	Disposal of disaster waste and debris: ・Investigation of amount and location of disaster waste and debris ・Contract with the providers for waste and debris management ・Disposal of disaster waste and debris ・Establishment of community groups for the support of building demolition especially for vulnerable people such as single women, those with disabilities and the elderly.	LSMC(Social Welfare and Environment dep.)	MoHP						14.0	–	–
		1-4-2	Formulation of a disaster waste management plan	Formulation of a disaster waste management plan for future earthquakes. (Example of contents) ・Establishment of a disaster waste management system. ・Estimation of the amount of debris. ・Promotion of recycling (development of recycle centres, etc.) ・Ensuring of temporary stock place for disaster waste.	LSMC(Social Welfare and Environment dep.)	MoHP						5.0	–	✓
		1-4-3	Ensuring of temporary stock places for disaster waste	Ensuring of temporary stock places for disaster waste in advance so that the space can be effectively utilized. ・Investigation of open spaces and consideration of candidates for temporary stock place for disaster waste ・Development of the spaces can be effectively utilized for temporary stock place	LSMC(Social Welfare and Environment dep.)	MoHP						2.0	–	✓
1-5 Education	Recovery and seismic resistance for schools	1-5-1	Recovery and reconstruction of schools	Recovery and reconstruction of schools ・Damage investigation of each school ・Consideration of priority for reconstruction ・Reconstruction of schools	MoE, MoUD(DUDBC)	LSMC(Social Welfare and Environment dep.)						100.0	6.1.7	–
		1-5-2	Seismic diagnosis and seismic resistant measures of schools	Seismic diagnosis and seismic resistant measures of schools ・Dispatch of experts or technicians for seismic diagnosis and checking schools ・(If necessary) Seismic resistant measures, retrofitting and reconstruction shall be implemented. ・Fund assistance to promote the reconstruction for private schools. ・Establishment of a legal system in order to ensure the seismic resistance of private schools.	MoE, MoUD(DUDBC)	LSMC(Social Welfare and Environment dep.)						3.0	6.1.7	✓
	Enhancement of school education	1-5-3	Education for disaster management	Education for disaster management in the school curriculum. ・Consideration of school curriculum for the disaster management and the experience of the Gorkha EQ. (Example contents of curriculum) ・Learning about the disaster, mechanisms, disaster management. ・Learning about ensuring safety when a disaster happens. ・Sharing the experience of the Gorkha EQ. ・Implementation of evacuation drills.	MoE	LSMC(Social Welfare and Environment dep.)						4.0	6.1.4	✓

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					Responsible Agency	Supporting Agency	73/74	74/75	75/76	76/77	77/78			
	Care for students	1-5-4	Training for teachers	Training for teachers regarding disaster management in order to teach students and ensure the safety of students. ・Establishment of a school disaster management committee. ・Consideration of training for teachers (Example contents of training). ・Workshop on the planning and practices of disaster management education. ・Workshop on sharing experiences of the Gorkha EQ. ・Training on mental health care, treatment method for injury, etc.	MoE	LSMC(Social Welfare and Environment dep.)						3.0	-	-
		1-5-5	Establishment of a mental care counselling room	Establishment of a mental care counselling room for the students affected by the Gorkha EQ in order to mitigate the mental hurt of the children. ・Establishment of a mental care counselling function in the health room in schools ・Training for school nurse・Dispatch of health technicians to schools.	MoE, MoHP	LSMC(Social Welfare and Environment dep.)						2.0	-	-
2. Urban Planning with Sustainable Development for a Safer and Secure City														
2-1 Public Building	Recovery, seismic resistance and safety of public buildings	2-1-1	Immediate damage investigation of public buildings	Public buildings should be kept to their function as much as possible even after a disaster in order to conduct recovery and reconstruction activities smoothly, receive evacuees, and provide public services continuously. ・Conduct building damage investigation of public buildings. ・Classify the damage level: No-damage, Safe, Usable with temporary repair, Unusable (danger)	MoUD(DUDBC)	LSMC(Urban development dep., Infrastructure construction dep.)						6.0	6.1.6	✓
		2-1-2	Emergency repair of damaged public buildings to secure safety and the construction of temporary public buildings for the operation of emergency relief, medical treatment, and evacuation of life under safe conditions	In order to conduct precise recovery and reconstruction activities, emergency repair should be done for public buildings to ensure safety and/or temporary facilities should be prepared. ・Based on the building investigation, usable buildings should be used as much as possible. ・Temporary repair should be done for buildings which received moderate damage. ・In the case of a massive disaster, temporary facilities to provide public services should be prepared (tent or any temporary structure). ・For this purpose, open spaces with disaster management functions should be distributed in urbanized areas.	MoUD(DUDBC)	LSMC(Urban development dep., Infrastructure construction dep.)						8.0	6.2.1	-
		2-1-3	Damage diagnosis of all public buildings and the reinforcement of public buildings (taking care of historical importance in case a public building is located in a historical area)	Towards the revitalization of the affected area, a detailed damage diagnosis should be done and it will be the basis of rebuilding of public buildings. ・Conduct detailed building diagnosis for public buildings. ・Consider methods for rebuilding and reinforcement. ・Consider the historical and cultural importance of the building or area where a public building is located.	MoUD(DUDBC)	LSMC(Urban development dep., Infrastructure construction dep.)						3.0	-	✓
		2-1-4	Prioritization and examination of possible unification and rearrangement of public buildings to rebuild and repair public buildings	Before starting construction work, the public buildings should be prioritized. It is also necessary to consider the unification and rearrangement of functions in order to conduct efficient public services. ・Prioritization of public building for reconstruction. ・Examination of Unification and rearrangement of public buildings. ・Consideration of the historical/cultural importance of the area.	LSMC(Urban development dep., Infrastructure construction dep.)	MoUD(DUDBC)						4.0	6.1.6	✓
		2-1-5	Recovery and reconstruction of aseismic public buildings on the basis of the National Building Code (NBC)	Based on the prioritization, reconstruction work should be accelerated and new buildings should follow the NBC to secure seismic resistance. ・Prioritized public building should be rebuilt or repaired based on the NBC. ・Consideration of the historical/cultural importance of the area for new building construction.	MoUD(DUDBC)	LSMC(Urban development dep., Infrastructure construction dep.)						3.0	6.1.6	✓
		2-1-6	Capacity building and the establishment of a permit process for new public building construction in order to enforce the NBC and land use zoning, as a leading municipality	Building permission process should be done properly in the municipality, then secure NBC and zoning regulation to make the municipal area resilient. ・Establishment of clear procedure for building permission based on NBC and land use zoning. ・Capacity building: Education to municipal officers who take responsible for building permission ・As Lalitpur has been a leading municipality for the building permission, diffusion of the establishment of the permission process is expected.	LSMC(Urban development dep., Infrastructure construction dep.)	MoUD(DUDBC)						2.0	-	✓

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					Responsible Agency	Supporting Agency	73/74	74/75	75/76	76/77	77/78			
		2-1-7	Promotion of aseismic public buildings by unification and rearrangement of public buildings, including construction of common building for government offices, as a part of highly-urbanized area in the Kathmandu Valley	For aseismic building construction, it is effective that some of the public buildings are unified and rearranged. Common buildings for government offices should secure its seismic resistance. ・Based on the examination of possible unification and rearrangement, common buildings for government offices should be built. ・Arrangement of related government agencies and organizations. ・As Lalitpur composes their urbanized area with Kathmandu Metropolitan City, joint public buildings are recommended for more effective public services.	LSMC(Urban development dep., Infrastructure construction dep.)	MoUD(DUDBC)						5.0	6.1.6	✓
	Development of Disaster Management Park	2-1-8	Using open spaces (parks) for the operation of emergency relief activities and providing public services	After a huge disaster, public buildings might be damaged and be in danger. Open spaces can be places where public services are provided and emergency relief activities are operated. ・Designation of open spaces for emergency relief, medical treatment, evacuation, etc. ・Build temporary public facilities to provide public services. ・Suburban area still has many open land areas (farms, forest, etc.). Effective usage of such land should be considered.	LSMC(Urban development dep., Infrastructure construction dep.)	MoUD(KVDA)						10.0	6.1.7	✓
		2-1-9	Designation of open spaces for reconstruction operation and long-term evacuation	Based on the open space policies by KVDA, distribution and usage of open spaces are examined and designated in the municipal area. ・Examination of the location and usage of open spaces, which have supplemental function of public services. ・Designation of open spaces in the unraised area ・As the historical urbanized areas are high-dense, evacuation routes should be also considered.	LSMC(Urban development dep., Infrastructure construction dep.)	MoUD(KVDA)						5.0	6.1.7	-
		2-1-10	Development of open spaces as evacuation sites and disaster management bases	For the preparation of another disaster or second disaster, open spaces should be developed as disaster management bases and evacuation sites. ・Examination of the function of each open space and prioritization for development ・Obtain consensus from neighbours ・Develop open spaces (including space for stockpiling, evacuation routes, etc.) ・Understanding of parks and open spaces to be utilized as temporary heliports. ・Designation of temporary heliports. ・Development of temporary heliports (securing enough spaces). ・Dissemination of evacuation sites to residents ・For future urbanized areas, new open spaces should be secured in the process of urbanization.	LSMC(Urban development dep., Infrastructure construction dep.)	MoUD(KVDA)						20.0	6.1.7	✓
		2-1-11	Promotion of the construction of evacuation sites and disaster management bases, and the establishment of an institutional system for implementation, operation and management	For the development phase, continuous efforts are required to develop open spaces. At the same time, institutional, operation and management systems also need to be improved. ・Prioritization for the implementation of open spaces, and the implementation (construction or improvement of existing open spaces) ・Establishment of an institutional system on the national level as well asthe municipal level for implementation. ・Establishment of an operation and management system on the municipal level as well as the community level, as most of the open spaces are expected to be managed by community organizations. A supporting system for the community organization is also needed. ・Revision of the open space network following urban expansion	LSMC(Urban development dep., Infrastructure construction dep.)	MoUD(KVDA)						10.0	-	✓
		2-1-12	Establishment of a legal system to secure open spaces as evacuation sites and disaster management bases in newly developing areas (land pooling project, etc.)	Urbanized areas are expected to be enlarged. To prepare for the next disaster, it is necessary to secure open spaces in a newly developed urban area. ・Establishment of a legal system to secure open spaces when an urban area is planned, such as land pooling scheme, etc.	LSMC(Urban development dep., Infrastructure construction dep.)	MoUD(KVDA)						20.0	-	✓
2-2 Infrastructure	Recovery, seismic resistance and safety of road and bridges	2-2-1	Recovery of roads and bridges to accelerate the recovery process for regional and municipal areas	After a disaster, transportation is important for emergency relief activities and transport goods. Temporary recovery of major roads and bridges should be done if roads and bridges get damaged. ・Emergency damage investigation on major roads ・Temporary recovery measures should be taken for nationally and regionally important roads. (Such as the Ring Road, and radial roads towards suburban cities) ・Minimum recovery, including debris removal, should be done for local roads to secure people's lives.	LSMC(Urban development dep., Infrastructure construction dep.)	MoPIT, MoUD, MoFALD						10.0	6.1.7	-
		2-2-2	Improvement of earthquake resistant roads for smooth transportation and evacuation, especially for designated emergency transportation roads and evacuation routes	Towards reconstruction and even further development, repairing roads with seismic resistance is required. It is also necessary to prepare for a second and other disasters. Especially designated emergency transportation roads should be repaired as a priority. ・Designation of a traffic control road network and emergency transportation road and improvement of designated roads and bridges. ・Detailed survey for the structure of bridges and reinforcement or reconstruction based on the survey result ・Promotion of road widening. Ring Road should be improved as a priority as it is an important road for the whole of Kathmandu Valley. ・Seismic resistance of buildings along designated evacuation routes.	LSMC(Urban development dep., Infrastructure construction dep.)	MoPIT, MoUD, MoFALD						10.0	6.1.7	✓

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					Responsible Agency	Supporting Agency	73/74	74/75	75/76	76/77	77/78			
		2-2-3	Continues efforts for improvement and construction of roads, including cooperation with the nation, Kathmandu Valley, districts, and adjacent municipalities/VDCs	Recovery and reconstruction of roads and bridges should be done continuously. As a road connects adjacent areas, the nation, Kathmandu Valley, district and municipality should collaborate and effective improvement is required. ・Review of an urban transport master plan and continuous promotion of improvement of roads and bridges. ・Cooperation with road and bridge development in different administrative levels. ・Securing the connectivity of roads by sharing information between different administrative organizations. A committee should be held for this purpose as needed. ・Construction of road and bridges on the municipal level for smooth emergency response, evacuation and transportation	LSMC(Urban development dep., Infrastructure construction dep.)	MoPIT, MoUD, MoFALD						10.0	6.1.7	✓
		2-2-4	Promotion of road construction together with urban development projects, such as land pooling	Road development should be done with urban development projects in surrounding areas. It is expected that some land pooling schemes would be done following urban expansion. Road construction should be done with the land pooling project by securing seismic resistance. ・Construction of seismic resistant roads when land pooling or any other urban development project would be done. ・When a road is constructed with an urban development project, it is important to secure connectivity with the existing urbanized areas for regional reconstruction and preparation of future disaster.	LSMC(Urban development dep., Infrastructure construction dep.)	MoPIT, MoUD, MoFALD						10.0	6.1.7	✓
		2-2-5	Examination of road standards for municipal roads in consideration of the characteristics of the municipality	In order to improve roads, the standards of road construction should be revised to secure seismic resistance and disaster prevention function. For the pilot municipality, the road standards should be based on the characteristic of the municipality. A long-term view is required and it should be done with the urban transport master plan of Kathmandu Valley. ・Review of the existing road standards and urban transport master plan ・Examination of the minimum requirements which should be suited for the municipality ・Arrangement of the nation and districts if a road is nationally or regionally important	LSMC(Urban development dep., Infrastructure construction dep.)	MoPIT, MoUD, MoFALD						1.0	–	✓
	Recovery, seismic resistance and safety of lifelines	2-2-6	Early recovery of supply lines and other related facilities and sanitation management	To accelerate the recovery and reconstruction process, it is required to repair supply lines and the related facilities of lifelines. ・Water and electricity: Recovery of supply lines and related facilities ・Sewage: recovery of the sewage treatment system and sanitation management	KUKL, NEA	LSMC(Urban development dep., Infrastructure construction dep.)						10.0	6.1.7	–
		2-2-7	Taking seismic resistant measures for supply lines and other related facilities, and improve their supply systems	After an emergency response from the disaster, upgrading of lifelines would be started. At that time, improvement of the supply system for the future should be considered. ・Seismic resistance of the supply system of water and electricity and improvement of the system ・Examination of the usage of solar energy, especially for public buildings and disaster management park ・Improvement of drainage, sewage, and sanitation systems	KUKL, NEA	LSMC(Urban development dep., Infrastructure construction dep.)						10.0	6.1.7	✓
		2-2-8	Development of sustainable stockpiling of water and fuel for emergency use stored in earthquake resistant and safe facilities, and consideration of their distribution and supply system	In order to for prepare second or other disasters, stockpiling is important for emergency situations. Water should be stored in a sanitary manner, and liquefied petroleum gas and petrol should be stored under safe conditions. Storage should be in a disaster management park. ・Examination of the quantity of drinkable water and fuels at a storage. Population covered by an emergency management park should be considered. ・Stockpiling of drinkable water in a sanitary manner ・Fuel (liquefied petroleum gas for cooking and petrol for generators and emergency transportation) should be stored in a safe condition.	KUKL, LSMC(Urban development dep., Infrastructure construction dep.)							10.0	6.1.7	✓
		2-2-9	Improvement of the sanitation management system	Introducing a clean sewage treatment system by considering sanitation which can be a problem in emergency situations. ・Promotion of a sewage treatment system. ・Temporary toilet (such as manhole toilet) should be installed in an emergency disaster management park for sanitation management.	KUKL	LSMC(Urban development dep., Infrastructure construction dep.)						20.0	–	✓
		2-2-10	Continuous development of the expansion of the supplying area and upgrading of existing facilities to be aseismic resistance and with a stable water, sewage, and electricity supply system	Expansion of the service area of lifelines with a seismic resistant system to secure a stable supply system even in emergency situations. ・Improvement of the supply system of lifelines and expansion of the service areas. ・When an urbanized area is enlarged, a stable supply system should be installed by considering future disasters.	Related lifeline organizations	LSMC(Urban development dep., Infrastructure construction dep.)						15.0	–	✓

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					Responsible Agency	Supporting Agency	73/74	74/75	75/76	76/77	77/78			
2-3 Cultural Heritage	Recovery, seismic resistance and safety of cultural heritage sites	2-3-1	Debris removal and temporary restoration of the cultural heritage sites while not increase the disaster damages	Cultural heritages and monuments which are found especially in the historical areas in the municipal area got heavily damaged. As those monuments were built adjacent to the urbanized area with residences and commercial buildings, it affected the city life for the public. Debris removal should be done first for the smooth operation of emergency response. Emergency repair should be done not to increase the damages. ・Debris removal should be quickly done for buildings which were severely damaged ・Emergency damage investigation for the all heritage buildings ・Emergency repair should be done for buildings which has a high risk for collapse so as not to spread the damages, and a measure for the public to be kept away from the buildings should be taken.	LSMC(Infrastructure construction dep.)							5.0	–	–
		2-3-2	Prioritizing recovery through the judgement of urgency from seismic diagnosis and historical importance	Reconstruction of the cultural heritage sites is not directly related to people's life, therefore long-term vision is required. On the other hand, repairing to prevent secondary disasters and to make a symbol of reconstruction are required. For this purpose, a detailed damage survey, seismic diagnosis, historical and cultural importance of the heritage should be clarified and prioritization should be done for reconstruction. ・Detailed damage survey and confirming condition of emergency repair ・Seismic diagnosis ・Survey for cultural and historical importance ・Prioritizing for reconstruction and making reconstruction plans for heritage sites	LSMC(Infrastructure construction dep.)	MoTCA						1.0	6.2.2	–
		2-3-3	Recovery of the prioritized cultural heritage sites in consideration of seismic resistance and their original value	Based on the priority set by the surveys, a reconstruction plan should be conducted. The reconstruction should improve seismic resistance and not spoil the historical and cultural values. ・Reconstruction of heritage based on the priority ・Examination of the method of reconstruction to secure seismic resistance not to spoil the original value. ・In areas where many historical buildings are concentrated, losses of the cultural cityscape are concerned as urbanization is rapidly seen. It is also necessary to examine in order to set priority areas to preserve the historical monuments.	LSMC(Infrastructure construction dep.)	MoTCA						50.0	6.2.4, 6.2.5	–
		2-3-4	Long-term vision for reinforcement: (Re)evaluation of the value of historical heritage sites and vulnerability of heritage monuments	In the development phase, a fresh evaluation would be recommended to be done. The evaluation should contain the importance of the heritage sites and structural vulnerability. In a long-term vision, inventory should be prepared for a sustainable plan to preserve heritage and a continuous effort is required. ・Evaluation of historical value and structural vulnerability of heritage sites ・Preparation of the inventory of the heritage sites for basic documents for long-term restoration and preservation measures.	LSMC(Infrastructure construction dep.)	MoTCA						5.0	6.2.5	✓
		2-3-5	Promotion of the restoration of the important cultural heritage sites to improve seismic resistance and keep their historical value	Based on the evaluation, restoration and preservation should be conducted. Seismic resistance should be improved with keeping the original value of the heritage sites. ・Restoration of the monuments based on the evaluation ・Evaluation of technical measures to improve seismic resistance with keeping the historical value. ・Areal development should keep the heritage sites and not spoil the historical cityscape.	LSMC(Infrastructure construction dep.)	MoTCA						2.0	6.2.5	✓
2-4 Land Use Restriction	Promotion of land use restriction	2-4-1	Designation of hazardous areas	Areas where severe damage by the disaster occurred should be designated and necessary measures should be taken to prevent secondary disasters. In the municipal areas, historical and new buildings are intermixed and building damage can be scattered. If the building damage is concentrated, hazardous areas should be designated. ・Designation of hazardous areas ・Prior emergency response should be done for those designated areas ・No-entry measures should be taken as needed	LSMC(Urban development dep., Infrastructure construction dep.)	MoUD(KVDA)						5.0	6.5.1	✓
		2-4-2	Revision of the land use zoning and building regulations based on geomorphology map, hazard assessment, and actual building damage (risk sensitive land use)	Based on geomorphological maps and hazard analysis (if available), land use and building regulation should be revised to make the city resilient. Actual damage situations can be used for the revision as well. It is aimed to make the city resilient by conducting smooth reconstruction and improving the seismic resistance of buildings and the city area. ・Analysis and comparison of geomorphological maps, hazard analysis and actual damage ・Revision of land use and building regulations ・Reconstruction based on the revision	LSMC(Urban development dep., Infrastructure construction dep.)	MoUD(KVDA)						5.0	6.5.1, 6.6.1	✓
		2-4-3	Considering the location of open spaces and public buildings (administrative facilities, schools, and hospitals), which can be utilized as emergency response bases, and emergency medical treatment facilities, and evacuation sites in safer and accessible areas	For the smooth reconstruction from a disaster, the distribution and location of public facilities should be reconsidered for providing effective public services. It is also useful to prevent secondary disasters. Open spaces, schools, hospitals and government buildings should be examined. ・Examination and designation of the location of open spaces for effective evacuation and emergency relief operation. ・Examination of the location of public buildings in order to provide public services under a disaster situation. ・A supplementary road network should be also examined to connect each public facility for the more effective usage of the facilities.	LSMC(Urban development dep., Infrastructure construction dep.)	MoUD(KVDA)						5.0	–	✓

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					Responsible Agency	Supporting Agency	73/74	74/75	75/76	76/77	77/78			
		2-4-4	Institutionalization of the land use zoning and building regulation and appropriate enforcement by municipality, as a leading municipality	In order to make a resilient city, land use zoning and building regulations should be enforced. For this purpose, necessary measures should be taken. Lalitpur has been a leading municipality in the building regulation; they should be a model of the enforcement. ・Enforcement of building approval process in the municipality ・In the process, land use and building regulations should be confirmed. Support by DUDBC should be considered if needed. ・Promotion to other municipalities as a leading municipality	LSMC(Urban development dep., Infrastructure construction dep.)	MoUD(KVDA, DUDBC)						10.0	6.6.1	✓
		2-4-5	Promotion of the land use zoning and urban development for the improvement of regional economies and create new industry to accelerate the development	By land use zoning, business districts can be promoted. It is important to conduct together with urban planning. By the promotion of business districts, the regional economy can be a leader and it would help employment and accelerate reconstruction. ・Designation of residential and business/industrial district and promotion ・Consistent with city planning ・Enforcement of building regulation by characteristics of the area	LSMC(Urban development dep., Infrastructure construction dep.)	MoUD(KVDA)						5.0	6.6.1	✓
2-5 Policy for Each Zone	Development of reconstruction promotion zone	2-5-1	Prior emergency relief operation for hazardous areas and areas which were severely damaged	Areas struck by huge damage and are vulnerable according to geomorphological maps and hazard analysis, prior recovery activities should be done to ensure the safety of the people. ・Identify areas with huge damage by conducting an emergency damage survey ・Identify areas which are vulnerable against a disaster by analysing geomorphological maps and hazard analysis ・Prior recovery and reconstruction measures should be taken to those identifying areas. ・Pay attention to the geological condition, especially in those municipal areas which have steep slopes ・Pay attention to the areas where historical buildings are found as those buildings do not have earthquake resistance	LSMC(Urban development dep., Infrastructure construction dep.)	MoUD(KVDA)						5.0	6.6.1	✓
		2-5-2	Designation of disaster stricken areas where intensive measures should be focused on urban planning, and high-dense areas and vulnerable areas which need disaster management for second disasters and other possible disasters	Hazardous areas, highly-dense areas, and vulnerable areas should be designated for concentrated reconstruction measures. ・Designation of hazardous areas for prior recovery measures in order to prevent the spread of damage ・Designation of highly-dense areas for preventing secondary damage and to secure safe evacuation ・Designation of vulnerable areas such as steep slopes or soft soils for preventing secondary disasters. ・Pay attention to slopes as the municipal area has some steep slopes	LSMC(Urban development dep., Infrastructure construction dep.)	MoUD(KVDA)						2.0	6.6.1	✓
		2-5-3	Revision of land use planning for those designated areas and taking actions as priority	For those designated areas, special attention should be given and land use zoning and building regulation should consider the characteristics of the areas to create a resilient city. ・Designation and enforcement of land use zoning and building regulations fitting to the characteristics of the designated areas	LSMC(Urban development dep., Infrastructure construction dep.)	MoUD(KVDA)						5.0	6.6.1	✓
		2-5-4	Overall approach of urban planning for the designated area in order to make the municipality resilient	It is recommended to have a long-term perspective of urban planning approach, especially for the designated areas. ・Comprehensive approaches are recommended with land use zoning, building regulations, infrastructure development, and so on. ・Restriction of construction in the case that an area is highly vulnerable for a disaster.	LSMC(Urban development dep., Infrastructure construction dep.)	MoUD(KVDA)						3.0	6.6.1	✓
3. Promotion and Improvement of Industry														
3-1 Employment	Support for employment	3-1-1	Support for the employment of victims who have lost work (financial support)	Financial support for the victims who have lost work ・Understanding of the victims who have lost work ・Support for payment by national government through the bank system ・Management and arrangement with national government and district	NRA, MoF	District, LSMC(General Administration dep., Finance dep.)						20.0	6.4.2	-
		3-1-2	Support for employment, employment training in consideration of vulnerable people and deprived/marginalized people (Pichadiyeko barga)	Support for employment, employment training in consideration of vulnerable people and deprived/marginalized people (Pichadiyeko barga) ・Special allowance for social security to such as the single women, poor, those with disabilities and elderly citizens ・Implementation of skill training programmes for employment	NRA	District, LSMC(Social Welfare and Environment dep.)						10.0	6.3.1, 6.3.2	-
		3-1-3	Support and introduction of cash or food for work	Support and introduction of cash or food for work for livelihood reconstruction ・Operation of cash or food for work programme ・Work for reconstruction such as debris disposal and reconstruction of buildings, etc.	NRA	District, LSMC(Social Welfare and Environment dep.)						10.0	6.4.1	-
		3-1-4	Human resource development for reconstruction and arrangement of employment opportunities for reconstruction work	Human resource development for reconstruction ・Establishment of a training centre ・Implementation of skill training programmes for employment ・Establishment of an employment centre and introduction of employment opportunities for reconstruction work	NRA	District, LSMC(Social Welfare and Environment dep.)						20.0	6.4.1, 6.4.2	-
3-2 Tourism	Support for the recovery and reconstruction of tourism	3-2-1	Dissemination of reconstruction information for tourism	Dissemination of reconstruction information ・Gathering and summarizing of reconstruction information for tourism facilities such as the reconstruction of heritage sites ・Dissemination of reconstruction information periodically by utilizing websites, etc.	LSMC(Infrastructure const dep.)	LSMC(Urban develop dep.)						1.0	6.4.3	-

Sector (Category)	Sub-Category	No	Action list	Contents	Responsibility		Duration (Recovery / Revitalizatio / Developmen)					Cost Estimation (NPR (Million))	Collaboration with National Reconstruction policy (Strategy)	To be integrated in DM Plan (to detail)
					Responsible Agency	Supporting Agency	73/74	74/75	75/76	76/77	77/78			
	Disaster management measures for tourist sites	3-2-2	Designation and development of evacuation sites adjacent to tourist sites	Designation and development of evacuation sites to ensure the safety of tourists ・Investigation of open spaces and facilities available to be utilized as evacuation sites adjacent to tourist sites ・Designation and development of evacuation sites such as the development of stockpile warehouses	LSMC(Infrastructure const dep.)	LSMC(Urban develop dep.)						20.0	6.4.3	✓
		3-2-3	Creation and distribution of guide maps and sign boards indicating emergency response actions and evacuation sites	Creation and distribution of guide maps and sign boards ・Consideration of the contents of the guide maps and sign boards (evacuation sites, what tourists should do when disasters occur) ・Creation and installation of multilingual guide maps and sign boards indicating evacuation sites ・Distribution of guide maps	LSMC(Infrastructure const dep.)	LSMC(Urban develop dep.), MoTCA						2.0	6.4.3	✓
		3-2-4	Establishment of a guidance system for tourists in the event of a disaster	Establishment of a guidance system for tourists in the event of a disaster. ・Establishment of a guidance system (section in charge) to evacuate tourists to evacuation sites safely ・Consideration of safety confirmation of tourists (creation of format for gathering tourist information) ・Implementation of exercises for the evacuation of tourists periodically	LSMC(Infrastructure const dep.)	LSMC(Urban develop dep.), MoTCA						2.0	6.4.3	✓
		3-2-5	Enhancement of stockpiles for tourists	Enhancement of stockpiles not only for residents but also including tourists. ・Estimation of number of tourists and estimation of the necessary amount of stockpiles for tourists ・Development of stockpile warehouses for tourists ・Procurement of stockpiles for tourists	LSMC(Infrastructure const dep.)	LSMC(Urban develop dep.), MoTCA						10.0	6.4.3	✓
3-3 Industry	Support for Agriculture	3-3-1	Recovery support for agriculture	Recovery support for agriculture ・Arrangement and provision of the seeds, fertilizers and other agricultural inputs to farmers at a cheaper price.	District							15.0	6.4.2	–
		3-3-2	Recovery and development of irrigation facilities	Recovery and development of irrigation facilities. ・Damage investigation of irrigation facilities. ・Recovery of damaged irrigation facilities. ・Maintenance, retrofitting and improvement of irrigation facilities .	District							2.0	6.1.7	–
	Support for Commerce and Industry	3-3-3	Recovery support for stores, shops and cottage industries	Recovery support for private enterprises ・Provision of financial support(loan) for private enterprises such as cottage industries to repair and reconstruct the stores, shops and warehouses and to reopen their industries and businesses.	NRA, MoF	District, LSMC(General Administration dep., Finance dep.)						15.0	6.4.2	–
		3-3-4	Support for expanding sales channels, trade	Support for expanding sales channels, trade ・Consultation and Promotion of cottage, small and medium industries in the municipality area.	District, LSMC(Social Welfare and Environment dep.)							15.0	6.4.2, 6.5.2	–
4. Development of Resilient Disaster Management City														
4-1 Resilient Disaster Management System	Establishment of a resilient disaster management system	4-1-1	Formulation of disaster management plan	Formulation of a disaster management plan ・Policy making based on the risk assessment ・Consideration of countermeasures for mitigation/preparedness, emergency response and recovery/reconstruction phases ・Legalization and budget allocation for implementation	LSMC(Urban development dep.)	MoFALD						2.0	6.5.4	✓
		4-1-2	Accumulation of disaster data for the Gorkha EQ and historical disasters	Accumulation of disaster data ・Accumulation and database compilation of historical disaster data including the Gorkha EQ ・Studying the Gorkha EQ, the past disasters and disaster trends.	LSMC(Urban development dep.)	MoFALD						2.0	6.5.4	✓
		4-1-3	Enhancement of disaster management organization	Enhancement of the disaster management section on the municipal level. ・Organizational restructuring including the promotion to the Division "Disaster Management Division" divided into several sections and allocated tasks. ・Increasing the number of staff,and the employment of experts for disaster management	LSMC(General Administration dep., Urban development dep.)	MoFALD						5.0	6.5.4	✓
		4-1-4	Establishment and enhancement of ward level disaster management organization	Establishment of disaster management section on the ward level ・Organizational restructuring including the establishment of a disaster management section on the ward level ・Determination of roles and responsibilities	LSMC(General Administration dep., Urban development dep.)	MoFALD						5.0	6.5.4	✓
		4-1-5	Human resource development for disaster management administration	Implementation of training for municipal staff in order to develop the human resources needed for disaster management administration. ・Consideration of training programmes for each level. ・Conducting the workshops and training.	LSMC(General Administration dep., Urban development dep.)	MoFALD						2.0	6.5.4	✓

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					Responsible Agency	Supporting Agency	73/74	74/75	75/76	76/77	77/78			
		4-1-6	Formulation and dissemination of evacuation plan	Formulation and dissemination of an evacuation plan. ・Designation of evacuation sites/routes and dissemination. ・How to lead others to the evacuation site. ・How to operate the evacuation site.	LSMC(Urban development dep.)	MoFALD						5.0	6.5.4	✓
		4-1-7	Understanding and dissemination of risk areas	To understand the risk area of the municipality, and dissemination to the residents. ・Hazard and risk assessment and understanding the risk areas. ・Dissemination to the residents such as creation of risk maps and disaster management maps.	LSMC(Urban development dep.)	MoFALD						2.0	6.5.4	✓
	Promotion of disaster management cooperation system	4-1-8	Strengthening cooperation with other municipalities, the establishment of a support and acceptance system, and conclusion of agreements	Conclusion of agreements for strengthening cooperation with other municipalities and the establishment of a support and acceptance system. ・Coordination with MoFALD for the cooperation system among municipalities.	LSMC(General Administration dep., Urban development dep.), MoFALD							20.0	6.5.4	✓
		4-1-9	Strengthening cooperation with other agencies (Police, Army, Red Cross), the establishment of a support and acceptance system, and conclusion of agreements	Conclusion of agreements for strengthening cooperation with other related agencies for emergency response and the establishment of a support and acceptance system. ・Coordination with Police, Army, Red Cross, etc.	LSMC(Urban development dep., Social Welfare and Environment dep.), MoFALD	MoFALD, MoHA, Nepal Army, Red Cross						0.5	6.5.4	✓
		4-1-10	Strengthening cooperation with private enterprises, and conclusion of agreements	Conclusion of agreements for strengthening cooperation with private enterprises, (Examples of agreements) ・Procurement of food, medicines, materials and equipment, etc.	LSMC(General Administration dep., Social Welfare and Environment dep.)	LSMC(Urban development dep.)						2.0	6.5.4	✓
		4-1-11	Support for the formulation of BCP for private enterprises	Support for the formulation of BCP (Business Continuity Plan) for securing the safety of private enterprises and industries (Examples of contents； Risk assessment, policy making (selection of important businesses), how to recover quickly and operate in the event of disaster, prevention and preparedness, etc.)	LSMC(General Administration dep., Social Welfare and Environment dep.)	LSMC(Urban development dep.)						2.0	6.5.4	✓
		4-1-12	Development of an acceptance system for volunteers	In order to manage the volunteers, a development of acceptance system should be created as follows. ・Establishment of section or assignment of staff in charge of volunteer activities. ・Establishment of a contact centre for volunteers.	LSMC(General Administration dep., Social Welfare and Environment dep.)	MoFALD						1.0	6.5.4	✓
4-2 Disaster Management Facilities /Infrastructure	Development of disaster management facilities and enhanced functionality	4-2-1	Designation, development, improvement and enhancement of disaster management base facilities	Designation, development, improvement and enhancement of disaster management base facilities. ・Designation of disaster management base facilities in a municipality (Municipal office, etc.). ・Improvement and enhancement of facilities as the disaster management base. (Seismic resistant measures, stockpile, communication facilities, etc.)	LSMC(Urban development dep.)	MoFALD, MoUD(DUDBC)						50.0	6.5.4	✓
		4-2-2	Development of stockpile warehouses, and ensuring disaster stockpiles	Development of stockpile warehouses, and ensuring disaster stockpiles. ・Development of stockpile warehouses and installation. ・Listing of necessary emergency goods (food, medical equipment, daily necessities, rescue equipment, fuel, etc.). ・Procurement of stockpiles.	LSMC(Urban development dep.)	MoFALD						50.0	6.5.4	✓
		4-2-3	Construction and management of disaster management training centre	Construction and management of disaster management training centre for all municipality (communities, municipal staffs) as a leading municipality ・Consideration of the concept of disaster management training centre ・Designing of the building ・Consideration of the training course/contents ・Planning of the operation and management for the training centre	LSMC(Urban development dep.)	MoFALD, MoUD(DUDBC), NSET, Universities						30.0	6.5.4	✓
		4-2-4	Enhancement of the disaster management functions of schools	Enhancement of the disaster management functions of schools in order to secure the children and promote the disaster management base. ・Seismic resistant measures ・Securing stockpiles ・Development of communication facilities, etc.	LSMC(Urban development dep.)	MoFALD, MoUD(DUDBC), MoE						2.0	6.5.4	✓
	Development of information/communication infrastructure	4-2-5	Development of an information database for disaster management	Development of a disaster information database ・Information of past disasters ・Information of people/section of related agencies (Name of contact person, contact number)	LSMC(Urban development dep.)	MoFALD						3.0	6.5.4	✓
		4-2-6	Establishment of an information sharing system	Establishment of an information sharing system to cooperate and operate in an emergency smoothly and quickly ・Development of a damage and recovery information sharing system with the rescue and health/medical institutions, road and bridges, lifelines, etc. (Radio system, dispatch the personnel from each agency to the municipal disaster response committee)	LSMC(Urban development dep.)	MoFALD						3.0	6.5.4	✓
		4-2-7	Development of an information sharing system for vulnerable people and deprived/marginalized people (Pichadiyeko barga)	Development of an information sharing system for vulnerable people and deprived/marginalized people (Pichadiyeko barga) ・Collection and sharing of information for vulnerable people （Name, Address, Condition, etc.) ・Establishment of a support system. (establishment of assistant group, etc.)	LSMC(Urban development dep.)	MoFALD						3.0	6.5.4	✓

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					Responsible Agency	Supporting Agency	73/74	74/75	75/76	76/77	77/78			
		4-2-8	Multiplexing means of communication	In order to avoid disconnection of the communication line and the disruption of information due to congestion in the event of a disaster, development of the multiplexing of communication means should be carried out. (e.g. Installation of satellite line)	LSMC(Urban development dep.)	MoFALD, MoIC						10.0	6.5.4	✓
		4-2-9	Development of disaster management administrative radio	Development of a disaster management administrative radio to be able to disseminate the information to residents in the event of a disaster.	LSMC(Urban development dep.)	MoFALD, MoIC						10.0	6.5.4	✓
4-3 Emergency Response	Capacity enhancement of emergency response	4-3-1	Establishment of an information collection and dissemination system	Establishment of an information collection and dissemination system ・Establishment of information collection from the ward level ・Establishment of an information dissemination system (development of information flow (from municipality to residents), utilization of media)	LSMC(Urban development dep.)	MoFALD, MoHA, District						2.0	6.5.4	✓(SOP)
		4-3-2	Establishment of the initial system and mobilization system for emergency response	Formulation of manuals including the following items in order to execute the initial emergency response activities smoothly: ・Establishment of a disaster response committee (how to inform, gather, etc.) ・Establishment of an initial system such as the mobilization of staff (how to inform, gather, etc.)	LSMC(Urban development dep.)	MoFALD, MoHA, District						2.0	6.5.4	✓(SOP)
		4-3-3	Formulation of a disaster emergency response manual(SOP)	Formulation of a disaster emergency response manual(SOP) (Examples of contents) ・Flow chart and check list of each section and each response activity such as search and rescue, medical, food provision, etc. ・Several formats for information collection, etc.	LSMC(Urban development dep.)	MoFALD, MoHA						1.0	6.5.4	✓(SOP)
		4-3-4	Implementation of disaster management exercises for emergency response	Implementation of disaster management exercises for capacity development of emergency response. ・Formulation of step-by-step exercise programmes for capacity development (From seminars, table-top-exercises, to command post exercises) ・Exercise in collaboration with other agencies ・Verification of exercises and revision of SOP (Examples of contents) ・Information collection and dissemination, sharing ・Mobilization ・Coordination with other agencies	LSMC(Urban development dep.)	MoFALD, MoHA, District, all related agencies						3.0	6.5.4	✓
	Capacity enhancement of rescue, first-aid and emergency medical activities	4-3-5	Designation of disaster base hospitals, medical centres	Designation of disaster base hospitals, medical centres ・Improvement and enhancement of facilities as the disaster base hospital (Seismic resistant measures, stockpiles, communication facilities, etc.)	LSMC(Urban development dep., Social Welfare and Environment dep.), MoHP	MoFALD						5.0	6.5.4	✓
		4-3-6	Establishment of an emergency medical transportation system	Establishment of an emergency medical transportation system in order to achieve quick emergency transport ・Improvement of ambulances and the transportation system	MoHP	LSMC(Urban development dep., Social Welfare and Environment dep.)						3.0	6.5.4	✓
		4-3-7	Promotion of cooperation with disaster wide-area hospitals (district or national level) and disaster base hospitals	Development of a manual for cooperation with wide-area hospitals ・Establishment of the hospital mutual cooperation system ・Development of a wide-area disaster medical information network	MoHP	LSMC(Urban development dep., Social Welfare and Environment dep.)						1.0	6.5.4	✓
	Traffic/transportation and lifeline management	4-3-8	Development of a plan/manual for the elimination of road obstacles, strengthening of elimination of road obstacles system, strengthen cooperation with the police	Development of a plan/manual for the elimination of road obstacles ・Designation of priority roads for the elimination of road obstacles ・Establishment of an elimination of road obstacles system in cooperation with Police	LSMC(Urban development dep., Infrastructure Const dep., Social Welfare and Environment dep.)	MoUD, MoFALD						3.0	6.5.4	✓
		4-3-9	Conclusion of agreements related to emergency recovery for roads with the construction companies	Conclusion of agreements related to emergency recovery for roads with the construction companies ・Selection of construction companies ・Consideration of contents of agreements (responsible areas, expenses, etc.) ・Conclusion of agreements	LSMC(Urban development dep., Infrastructure Const dep., Social Welfare and Environment dep.)	MoUD, MoFALD						2.0	6.5.4	✓
		4-3-10	Strengthening of emergency response capacities in cooperation with lifeline operators	Establishment of a cooperation system with lifeline operators ・Implementation of the training in cooperation with lifeline operators to strengthen disaster response capabilities.	Each Lifeline Operators	LSMC(Urban development dep., Social Welfare and Environment dep.), MoUD, MoFALD						1.0	6.5.4	✓
4-4 Culture of Disaster Prevention/Resilience	Transferring earthquake experiences/ lessons learned and establishment of culture of disaster resilience	4-4-1	Development of bases for culture of disaster prevention/ resilience	In order to keep the memory of the Gorkha EQ, development as a base for culture of disaster prevention/resilience ・Consideration of the bases for culture of disaster prevention/resilience (Candidate of base) ・New monument, construction of reconstruction park ・Damaged and remaining heritage sites such as temples	LSMC(Urban development dep.)	MoFALD						20.0	6.5.4	✓

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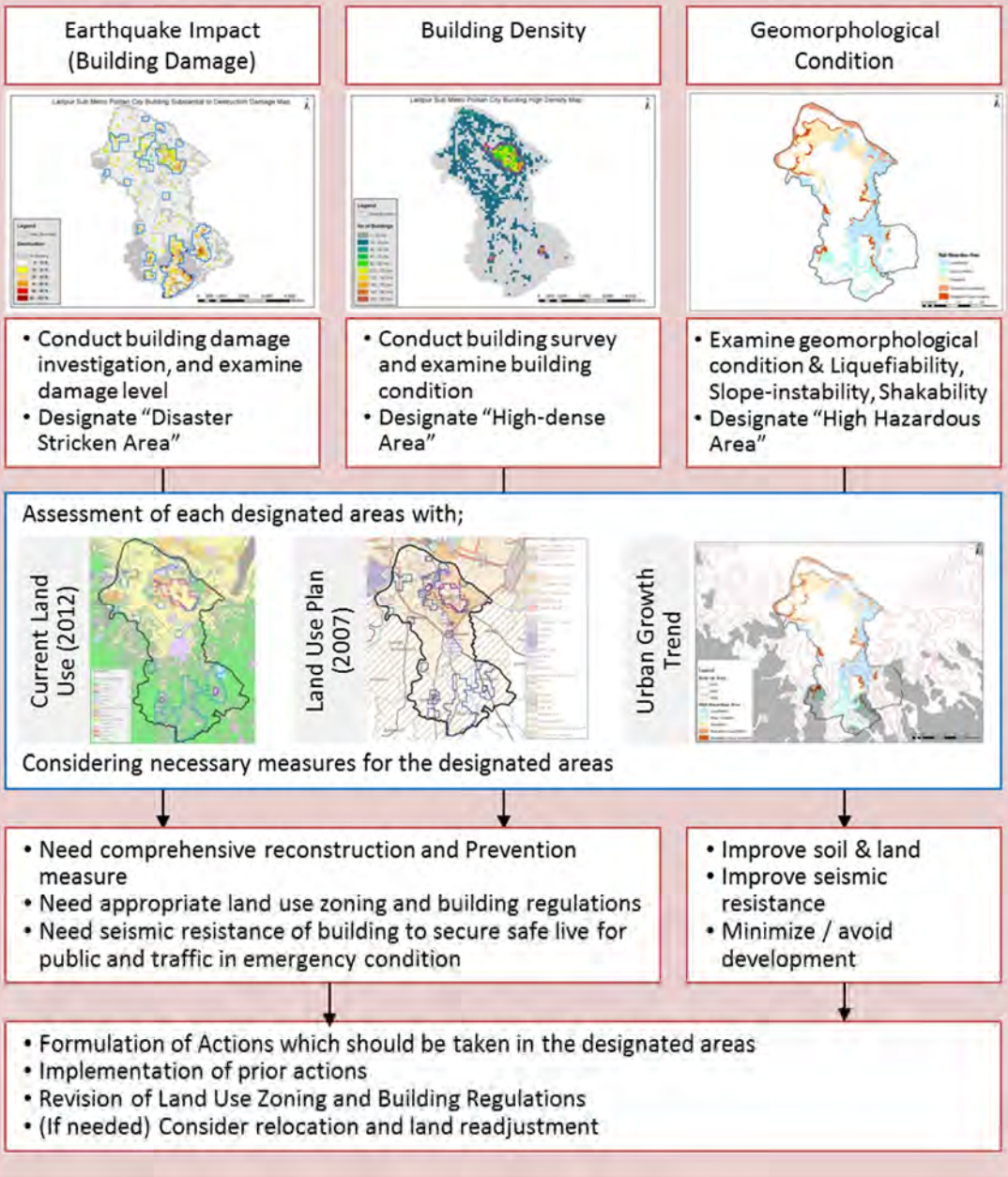
					Responsible Agency	Supporting Agency	73/74	74/75	75/76	76/77	77/78			
		4-4-2	Implementation of events for promoting the establishment of culture of disaster prevention/ resilience	Implementation of events for promoting the establishment of culture of disaster prevention/resilience ・Disaster management exercises every April 25(the day of Gorkha EQ) to keep the memory of the Gorkha EQ	LSMC(Urban development dep.)	MoFALD						2.0	6.5.4	✓
		4-4-3	Enhancement of disaster risk reduction education (education based on the earthquake experiences, learning for disaster risk reduction)	Implementation of activities for the establishment of a culture of disaster prevention/resilience through the following activities. (Examples of activities) ・Education and learning for DRR/DRM based on the earthquake experience by such as story teller ・Collaboration with the DRR/DRM events and existing events	LSMC(Urban development dep.)	MoFALD, MoE						5.0	6.5.4	✓
5. Strengthening of Community Disaster Risk Management														
5-1 Public Awareness on Disaster Risk Reduction/ Management (DRR/DRM)	Enhancement of public awareness of DRR/DRM	5-1-1	Development of a handbook on DRR/DRM for families	Development and Distribution of a handbook about DRR/DRM for families (Examples of contents) ・Learning about disasters (earthquake mechanisms, etc.) ・What to do in the event of disaster ・Preparedness (Making earthquake resilient houses, preparing emergency stockpiles)	LSMC(Urban development dep., Social Welfare and Environment dep.)	MoFALD						2.0	6.5.4	✓
		5-1-2	Implementation of awareness-raising programmes on DRR/DRM	Implementation of awareness-raising programmes on DRR/DRM (Examples of programmes) ・Community workshop for learning DRR/DRM ・Development/Utilization of educational tools ・TV/Radio awareness programme	LSMC(Urban development dep., Social Welfare and Environment dep.)	MoFALD						2.0	6.5.4	✓
		5-1-3	Promotion of the preparation of emergency stockpiles by families	Promotion of the preparation of emergency stockpiles by families. ・Preparation of list of emergency ・Promotion of preparation of emergency stockpiles by families (Development of brochure, leaflet for stockpiles)	LSMC(Urban development dep., Social Welfare and Environment dep.)	MoFALD						2.0	6.5.4	✓
5-2 CBDRM (Community Based Disaster Risk Management)	Enhancement of CBDRM	5-2-1	Establishment of "Community Disaster Management Committees (CDMCs)" as organizations for disaster preparedness, response, and rehabilitation at the community level	Establishment of "Community Disaster Management Committees (CDMCs)" ・Determination of members of CDMC based on the Ward Citizen Forum ・Determination and allocation of roles and responsibilities of CDMC ・Determination of DRR/ DRM capacity development programmes	LSMC(Urban development dep., Social Welfare and Environment dep.)	MoFALD						2.0	6.5.4	✓
		5-2-2	Formulation of community DRR/DRM plans	Support for Formulation of Community DRR/DRM plans ・Hazard/Risk assessment of community level based on the risk assessment on the municipal level ・Establishment of planning committee ・Formulation of Community DRR/DRM plans (Example of contents：General overview, Community profile, Risk assessment, Disaster management policy, Action plan, etc.)	LSMC(Urban development dep., Social Welfare and Environment dep.)	MoFALD						2.0	6.5.4	✓
		5-2-3	Formulation of "community carte" for summarized information of current conditions on disaster management at the community level	Formulation of "community carte" (Examples of contents) ・Community Profiles(Population, Geography, Location) ・DRR related information (Status of preparedness, Vulnerable people, Evacuation places/routes, etc.) ・Disaster Risk Assessment (maps and outline) ・Community DRR Map, etc.	LSMC(Urban development dep., Social Welfare and Environment dep.)	MoFALD						2.0	6.5.4	✓
		5-2-4	Implementation of DRR/ DRM capacity development programmes for community leaders	Implementation of DRR/DRM capacity development programmes for community leaders ・Establishment of Task forces ・Determination and implementation of DRR/DRM capacity development programmes (Examples of programmes) ・Know risks of own community (Hazard/Risk assessment, Field survey, Risk Mapping) ・Consider disaster preparedness of community (Disaster management planning, Making action plans, etc.)	LSMC(Urban development dep., Social Welfare and Environment dep.)	MoFALD						4.0	6.5.4	✓
		5-2-5	Carrying out of community disaster management exercises	Carrying out of community disaster management exercises ・Formulation of annual plan for disaster management exercise ・Carrying out of community disaster management exercise (Examples of exercise) ・Evacuation exercise ・Fire-fighting exercise ・SAR, first-aid exercise	LSMC(Urban development dep., Social Welfare and Environment dep.)	MoFALD						6.0	6.5.4	✓

CHAPTER 3.
PRIORITY PROJECT

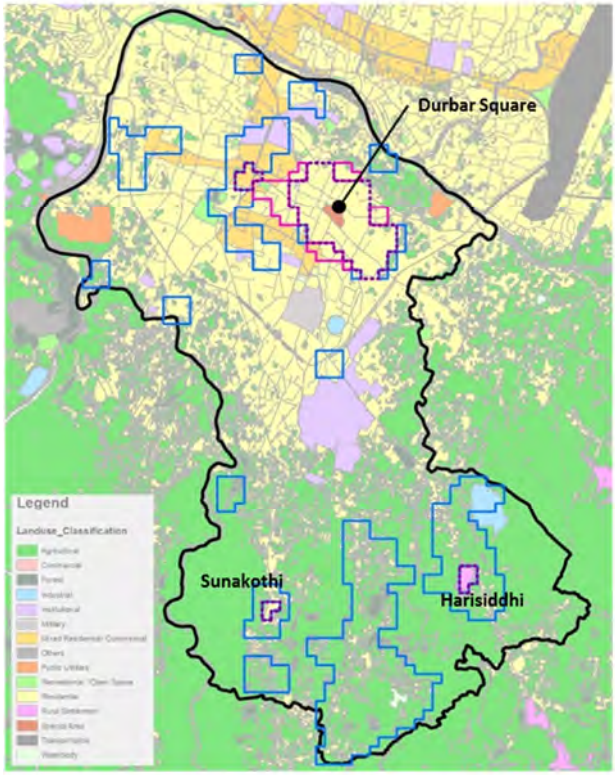
The priority projects are selected through the priority, necessity and importance of the projects in the Action Plan. The Priority projects are to prepare as a project sheet for each project, and are to describe further details of the contents. Based on this sheet, LSMC implements the actual project.

Title	Implementation of training of house reconstruction for masons, local communities, technicians, etc. (1-1-5)
Responsible Agency	Responsible Agency: LSMC(Urban development dep., Infrastructure construction dep.) Supporting Agency: MoUD(DUDBC)
Objectives	・To develop the capacity of safe construction methods.
Contents	・Planning for training (training course, target, schedule). (Example of training) ・Understanding the building codes, building by-laws, building regulations and their provisions. ・Training on construction (construction of load bearing buildings (brick, stone, block masonry)), construction of frame structure buildings (RCC Framed).
Schedule	2016.7 –
Workflow & Output Image	Planning for training ・Training course ・Target ・Implementation schedule Training for designers ・Understanding the building codes(NBC), building by-laws, building regulations ・Implementation of NBC, training on design ・Training on retrofitting design of existing buildings Training for masons Construction training of load bearing buildings (brick, stone, block masonry) ・Introduction for course, Lecture on NBC ・Construction of foundation ・Construction of walls ・Construction of floor and roof ・Quality control of construction materials ・Retrofitting of existing buildings Training for masons Construction training of frame structure buildings (RCC Framed) ・Introduction for course, Lecture on NBC ・Construction of foundation ・Construction of beams and columns ・Construction of floor and roof ・Quality control of construction materials ・Retrofitting of existing buildings Image of mason training  Source: JICA Project for the Transitional Project Implementation Support for Emergency Reconstruction Projects

Title	Designation of disaster stricken areas, high-dense areas, and vulnerable areas (2-5-2)
Responsible Agency	Responsible Agency: LSMC(Urban development dep., Infrastructure construction dep.) supported by the JICA Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley Supporting Agency: MoUD and KVDA
Objectives	・To conduct concentrated reconstruction measures in the designated areas and make the municipal area resilient.
Contents	・Designation of "Disaster Stricken Area" for prior recovery not to spreading damages ・Designation of "High-dense Area" for preventing secondary damages and to secure safe evacuation ・Designation of "High Hazardous Area" considering liquefaction, slope failure, and shakability for better reconstruction and future urbanization in safe condition.
Schedule	2016.7 – 2017.12
Workflow & Output Image	

Indication for Land Use Policy

High-dense Area X **Disaster Stricken Area** X **Current Land Use**



Disaster Stricken Area + High-dense Area

- "Residential Area", "Mixed Residential / Commercial" and "Special Area (Heritages)" in the historical centre of Lalitpur.
- "Residential Area" and "Rural Settlement" in Sunakothi and Harisiddhi

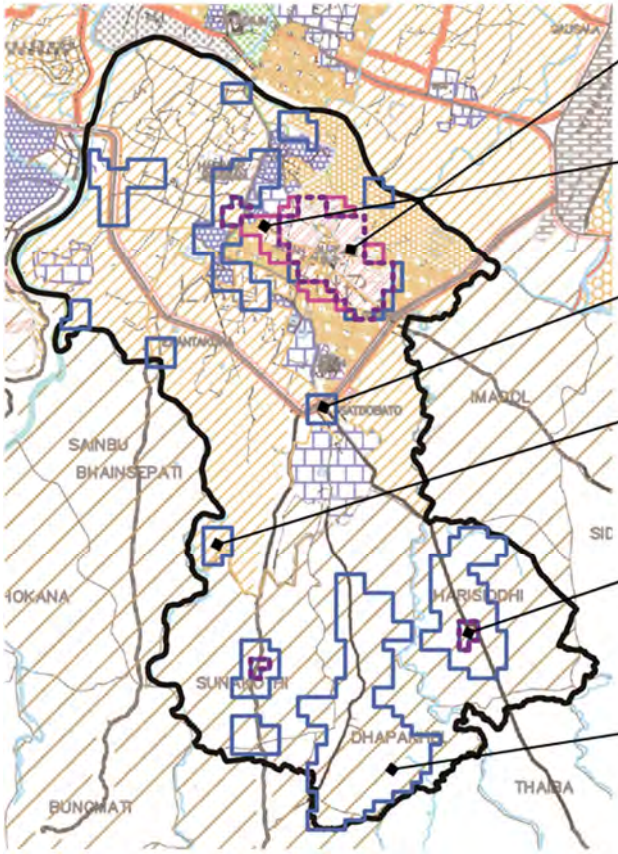
Disaster Stricken Area (Only)

- Some "Residential Area" and "Mixed Residential / Commercial" in the northern part of Lalitpur
- Rural Area located in the southern part of Lalitpur. The areas are not urbanized yet. (Mainly "Residential Area" in "Agriculture").

High-Dense Area (Only)

- Some residential area around "Disaster Stricken Area + High-dense Area" in the centre of Lalitpur

High-dense Area X **Disaster Stricken Area** X **Zoning Plan**



A: Dense area with huge Building Damages in the historical centre
> Need comprehensive reconstruction measures.

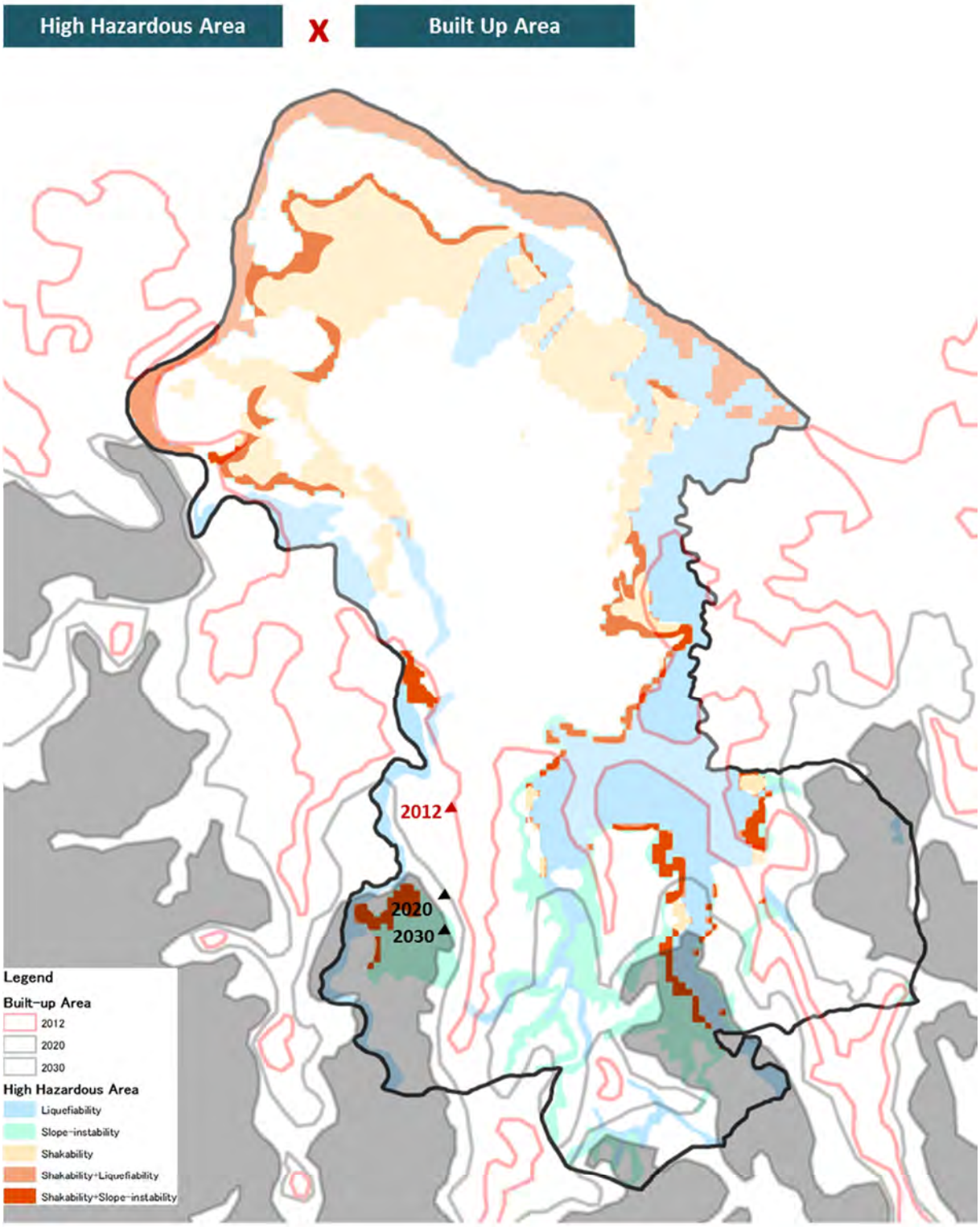
B: Dense, but not many damages. This area might get damages
> Need comprehensive prevention measures.

C: Roadside. Some area got damages.
> Need seismic resistance to secure traffic in emergency condition

D: Designated as residential area with some damages (nearby river)
> Need to confirm geo./topo. Condition for building construction.

E: Rural Town, dense and god sever damages. Zoning (Urban Expansion Zone) is same as surrounding farm land.
> Need Appropriate Land Use Zones

F: Rural area got some damages. Urbanization is expected.
> Need to confirm geo./topo. Condition for urbanization

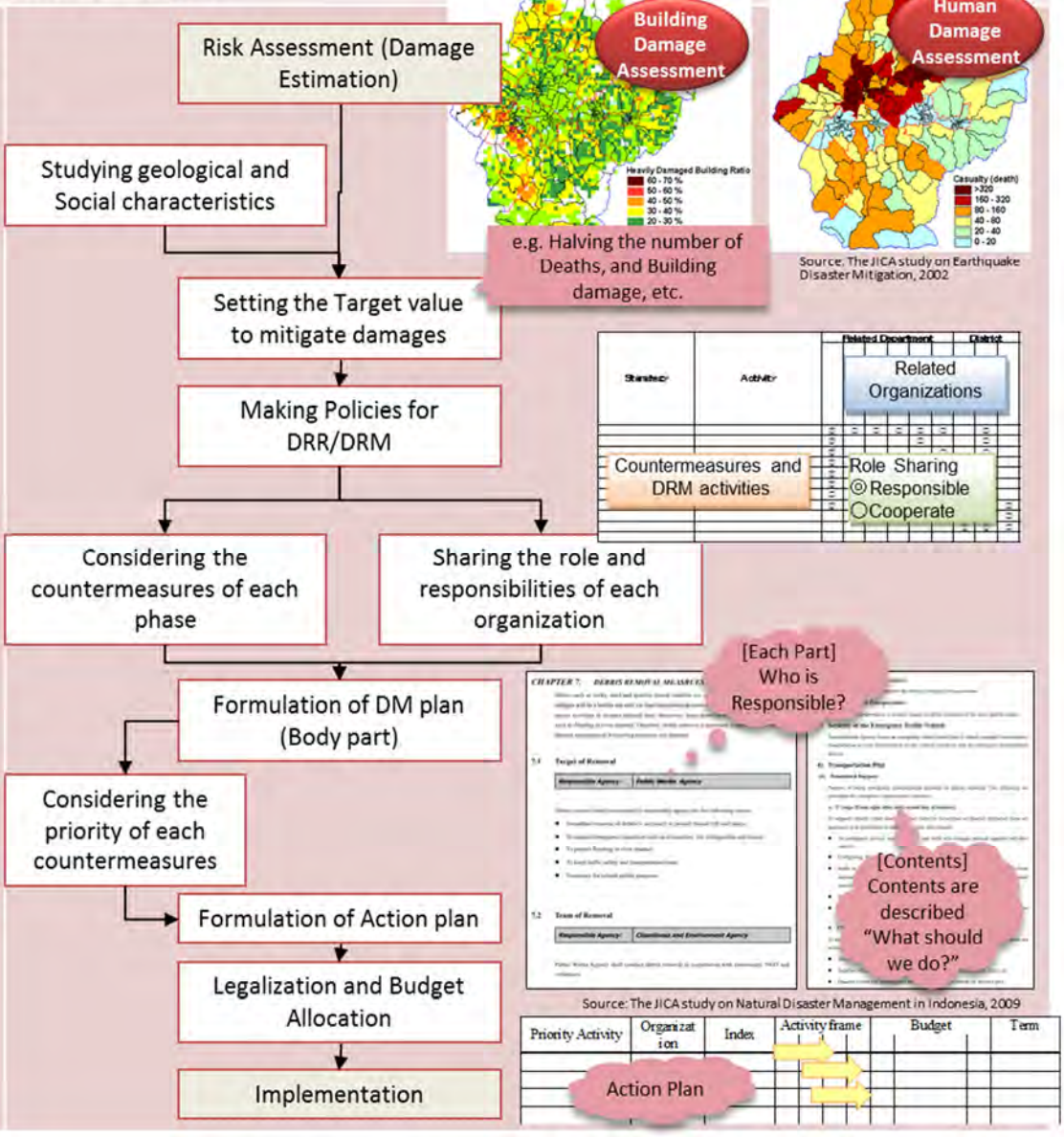


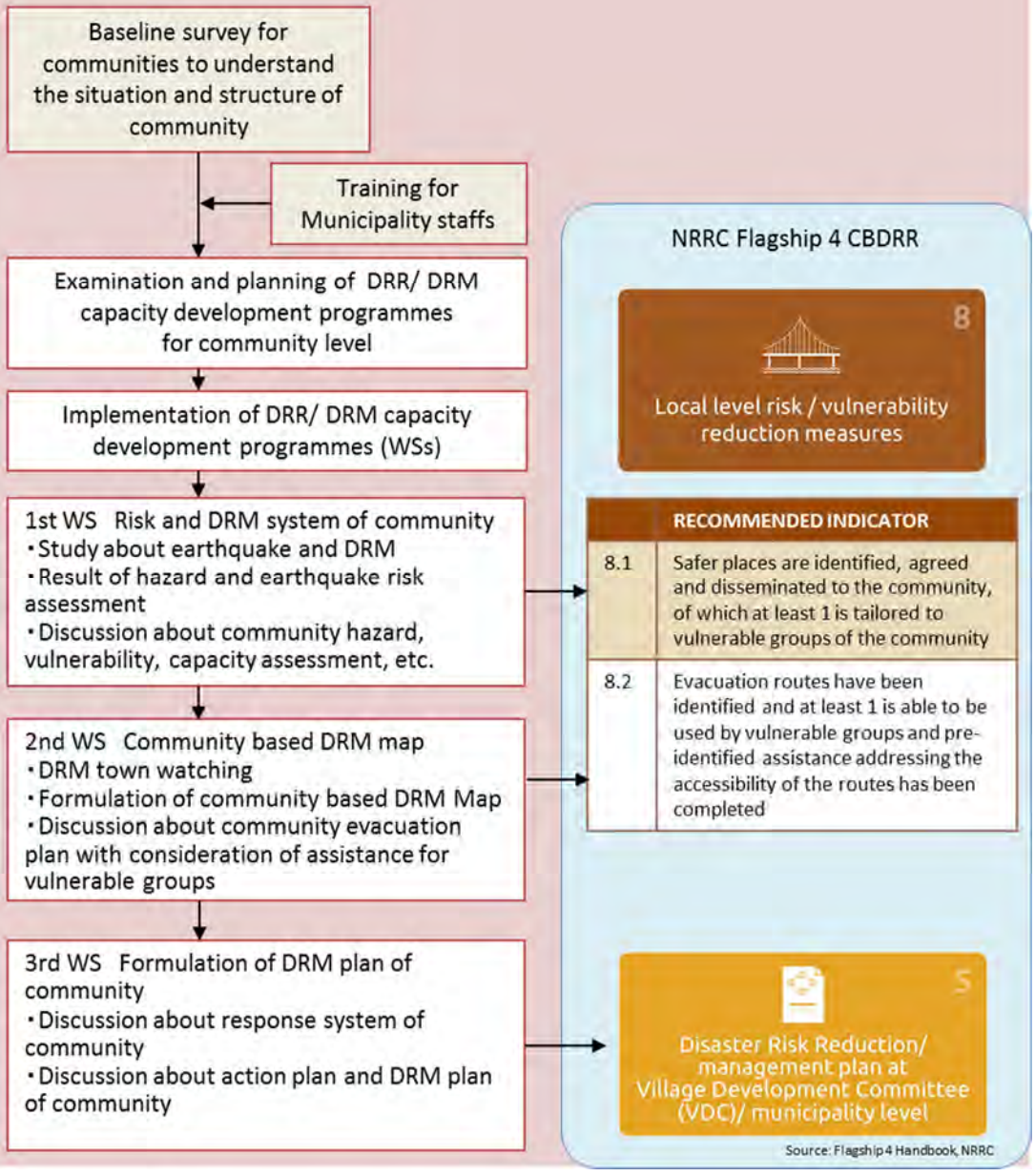
Past development

- Took place in the northern-central part of the city, where hazardous areas are relatively less
- Liquefiability, shakability and combination of the two are the major types of high hazardous area

Future development

- Development up to 2030 is projected to happen towards south.
- Development is expected to take place mainly in high liquefiable and some in slope-instability areas

Title	Formulation of Disaster Management Plan (4-1-1)
Responsible Agency	Responsible Agency: LSMC(Urban development dep.) supported by the JICA Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley Supporting Agency: MoFALD
Objectives	・To protect the citizen's lives and property ・To set the target to prevent and mitigate the damages by the future earthquake ・To implement the countermeasures effectively among all stakeholders
Contents	・Regional characteristics of geological and social conditions ・Result of the Risk Assessment ・DRR Target based on the Risk Assessment ・DRR Policies ・Roles and Responsibilities of each organization ・Countermeasures for mitigation/preparedness, emergency response and recovery/reconstruction phases ・Action plan prioritized countermeasures by budget, emergency, and necessity ・Legalization and Budget allocation for Implementation, etc.
Schedule	2016.11 – 2017.12
Workflow & Output Image	

Title	Implementation of DRR/ DRM capacity development programmes for community leaders (5-2-4)
Responsible Agency	Responsible Agency: LSMC(Urban development dep., Social Welfare and Environment dep.) supported by the JICA Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley Supporting Agency: MoFALD
Objectives	・To develop the capacity on DRR/DRM for communities
Contents	・Establishment of Task forces ・Determination and implementation of DRR/DRM capacity development programmes (Examples of programmes) ・Know risks of own community (Hazard/Risk assessment, Field survey, Risk Mapping) ・Consider disaster preparedness of community (Disaster management planning, Making action plans, etc.)
Schedule	2016.12– 2017.12
Workflow & Output Image	

CHAPTER 4.
MONITORING AND EVALUATION

Monitoring is an activity to observe the progress of the implementation of the action plan and to identify as well as anticipate the emergence of problems, so that they can be prevented or solved as early as possible.

Monitoring is carried out to observe the progress in the achievement of outputs, delivery of funds and emerging problems. Monitoring needs to be done regularly to obtain accurate information on the implementation of the reconstruction actions and the results achieved.

Evaluation of the implementation of the action plan will be done to the outcomes of actions in the form of impact or benefit for the community and/or LSMC. In principle, evaluation is a series of activities that compare the realization of action inputs, outputs and outcomes with the plan. Evaluation is done based on the resources used and the indicators and targets of an action.

Monitoring and evaluation are conducted with regard to the following principle and format is shown as follows:

1. Effectiveness	A criterion for considering whether the implementation of action has benefited (or will benefit) and has reached its desired result
2. Efficiency	A criterion for considering how economic resources/inputs are converted to results. The main focus is on the relationship between project cost and effects/output
3. BBB Impact	A criterion for considering the effects of the project with an eye on the longer term effects, positive or negative, intended or unintended with the BBB concept

Format of Monitoring and Evaluation

ACTION	PROGRESS / INDICATOR		BUDGET		EVALUATION (LEVEL OF ACHIEVEMENT)	SOLUTION, NOTES
	PLANNED	**REALIZATION**	**PLANNED**	**REALIZATION**		

Monitoring and Evaluation of the Action plan will be carried out by the responsible agencies of each action. Monitoring and Evaluation will be carried out once every six months.

The Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley in Nepal