



# Enumeration Area Mapping (Economic Census 2018)

GIS Section  
Central Bureau of Statistics  
Kathmandu, NEPAL

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## Objectives



- The main objective of the EA mapping is to demarcate area of wards of Municipalities to make Enumeration Areas without any omitted and duplicated area.
- Make maps of wards of all VDCs of the country to be used for Economic Census 2018 as Enumeration Area.
- Prepare EA maps in such a way that, the maps can be used for upcoming Population Census and other surveys as well.
- These maps are to be used basically for listing up exactly every establishment in implementation of the 2018 Economic Census,



## Introduction



- Without well defined territory, possibility of double counting or missing the targeted object (omission and duplication)
- Important role in census operation as well as the dissemination and analysis of census results
- The quality of Maps used in the censuses has a major impact on the quality and reliability of census results.



## The Role of Maps in the Census



- Maps are needed during all stages of a census or survey i.e. planning, data collection, and presentation and analysis of the result.
- The role of maps in the census lies in supporting enumeration task and presenting census results.
- This role has been expanded with the introduction of digital mapping system.
- GIS has played a key role in production of EA maps, Thematic mapping of census data, spatial analysis and dissemination of census data.
- Master sample frame
- Statistical zoning

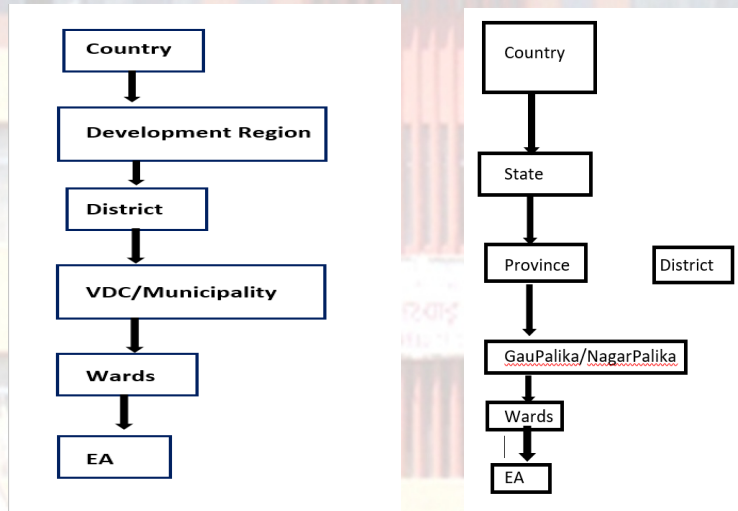


## Tools Using for Census Mapping

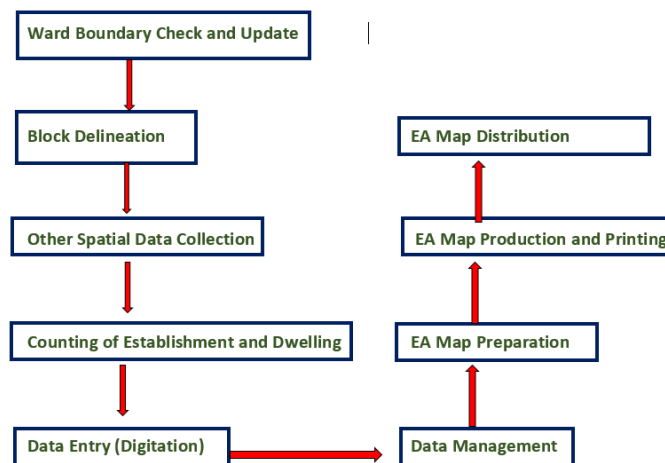


- ArcGIS software to preparing maps for field data collection
- At the beginning the google earth images were used but now the provided satellite images are using
- ArcGIS software and High resolution satellite images were used for digitation and Preparation of EA map

# Geography



# Task to be performed for EA Mapping



## Coding Skim for EA Map

Description	No. of digit
District code	2 digit
VDC/Municipality Code	3 digit
Ward No	2 digit
Block No	2 digit
EA Number	9 digit

The EA number of Kathmandu Metropolitan City of Ward No. 9 should be 270310901, 270310902, 270310903 and so on.



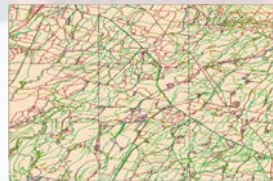
## Procedure Adopted



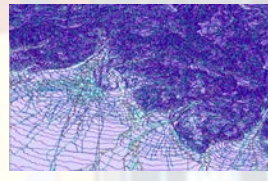
TopoSheet 2687 (A06)



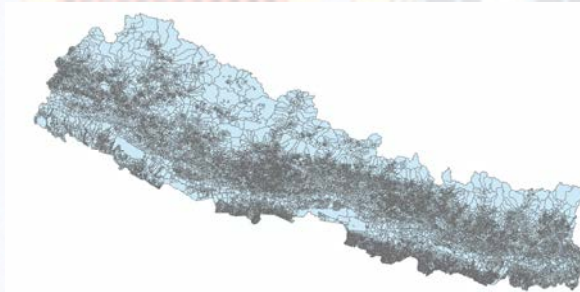
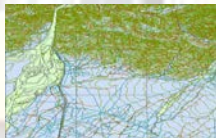
TopoSheet 2687 (B05)



TopoSheet 2687 (C02)

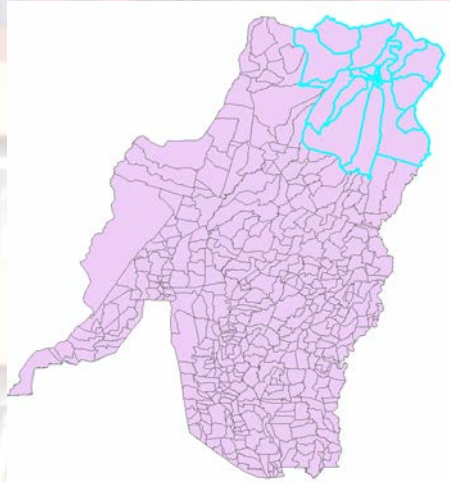


TopoSheet 2687 (D01)





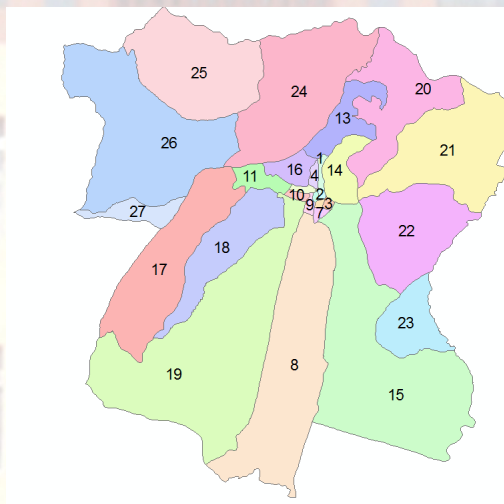
## Extraction of Municipality



Extraction of Municipality from ward boundary of Nepal



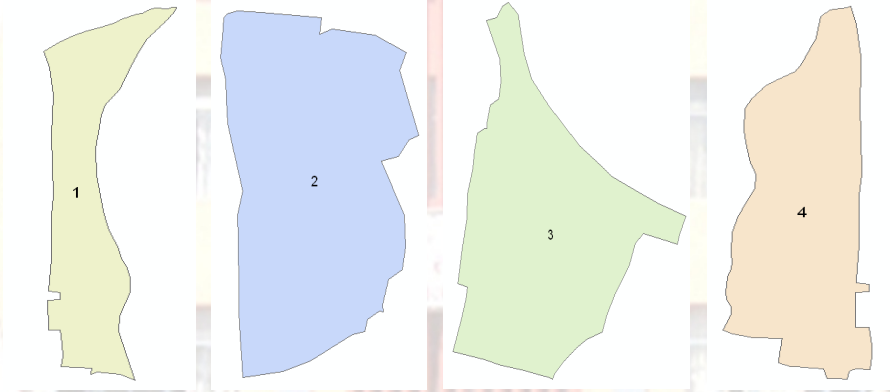
## Extracted Municipality



Extracted Municipality from ward boundary of Nepal



## Ward Separation



Spited Wards From Municipality



## Satellite Images





## Ward Boundary Overlaid



Overlaid Ward Boundary to the Image



## Ready to print for Data Collection

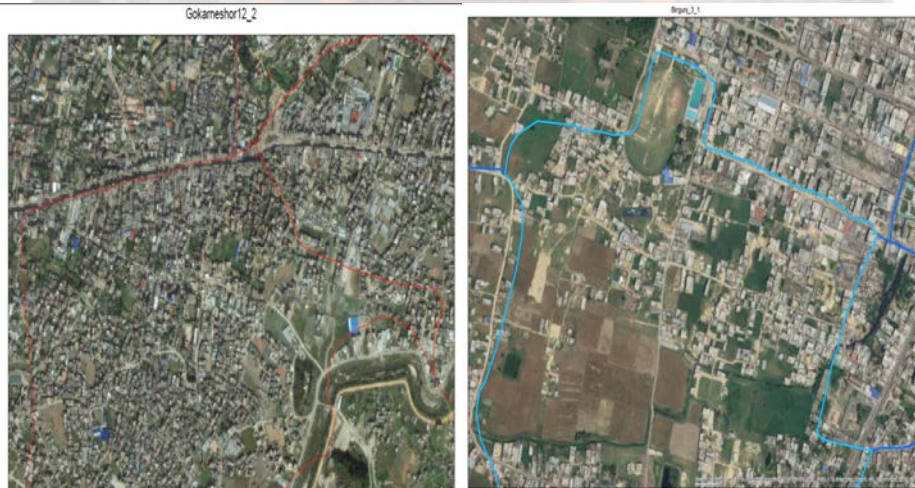


A3 size Map will be  
Printed for field data  
collection

Make Features Visible



## Samples of Field Map



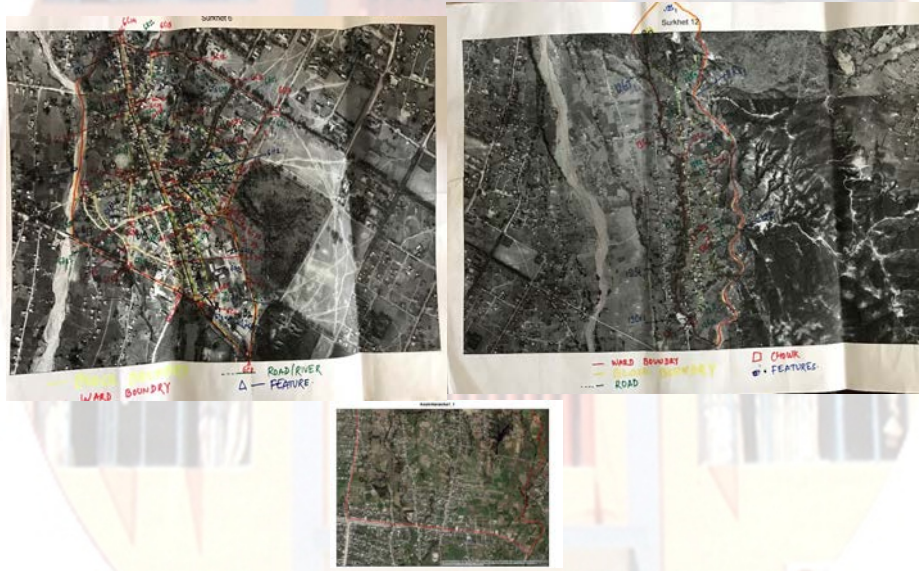
### Data Preparation for Field works



- Extraction of particular Municipality Boundary from Ward Boundary of Nepal.
- Split the Municipality Boundary to Ward Boundary.
- Overlay the Municipality Boundary to the Image
- Print the ward wise maps for each municipality and dispatch to the districts for geographic data collection. ( about three to four maps should be printed for each ward.)



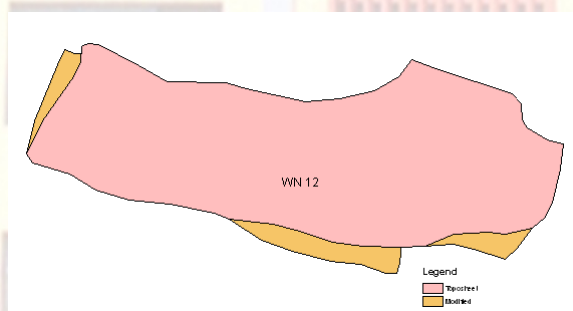
# Field Work



# Field Work

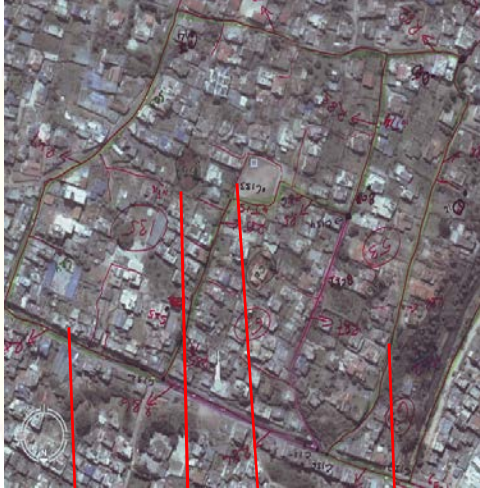


- Ward Boundary Verification and Modification





## Road Identification



4R1

4R2

4R3

4R4

कञ्चन लुम्बिनी नगरपालिका  
सुदूरपश्चिम प्रदेश

सुदूरपश्चिम प्रदेश  
कञ्चन लुम्बिनी नगरपालिका

दिनांक: २०७३/०८/०९  
मापन नं: ४  
मापन विधि: २०७३/०८/०९

सुदूरपश्चिम प्रदेश  
कञ्चन लुम्बिनी नगरपालिका  
सुदूरपश्चिम प्रदेश  
कञ्चन लुम्बिनी नगरपालिका

सडक श्रेणी	सडकको नाम	प्रकार	वर्ग
4R1	सुदूरपश्चिम	सडक	सुदूरपश्चिम
4R2	सुदूरपश्चिम	सडक	सुदूरपश्चिम
4R3	सुदूरपश्चिम	सडक	सुदूरपश्चिम
4R4	सुदूरपश्चिम	सडक	सुदूरपश्चिम
4R5	सुदूरपश्चिम	सडक	सुदूरपश्चिम
4R6	सुदूरपश्चिम	सडक	सुदूरपश्चिम
4R7	सुदूरपश्चिम	सडक	सुदूरपश्चिम
4R8	सुदूरपश्चिम	सडक	सुदूरपश्चिम
4R9	सुदूरपश्चिम	सडक	सुदूरपश्चिम
4R10	सुदूरपश्चिम	सडक	सुदूरपश्चिम



## Establishment and House Counting for Block Delineation



4B1

३१) कञ्चन लुम्बिनी नगरपालिका

सुदूरपश्चिम प्रदेश

सुदूरपश्चिम प्रदेश

सुदूरपश्चिम प्रदेश

सडक नम्बर	सडकको नाम	प्रकार	वर्ग
B1	सुदूरपश्चिम	सडक	सुदूरपश्चिम

सडक नम्बर	सडकको नाम	प्रकार	वर्ग
B2	सुदूरपश्चिम	सडक	सुदूरपश्चिम



## Chowk Identification



केन्द्रीय तस्मातु विभाग  
सम्पन्न विभाग

पत्राङ्क ३  
सिंह बजार बटौली

विभाग: सुदूरपश्चिम  
सि.वि.नं./सम्पन्नविभाग: ३०१  
सर्दर नं.: ३  
मिति: २०७२/०८/१०

चौकको नाम: सिंह बजार बटौली  
मोर्चालेख नं.: १९२१०२/१०८  
पुरविभागको नाम: आशिक भद्रपुर  
मोर्चालेख नं.: १९२१०२/१०८

चौक आइ.टी.	चौकको नाम	प्रकार	विस्तार	वैशिष्ट्य
4C1	बजार चौक			
4C2	विश्वकर्मा बाटो र ताम्सी बाटो चौक			
4C3	सुदूरपश्चिम बाटो र ताम्सी बाटो चौक			
4C4	सुदूरपश्चिम बाटो र ताम्सी बाटो चौक			
4C5	सुदूरपश्चिम बाटो र ताम्सी बाटो चौक			
4C6	सुदूरपश्चिम बाटो र ताम्सी बाटो चौक			
4C7	सुदूरपश्चिम बाटो र ताम्सी बाटो चौक			
4C8	ताम्सी बाटो चौक			

4C8      4C4      4C2      4C8



## Features Collection



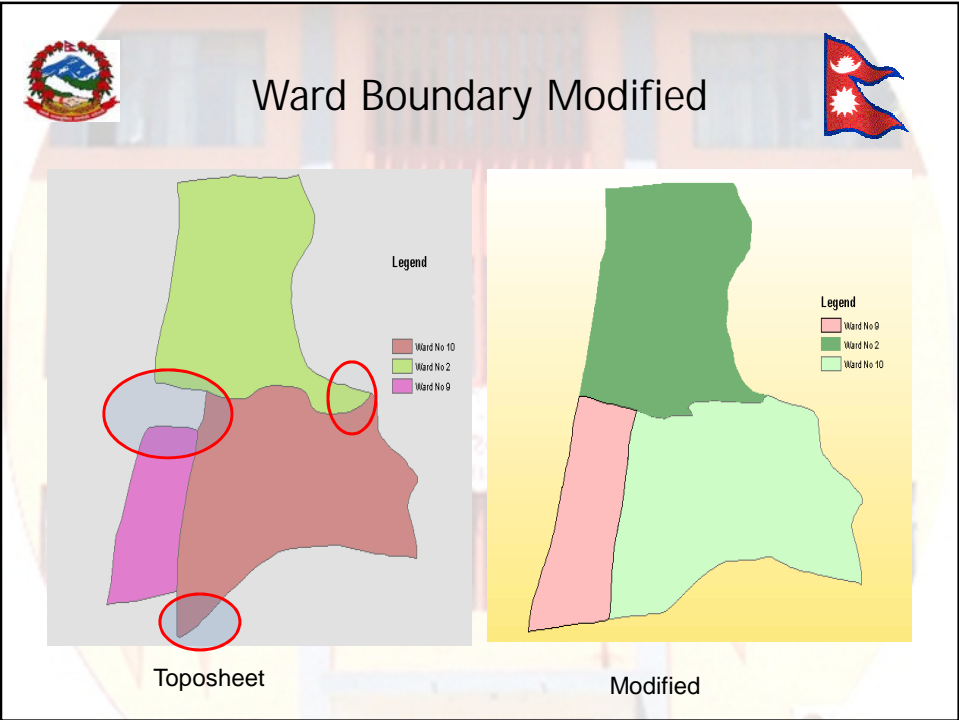
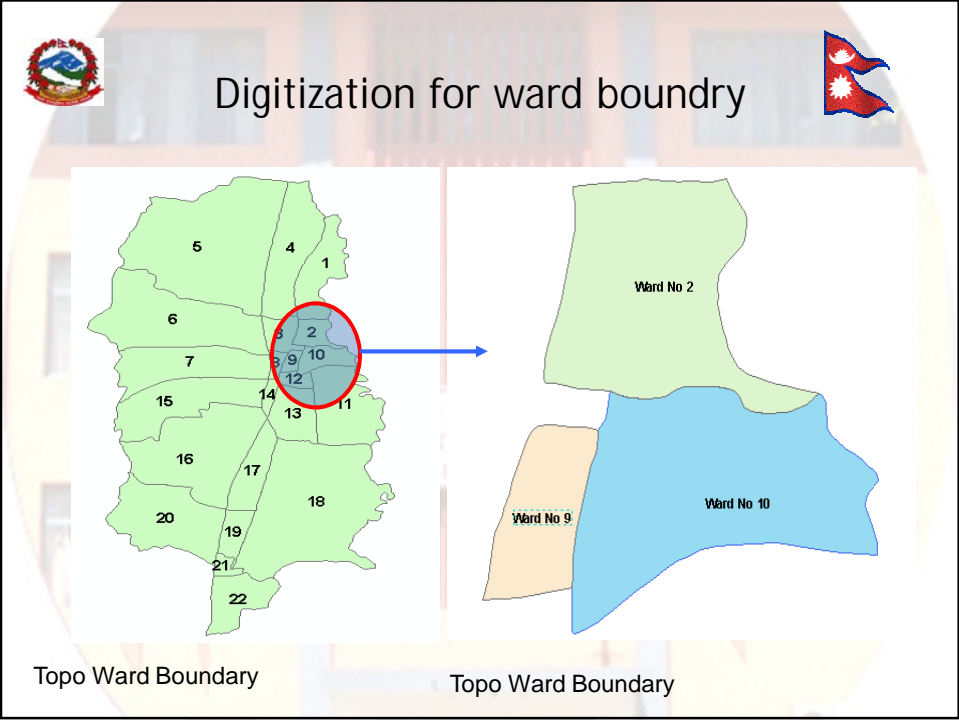
केन्द्रीय तस्मातु विभाग  
सम्पन्न विभाग

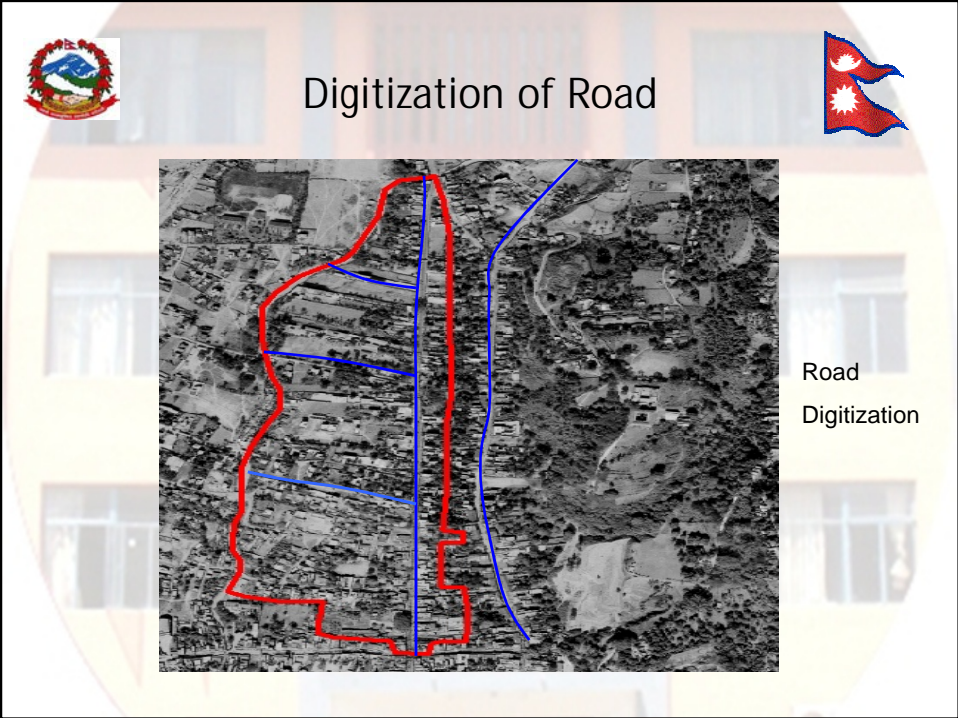
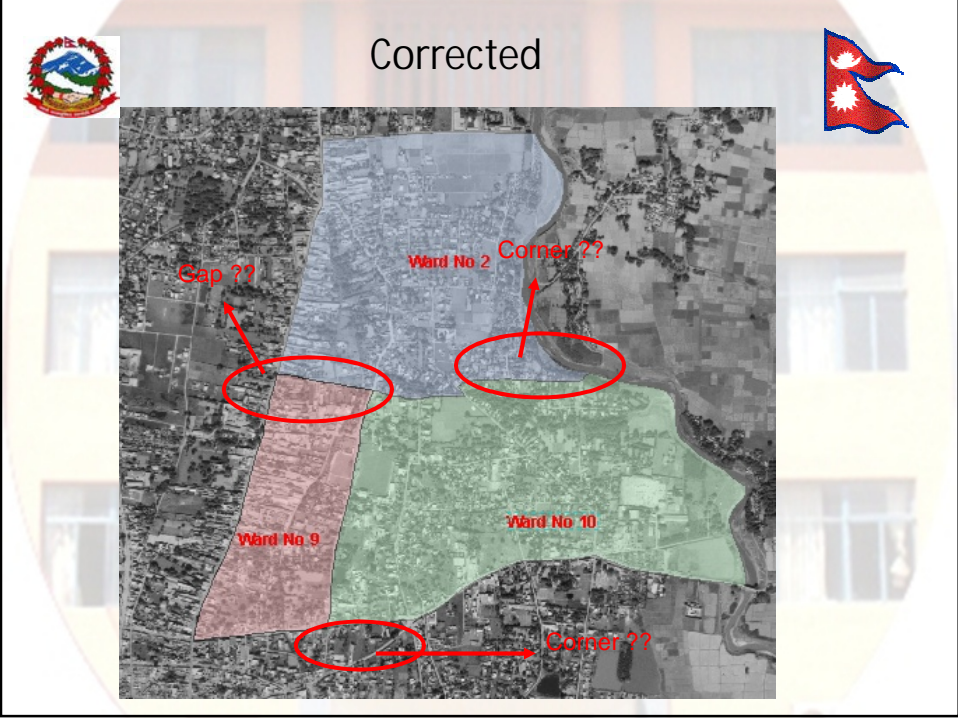
पत्राङ्क ४  
सिंह बजार बटौली

विभाग: सुदूरपश्चिम  
सि.वि.नं./सम्पन्नविभाग: ३०१  
सर्दर नं.: ३  
मिति: २०७२/०८/१०

चौकको नाम: सिंह बजार बटौली  
मोर्चालेख नं.: १९२१०२/१०८  
पुरविभागको नाम: आशिक भद्रपुर  
मोर्चालेख नं.: १९२१०२/१०८

चौक आइ.टी.	प्रकार	चौकको नाम	सर्दर वा लेलाको नाम	वैशिष्ट्य
4B1	पुला	सुदूरपश्चिम पुला	ताम्सी बाटो	
4B2	पुला	सुदूरपश्चिम पुला	सुदूरपश्चिम बाटो	
4B3	पुला	सुदूरपश्चिम पुला	सुदूरपश्चिम बाटो	
4B4	पुला	सुदूरपश्चिम पुला	सुदूरपश्चिम बाटो	
4B5	पुला	सुदूरपश्चिम पुला	सुदूरपश्चिम बाटो	
4S1	निर्मित रकबा	सुदूरपश्चिम रकबा	सुदूरपश्चिम बाटो	
4S2	निर्मित रकबा	सुदूरपश्चिम रकबा	सुदूरपश्चिम बाटो	
4S3	निर्मित रकबा	सुदूरपश्चिम रकबा	सुदूरपश्चिम बाटो	
4S4	निर्मित रकबा	सुदूरपश्चिम रकबा	सुदूरपश्चिम बाटो	
4S5	निर्मित रकबा	सुदूरपश्चिम रकबा	सुदूरपश्चिम बाटो	







## Road Digitization



## Digitized Road





## Digitization of Block



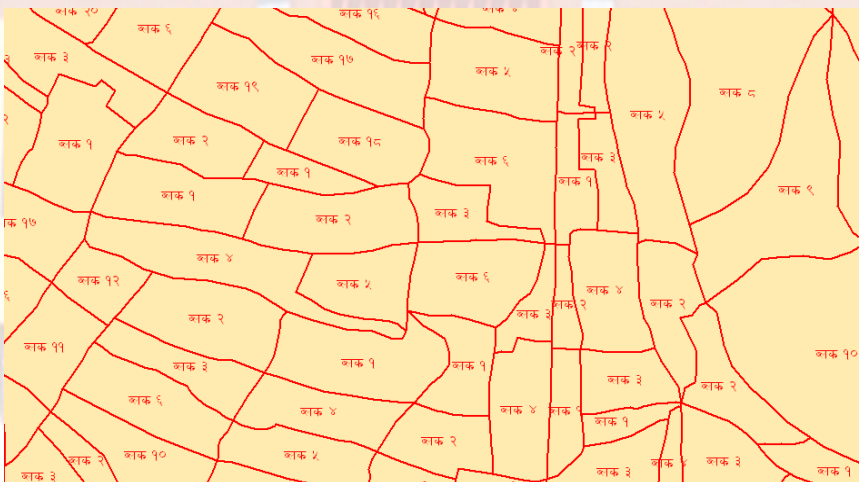
Dwelling and  
Establishment  
Counting and  
Block Delineation



30 – 70  
Dwellings



## Digitized Block









## Geodatabase preparation and lay out design for EA Maps



- Before start digitization activities, the geodatabase will be prepared for all municipalities
- Lay out design of EA map
- Data Driven Page functionality of ArcMap Application will be used to prepare EA Maps (Hard copy)
- Prepare EA Map for Tablet User



## Geodatabase preparation



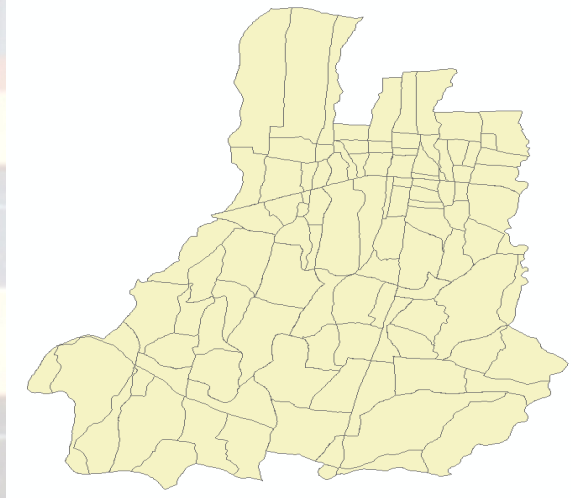
BiratnagarSubMetropolitanCity.mdb

- BiratnagarSMetropolitanCity
  - Biratnagar
    - BiratNagar\_Block
    - BiratNagar\_Block\_Line
    - Biratnagar\_Chowk
    - Biratnagar\_EA
    - Biratnagar\_Features
    - Biratnagar\_Features\_Point
    - Biratnagar\_River
    - Biratnagar\_Road
    - Biratnagar\_Wards

OBJECTID*	SHAPE*	WN	Block_No	Dwelling	MHLD	District	VDC	EA	Block_Nep
3	Polygon	1	1	59	78	4	12	1	Ans 1
4	Polygon	1	2	84	111	4	12	1	Ans @
5	Polygon	1	3	116	153	4	12	2	Ans #
6	Polygon	1	4	85	112	4	12	3	Ans \$
7	Polygon	1	5	95	125	4	12	4	Ans %
8	Polygon	1	8	105	139	4	12	7	Ans *
9	Polygon	1	9	88	116	4	12	8	Ans (
10	Polygon	1	7	93	123	4	12	6	Ans &
11	Polygon	1	6	111	147	4	12	5	Ans ^

OBJECTID*	SHAPE*	WN	Chowk_Na	Code	Name_Nepa
2	Point	1	Saangam Ch	2	;-ud rfjs
3	Point	1	Halder Chow	3	xNbf rfjs
4	Point	1	Dhakai Chow	4	9sfn rfjs
6	Point	1	Rabi Stand C	5	/jL .608 rfjs
19	Point	1	Mahalaxmi C	6	dxfnldL rfjs
21	Point	1	Navadurga C	7	geb'uf rfjs
22	Point	1	Nagar Palika	8	gu'kfnLsf rfj
24	Point	1	Falgunanda	9	kmfnU'gfgGb
25	Point	1	Dhans Baha	11	u'p sv'rfj r

OBJECTID*	SHAPE*	WN	Road_Name	Type	Class	Name_Nep
97	Polyline	10	Amda Marga		1	cDbf dfuf
108	Polyline	11	Sabji line Marga		1	:jHl nFO'g d
157	Polyline	12	Mahendra Raj Marga		1	dxjGbi /fh df
158	Polyline	12	Buddha Marga		1	a* dfuf
160	Polyline	12	Redcross Marga		1	/j8aj; dfuf
78	Polyline	10	Mahendra Raj Marga		1	dxjGbi /fh df
104	Polyline	11	Namuna Marga		1	gd'gf dfuf
103	Polyline	11	Nagar Palika Road		1	gu'kfn'sf /fj8
150	Polyline	12	Goashan Road		1	3fj;sf dfuf

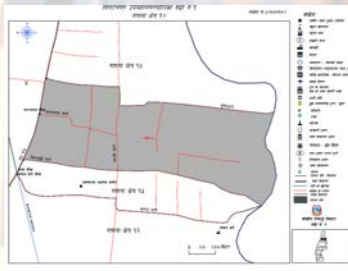


**Koshi Haraicha Municipality**  
**Number of wards: 15**  
**Number of Blocks: 105**

**Number of Establishments: 1500**  
**Number of Dwellings: 10558**

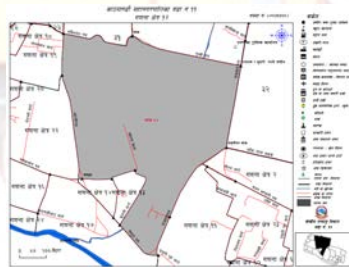


## EA Maps for Municipality



### **विराटनगर नगरपालिका वडा नं. १** **गणना क्षेत्र १४**

- ब्लक १४**  
**पूर्व :** तिगिया खोला ।  
**उत्तर :** तिगिया खोला दक्षिण केराव भूतलको घर, रामेन्द्र खोलीको घर हुँदै शीटगार्ग हुँदै वृष्टि चौकसम्म ।  
**पश्चिम :** वृष्टि चौकदेखि मेनरोड हुँदै नेवगाडी चौकसम्म ।  
**दक्षिण :** नेवगाडी चौकदेखि नेवगाडी मार्ग हुँदै तिगिया खोलासम्म ।



### **काठमाडौं महानगरपालिका वडा नं. ११** **गणना क्षेत्र १२**

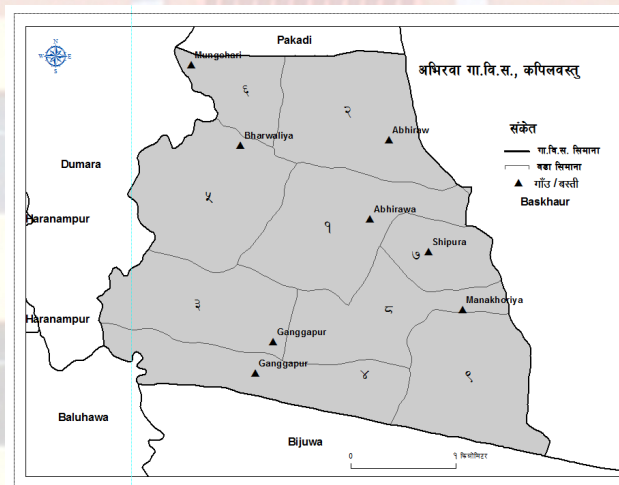
- ब्लक १४**  
**पूर्व :** रामशाहपथ (सिंहदरवार) सेटअगाडीबाट धापाथली चौकसम्म।  
**उत्तर :** कुमारी मार्गबाट दशरथ मार्ग हुँदै विपुलेश्वर चौक र कान्तीपथ बाट मुधारा चौक हुँदै भद्रकाली तथा सिंहदरवार सेटसम्म।  
**पश्चिम :** कुमारी मार्ग (विपुलेश्वर बाट दशरथ मार्ग चौकसम्म)।  
**दक्षिण :** विपुल पथ (धापाथली) फोकदेखि कुमारी मार्ग जाने चौक सम्म।

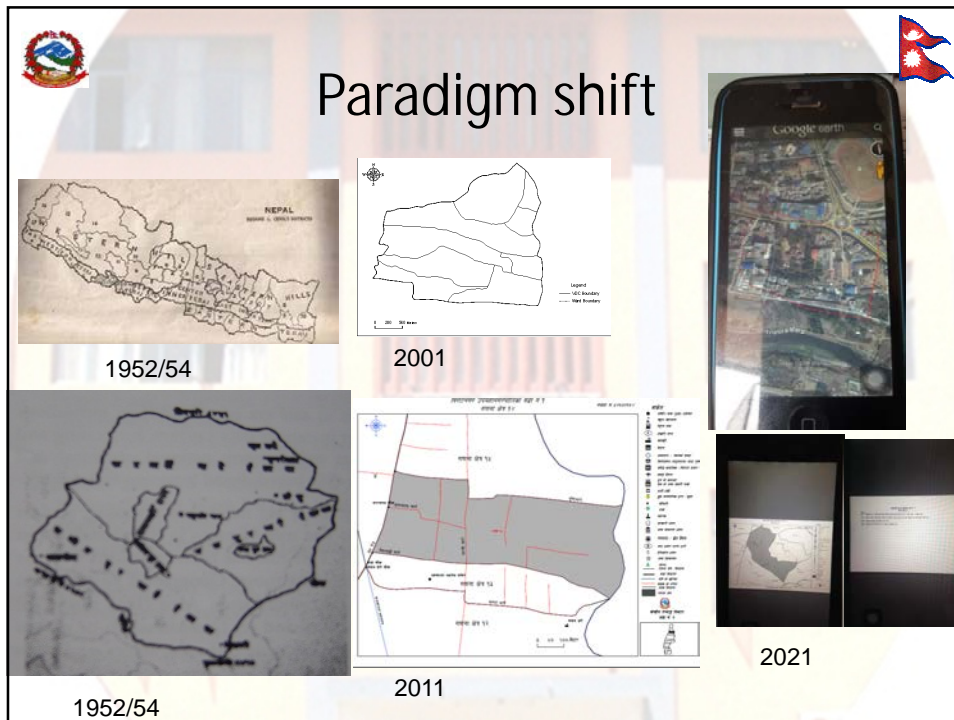


# EA Map for Tablet User



# EA Map for VDC





**Target for FY 2073/74**

- Training on EA mapping data collection – 2
- Training on Digitation and preparation of EA Map - 4
- EA maps of 22 Municipalities outside Kathmandu Valley
- EA maps of 22 Municipalities inside Kathmandu Valley
- EA Map for VDC of 30 Districts
- 66 EA map for Pilot census



## Current Status



- Training for Staffs of District offices on EA mapping data collection already conducted
- Training for Staffs of District Offices on Digitation and preparation of EA Map is partially completed ( will be completed in April 2017
- Already started spatial data collection for the municipalities out side of Kathmandu valley by district offices except the district involved in NRA field work.

## Current Status

- Some district offices has already started digitizing
- Preparation of EA maps for Pilot survey will be completed on next week.
- The spatial data collection for the municipalities inside Kathmandu Valley has not started yet.
- Minimum 10 Enumerators are required starting spatial data collection and update of municipalities. If this can be managed, the GIS section meet the target of this fiscal year.



## Limitations and Problems



- The Base map (Topo sheet) has problems in ward boundary
- Lack of budget for conducting training in EA mapping and digitation for all district office staffs
- Lack of human resource in SOs for data collection and digitization
- The field data collection and digitization work should be performed using out sourcing method for better result.
- But lengthy government procedure for hiring field staff and digitation staff.



## Challenges



- There has been tremendous growth of Settlements and Establishments in urban areas. There are already 217 urban area in the country. It is essential to develop quality EA maps for all municipalities and densely populated VDC but budget is constraint in CBS to purchase satellite images for all municipalities and perform mapping activities.
- In the absence of the good enumeration area (EA) maps, it is very difficult to conduct the census and achieve the complete coverage and enumeration of the whole country.



## Conclusion



- Census mapping is considered to be very important sector in all stages of different censuses and surveys.
- The presentation of census/survey results with visualization in the map has been more effective and efficient nowadays for the prospective users to fulfill their purpose.
- Time has come to think seriously to change the census taking procedure from traditional methods to the modern technology ; and to find the alternative ways for development of geodatabase and prepare a new map base; for future censuses and surveys to come, once for ever.
- The GPS coordinate of all Establishment has to be collected which will be helpful to manage different other economic related censuses and surveys.



Suggestions and Feedbacks  
are highly Welcomed !!!  
Thank You



