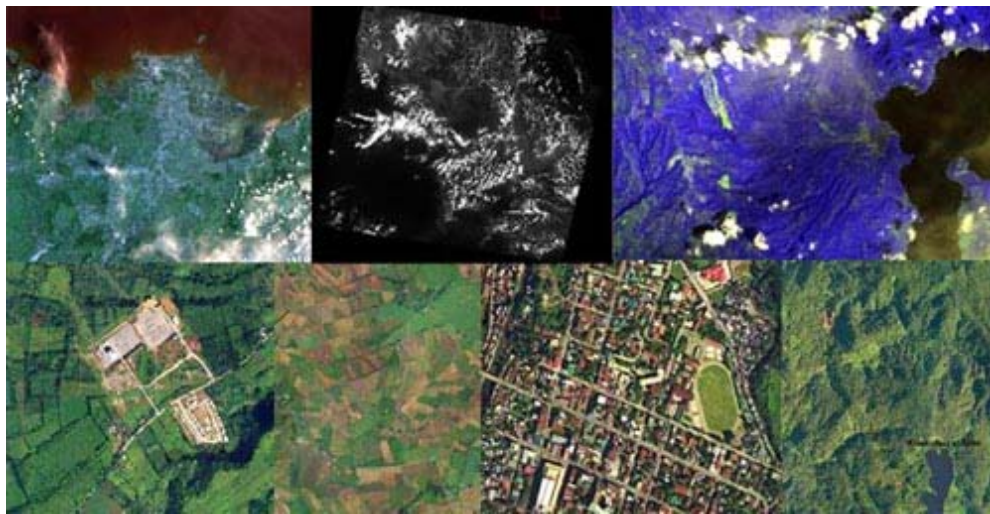




### 4.09.02 Land Management: Existing Land Use

*Note: This is a first attempt to provide guidance in preparing the information product needed for the CLUP and is intended to be used hand-in-hand with Volumes 1 and 2. As more knowledge is gathered, the IP will be updated. Likewise, updates may be required due to new or changing land-use policies. Furthermore, data will continuously be prepared by the custodians, which may require updates.*

For the latest update, please check HLURB Homepage: <http://www.hlurb.gov.ph/> or contact HLURB, telephone +632 927 2698.



#### Step 1: Provide a Background and Identify the Objective of the GIS Analysis

Remote Sensing is the act of obtaining information about an object from a distance. Although that distance can be **near or far**, remote sensing usually means gathering data from some distance above the Earth's surface (e.g. aerial photography and satellite remote sensing).

Satellite Image- A picture of the earth taken from an earth-orbital satellite. Satellite images may be produced photographically or by on-board scanners (e.g. MSS).

Aerial Photo- High altitude pictures taken from an aircraft or satellite.

The objective is to prepare an existing land use map of the municipality/city to see the actual development in a municipality/city.



	Satellite images and aerial photos will greatly aid the planner in delineating the boundaries of the different land uses. This is the best and quickest way to prepare an existing land use map.	
	<b>Step 2: Identify the Indicators to Evaluate Land Use</b>	
	<p>Validation on the ground or ground truthing is necessary to determine the correctness of the initial land use interpretation.</p> <p>Built-up Area – a contiguous grouping of ten (10) or more structures  Agricultural – an area within a city/municipality intended for cultivation/fishing and pastoral activities, e.g. fish farming, cultivation of crops, goat/cattle raising, etc.  Forest - an area within a city/municipality intended primarily for forest purposes  Residential - an area within a city/municipality principally for dwelling/housing purposes  Commercial - an area within a city/municipality for trading/services/business purposes  Industrial – Includes manufacturing, refining, fabricating, assembly, storage, parking and other incidental uses; including food processing, cottage industries, sawmills, rice mills, steel mills, chemical processing, etc.  Institutional - an area within a city/municipality principally for general types of institutional establishments e.g. government offices, schools, hospitals/clinics, academic/research, convention center.</p>	
	<b>Step 3: Create the Database</b>	
	<b>Attributes</b>	
	<p>The following attribute table may be used for this sector. It is used for the examples here.</p> <p><b>LM01 Existing General Land and Water Use</b></p>	
	The Custodians of sector data are NAMRIA (For Land Classification), LMB (For A&D Lands) and the LGU.	
	<b>Spatial</b>	
	The following Analyses layers can be prepared from the Baseline Information:	
	The use of aerial photos or satellite imagery is recommended in the	



preparation of an Existing land Use map of a municipality/city.

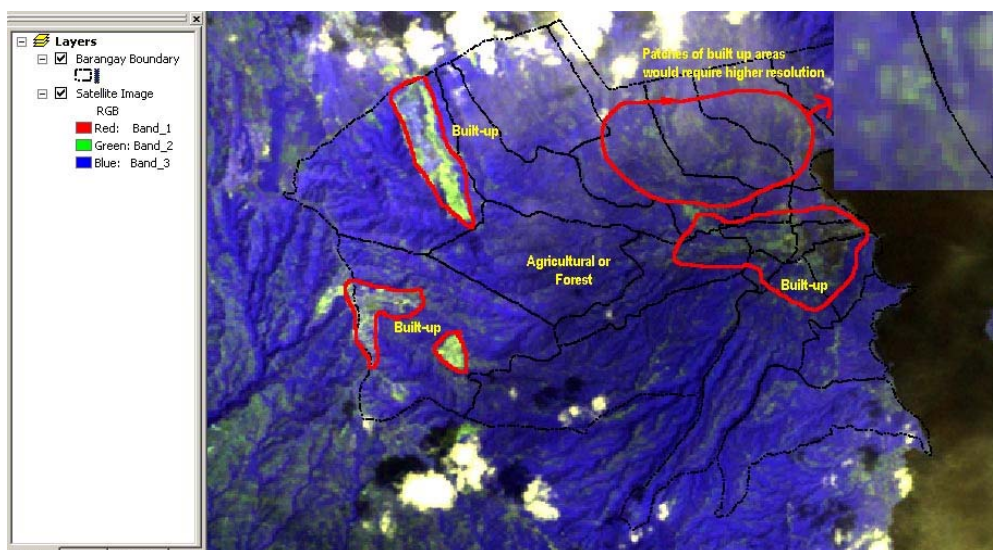
The resolution of the Satellite Image and the size of the municipality/city are of major consideration. High-resolution satellite images (2.5 m or higher) are ideal and will be useful for both urban and rural areas but these are more expensive. Low resolution Satellite images (10 m or lower) are inexpensive and can cover a larger area but are only of good use for rural areas (forest, agricultural) and in identifying built up/urban areas. For low-income municipalities, it is advisable to have high resolution satellite Images.

For a large rural municipality/city, a combination of Low Resolution Satellite Images and either Aerial Photography or High Resolution Satellite image may be very useful in preparing the existing land use map for LGU. Aerial Photography or High Resolution Satellite images will best be used for the urban areas (usually the Poblacion). Archive images of not more than 5 years for rural areas and 3 years for urban areas may be used. If the available archive image is older, or no Aerial Photographs are available, it is advisable for the LGUs to acquire these photos if funds allow.

Aerial Photos or satellite images will not be enough to create the existing land use map. At first, they can be used to view the municipality/city 'from the top'. An initial interpretation of the images can already be made to determine the actual land use, however, ground survey is necessary to determine unidentifiable features and to verify if initial interpretation is correct.

It is also preferable that the base map coincide with the aerial photos or satellite images. Documentation on how and what adjustments were made to whatever dataset was adjusted should be created and attached as metadata on the adjusted layer.

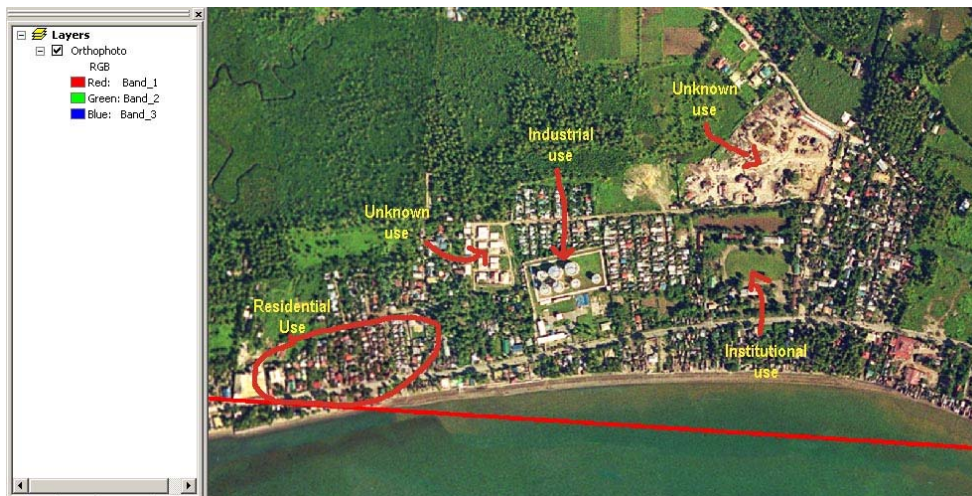
The figure below shows a satellite image overlaid with the base map of the municipality/city. Low-resolution satellite images distinguish between built-up and vegetation which maybe agricultural or forest use. Higher resolution will be required for built-up areas. Further processing of the image using Remote Sensing software may further distinguish agricultural and forest use.



An aerial photo also shows land that is used for agricultural purposes. Areas marked in red are built-up areas where more detailed inspection should be done.



Further inspection of the built-up areas will show possible uses in these areas.



Determining land use for a certain area can be based on stored knowledge. Municipal planners usually know the locations of schools and big industries and once they see them in the photos, these are easily interpreted/identified.

The following figures constitute a basic photo interpretation tutorial:

Residential areas are usually clusters of small buildings, organized in blocks and streets.



Agricultural lands can easily be identified as big areas of green or open areas while brown patches are rice paddies that have not yet been planted.



The presence of these irregularly shaped structures that look like storage facilities indicates a possible industrial activity.



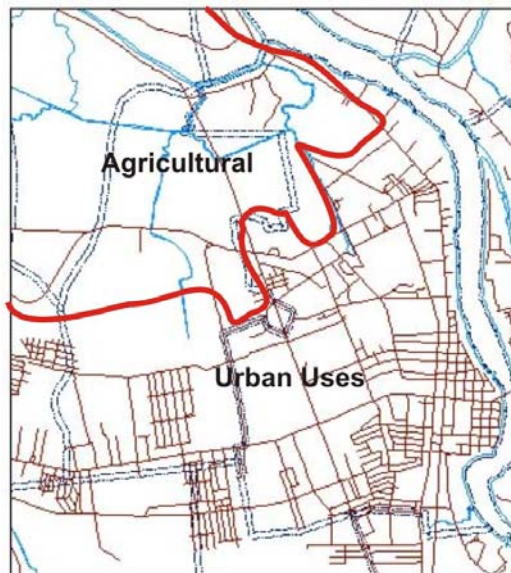
There will however be features that will be difficult to identify. The photo below left is a possible construction site or just an open area, while the one on the right may be an industrial building or factory, a school facility or a site for mass housing (BLISS or condominium type). In this case, and for other similar cases, ground truthing or field validation is necessary.



Urban Areas will require more detailed inspection, since the uses of the areas in the aerial photos will only be approximated. A field survey will give the exact details of the actual uses.



Google earth will also be very useful if a High Resolution image is available for the LGU. Though the images in Google Earth cannot be downloaded or read directly from a GIS software, it can still aid in the delineation of land uses. With a base map, it can be used as a guide to determine land use as shown in the example below.



The outcome will be a draft existing land use map that will be verified by field survey. It's handy to have this printed and overlaid with the aerial photo and brought along when the field survey is conducted.



LAND USE CATEGORIES	COLOR CODING
Urban Use Areas	
Residential	Yellow (yellow A), RGB-255,255,130
Commercial	Red (super warm red A), RGB-255,0,0
Infrastructure/utilities	Gray, RGB-190,190,190
Institutional	Blue (293-A), RGB-0,0,255
Parks/playgrounds and other recreational spaces	Light Green, RGB-100,225,100
Industrial	Violet (265-A), RGB-140,0,200
Agriculture	Green (354-A), RGB-0,150,0
Forest and forest use categories	Dark Green (different symbols/ patterns over dark green background per forest use category), RGB-0,100,0
Mining/quarrying	Brown (139-A), RGB-153,51,0
Grassland/pasture	Olive Green (399-A), RGB-90,125,40
Agro-industrial	Light Violet (528-A), RGB-200,150,255
Tourism	Orange, RGB-255,102,0
Other uses /categories Cemeteries Dumpsites/Sanitary Landfills Buffer zones/greenbelts Idle/vacant lands Reclamations	Appropriate color other than the above
Water uses Nipa Swamps Mangrove Forest Tourism (recreation/resorts) Settlements on Stilts Infrastructure (e.g. ports/fish landing) Aquaculture and Marine Culture (e.g. fish cages/fishpens, seaweed culture) Others, specify (e.g. river sand/gravel quarrying)	Light blue super-imposed with different patterns/symbols per sub-category. RGB-175,215,230



0 \*Definition of terms for coastal and marine areas are provided in Annex  
0 4-4.



For field validation, refer to Chapter 4.19.02 (Case Study – How to Prepare a Barangay Survey). Once ground verification is complete, the changes or corrections should be made with the aid of the aerial photos.

Updated Land Use Map for Barangay Linao 2006

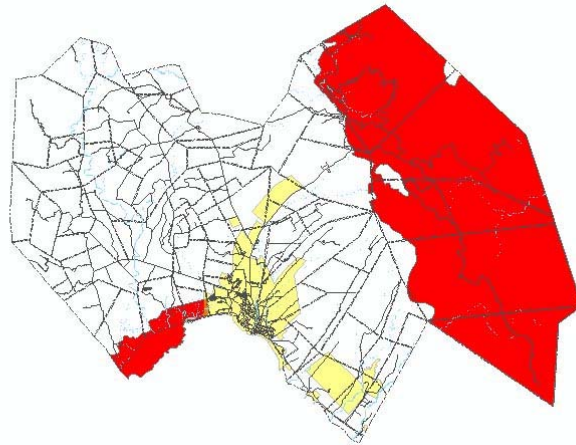
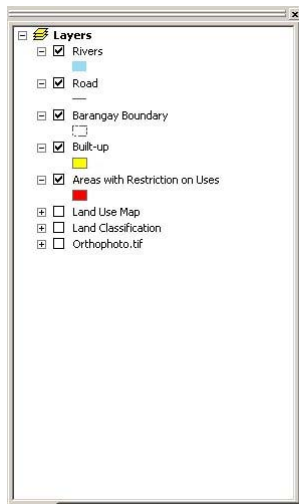


**Step 4: Analyze the Data**

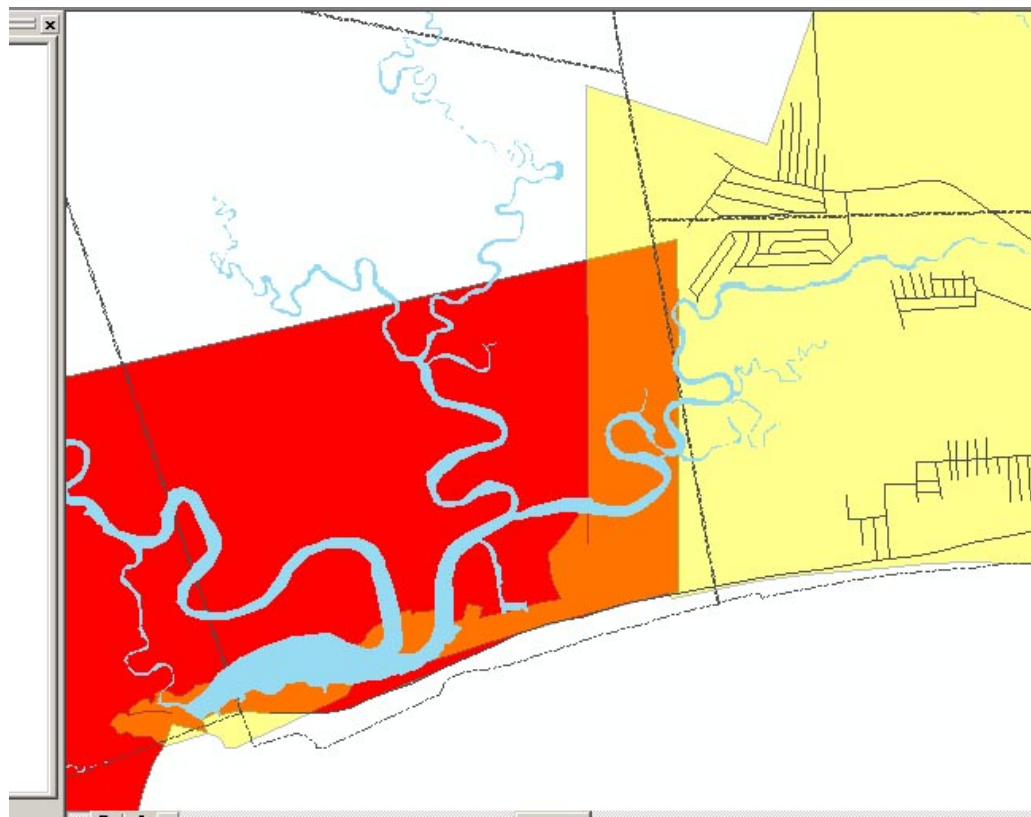
The existing land use map will show whether any of the land uses are in conflict with other data that have legal restrictions like NIPAS, Protected



**Areas and Forestlands.** This can be done by highlighting the uses that will be conflicting with the usual restricted activities like commercial, industrial or recreational activities like golf courses. It is more informative when overlaid with the base map.

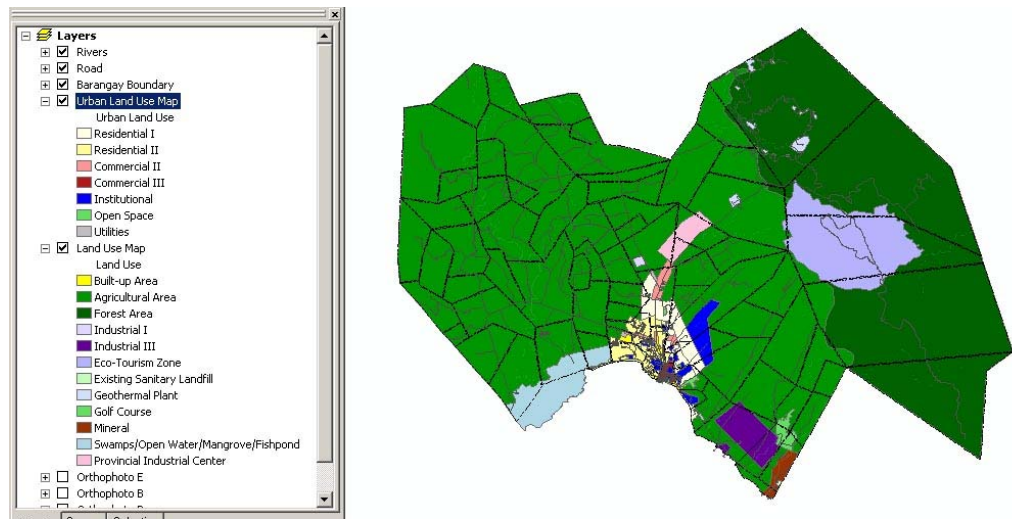


In this example figure, the identified land use is analyzed for conflicting uses. In the scenario below, red color is used for areas with restricted use (mangrove area). The area at the lower left in yellow color, and the large area in yellow, represent the built up areas, which as shown below have areas of overlap with the red color. The colors selected make it possible to make the overlaps more visible. By making the yellow layer semi-transparent, any overlaps will be reflected as orange area, which represent in this case those areas of conflicting use.



**Step 5: Present the Data**

The existing Land Use Map of the whole municipality/city overlaid with the base map.



**Layers**

- Rivers
- Road
- Barangay Boundary
- Urban Land Use Map
  - Urban Land Use
    - Residential I
    - Residential II
    - Commercial II
    - Commercial III
    - Institutional
    - Open Space
    - Utilities
- Land Use Map
  - Land Use
    - Built-up Area
    - Agricultural Area
    - Forest Area
    - Industrial I
    - Industrial III
    - Eco-Tourism Zone
    - Existing Sanitary Landfill
    - Geothermal Plant
    - Golf Course
    - Mineral
    - Swamps/Open Water/Mangrove/Fishpond
    - Provincial Industrial Center
- Orthophoto E
- Orthophoto B



The details of the urban land use are shown below.



The land area should be quantified in a matrix as shown below.

LAND USE CATEGORIES	AREA ( in hectares)	PERCENT TO TOTAL
Urban Area	1891.25	4.03
Residential	1136.80	60.11
Commercial	244.02	12.90
Institutional	403.13	21.32
Utilities	63.25	3.34
Open Space	44.02	2.33
Agricultural Area	26612.65	57.37
Forest Area	13307.11	28.69
Industrial	596.46	1.29
Geothermal Plant	143.81	0.31
Eco-Tourism Zone	2324.35	5.01
Golf Course	129.58	0.28
Provincial Industrial Center	298.96	0.64
Existing Sanitary Landfill	4.68	0.01
Mineral	156.93	0.34
Swamps/Open Water/Mangrove/Fishpond	945.64	2.04
<b>TOTAL</b>	<b>46411.48</b>	<b>100.00</b>