

# VBMP Land Cover Mapping Products

## VIRGINIA BASE MAPPING PROGRAM

Land management and land planning requires a knowledge of the current state of the landscape. Understanding current land cover and how it is being used, along with an accurate means of monitoring change over time, is vital to any person responsible for land management. Measuring current conditions and how they are changing can be easily achieved through land cover mapping, a process that quantifies current land resources into a series of thematic categories, such as forest, water, and paved surfaces.

By using remotely sensed imagery and semi-automated classification methods, Sanborn provides cost-effective and accurate means to derive land resource information and maintain its currency into the future.

More current, accurate, and cost-effective methods for gathering information about landscape change have become increasingly evident to users in the fields of urban planning, land management, and natural resource conservation. Sanborn offers three scales of land cover products that can be tailored to meet your needs from nationwide mapping to town and cities.

### Who benefits from Land Cover Mapping?

The surface of the Earth is continuously changing at many levels; local, regional, national, and global scales. Changes in land use and land cover are pervasive, increasingly rapid, and can have significant impacts for people, the economy, and the environment. Organizations that will benefit from the information derived from land cover solutions are:

- Federal agencies
- State, city, county government agencies
- Environment and research organizations
- Water districts
- Private forestry organizations

### Land Cover Mapping Applications

Sanborn's land cover products and solutions are used for planning land use and deriving additional thematic layers to support land management applications such as:

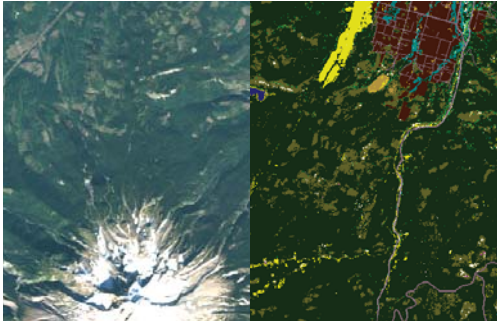
- Impervious quantifications for stormwater runoff prediction and drainage requirements
- Tree canopy calculations for stormwater runoff and pollution impact studies
- Irrigated and non-irrigated water use calculations for arid areas
- Environmental assessment of undeveloped and vacant land identification
- Planning green space and trails for recreational purposes and other urban planning applications
- Ecosystem or forest species and community maps
- Fire hazard maps that relate to fuel availability for wild land fires
- Urban planning assessment



Top: Michigan Stadium, Ann Arbor, 6" aerial imagery  
Bottom: Enhanced Land Cover data

## VBMP Land Cover Mapping, continued

Sanborn has created regional, state, and nationwide land cover data sets for the US and many other parts of the world. Sanborn has successfully mapped over a billion acres of land cover from satellite imagery and has been integral in data production for the USGS National Land Cover Dataset (NLCD), the NOAA Coastal Change Assessment Program (C-CAP), and the USGS GAP project.

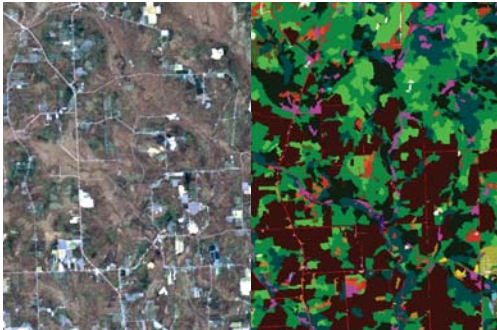


### Regional Land Cover

Cost-effective land cover planning and management can be achieved over large areas with remotely-sensed land cover mapping data. Land cover mapping classifies the current land conditions to a series of land cover categories. Comparing two or more similar land cover classifications can provide insight into change occurring on the landscape.

Sanborn offers a product based of 30 meter imagery, which is appropriate for areas that are greater than 500 square miles. Sanborn's Regional Land Cover product provides an accurate and cost-effective way to monitor changes in land cover for decision making.

This product meets most land management activities for both state and federal governments that require broad scale data for research projects and planning by non-profit organizations.



### Standard Land Cover

Sanborn has developed a medium resolution product that leverages Regional Land Cover scale information yet refines the land cover boundaries. This cost effective product is a polygon based map with a five meter impervious dataset that allows statewide planning at a price and accuracy that previously was not possible.

This land cover is perfect for regional governments, states, and multi-state regions 200 - 100,000 square miles. It is easy to interpret and accurately maps smaller areas with more defined boundaries. The product also delivers a five meter impervious layer. Being polygon based with well defined boundaries, allowing easier identification of smaller features, and separate broken out impervious structures are the advantages of the Standard Land Cover product.



### Enhanced Land Cover

Sanborn can collect new high-resolution multispectral imagery over an area of interest or use existing imagery to create land cover data sets for any community. Using proven semi-automated classification techniques we produce a precise, accurate, and detailed land cover map. This provides comprehensive land cover inventory, along with the means to monitor conditions over time through change detection analysis.

Digital data is classified by Sanborn into land cover classes required for planning. This solution is compatible with all of today's popular GIS software products and integrates with existing workflows and GIS data layers.

### Sample Enhanced Land Cover Classification Categories

Baseline	Level 1	Level 2
Impervious	Impervious	Impervious
Pervious	Woody	Deciduous Evergreen Shrub
	Non-Woody Vegetation	Grassland Cropland
	Water	Lake River Pond
	Barren	Natural Man-Made



## Sanborn Land Cover Technical Specifications



Regional Land Cover: Panama City, Florida  
Imagery source: 30 meter Landsat™

### Regional Land Cover

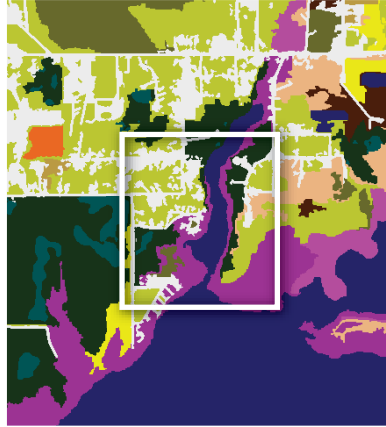
- Based off ~30m imagery
- Nominal scale 1:60:000
- Appropriate for areas > 500 square miles
- 18 classes
- Overall 85% accuracy
- Minimum mapping unit 2 acres
- Delivered as a raster dataset (grid)

### Applications

- Regional planning
- Land cover trend analysis
- Watershed management
- Forest analysis

### Options

- Additional classes
- Change analysis
- Canopy and impervious % maps
- Fuels map
- Impervious surface model



Standard Land Cover: Panama City, Florida  
Imagery source: 5 meter IRS ResourceSat

### Standard Land Cover

- Based off ~5m imagery
- Nominal scale 1:24:000
- Appropriate for areas > 200 square miles
- 18 classes
- Overall 85% accuracy
- Minimum mapping unit 1 acre, impervious as 0.5 acres
- Deliverable as a raster or vector dataset (polygon)

### Applications

- State and county planning
- Stormwater management and modeling
- Forest inventory analysis
- Natural resource management
- Urban planning

### Options

- Additional classes
- Change analysis
- Urban ecosystem analysis
- Increased accuracy
- Impervious surface model



Enhanced Land Cover: Panama City, Florida  
Imagery source: 1 meter IKONOS

### Enhanced Land Cover

- Based off 1m imagery
- Nominal scale 1:8:000
- Appropriate for areas < 1,000 square miles
- Number of classes
  - Impervious: 2 classes - 90% accuracy
  - Level 1: 5 classes - 90% accuracy
  - Level 2: 11 classes - 85% accuracy
- Minimum mapping unit 0.3 acre, impervious as 0.01 acres
- Deliverable as a raster or vector dataset (polygon)

### Applications

- Air quality management
- Stormwater planning and modeling
- Urban planning and zoning
- Greenways planning
- Urban tree management
- Fire hazard assessment
- Environmental assessments
- Impervious or canopy model provided\*

### Options

- Green infrastructure version
- Fuels version
- Irrigated, non-irrigated version
- Change analysis
- Urban ecosystem analysis
- Increased accuracy
- Additional classes

























\* application provided based on source imagery

**Standard Land Cover classification categories | Maine DEP**

“The new Maine land cover and impervious data provided by Sanborn has gone such a long way to providing our users with better tools to make decisions. We can perform watershed analyses and do modeling at a scale and accuracy level that was never before possible.” —Michael Smith, Maine DEP



The chart below provides the basis for the NLCD classification system and an example of custom classifications systems developed for the State of Maine (illustrated above). The State of Maine chose to include both blueberry and forest management classifications.

Level 1 (Regional)	National LCD (Standard)	Maine LCD (Custom Standard)
Developed	Developed, High Intensity Developed, Medium Intensity Developed, Low Intensity Developed, Open Spaces	<ul style="list-style-type: none"> <li> Developed, High Intensity</li> <li> Roads/Runways</li> <li> Developed, Medium Intensity</li> <li> Developed, Low Intensity</li> <li> Developed, Open Spaces</li> </ul>
Agriculture	Cultivated Pasture/Hay	<ul style="list-style-type: none"> <li> Cultivated</li> <li> Blueberry</li> <li> Pasture/Hay</li> </ul>
Openland	Grassland Tundra Scrub/Shrub	<ul style="list-style-type: none"> <li> Grassland</li> <li> Tundra</li> <li> Scrub/Shrub</li> </ul>
Forest	Deciduous Forest Evergreen Forest Mixed Forest	<ul style="list-style-type: none"> <li> Deciduous Forest</li> <li> Evergreen Forest</li> <li> Mixed Forest</li> </ul>
<b>Forest Management Classes</b>		<ul style="list-style-type: none"> <li> Clear Cut</li> <li> Light Partial Cut</li> <li> Heavy Partial Cut</li> <li> Forest Regeneration</li> </ul>
Water	Water Perennial Snow/Ice	<ul style="list-style-type: none"> <li> Water</li> <li> Perennial Snow/Ice</li> </ul>
Wetland	Woody Wetland Emergent Wetland	<ul style="list-style-type: none"> <li> Forested Wetland</li> <li> Emergent Wetland</li> </ul>
Bare	Bare Land Unconsolidated Shore	<ul style="list-style-type: none"> <li> Bare Land</li> <li> Unconsolidated Shore</li> </ul>

**Deliverables:**

- The dataset will be delivered with an accuracy assessment and FGDC compliant metadata.
- The final product will be produced in the .TIFF file format and will be delivered on media appropriate to the size of the file.
  - CD – File Size < 700 MB
  - DVD – File Size < 4.7 GB
  - Hard Drive – File Size > 4.7 GB
- Optional delivery method via FTP (file transfer protocol) allows the file to be downloaded without the use of additional media.

**Accuracy Assessment**

On all products, an accuracy assessment is conducted using standard procedures. This is done by randomly selecting a series of points throughout the area and determining whether the classification is correct or incorrect. Sanborn will detail the methodology used at the kickoff meeting.

**About Sanborn**

With a rich tradition of mapping dating back to 1866, Sanborn provides comprehensive end- to-end geospatial solutions. Sanborn offers products and services that satisfy diverse and evolving customer needs for GIS software systems, application development, systems integration, and spatial analysis and modeling. Leveraging precision remote sensing techniques, Sanborn also supports a wide range of applications and users. Sanborn’s solutions are founded on a strong legacy of innovative geospatial data collection and processing capabilities. An internationally recognized company, Sanborn has multiple U.S. offices with customers worldwide. For more information, visit [www.sanborn.com](http://www.sanborn.com).