

*Using Parcel Based Data to Improve the Accuracy of Measuring
Developed Land at the County Level*

*Prepared by
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*For
The Council on Affordable Housing
Department of Community Affairs
State of New Jersey*

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1.0 Introduction

During the two recent public comment periods associated with adoption of amended and final Third Round Rules by the New Jersey Council on Affordable Housing (COAH), a number of municipal and county planning officials questioned the accuracy of the vacant land analysis prepared by The National Center for Neighborhood & Brownfields Redevelopment (the Center) because it did not utilize more current local land use information. Many of these officials were using recently developed parcel based spatial data and related local property tax information to compare with the DEP's 2002 LU/LC and other statewide data utilized by the Center in its study. COAH requested the Center to conduct a pilot study to determine how and why the results might differ, and what the impact might be on future development capacity. Somerset County offered to provide its county-wide parcel based zoning and MOD IV property information for this analysis.

2.0 Land Use Definitions

Vacant land is defined as those lands which are undeveloped and not environmentally or otherwise constrained from future development, based on current State or regional agency regulations and policies. Thus the determination of what lands are "developed" versus undeveloped is critical to the identification and calculation of vacant land.

1.1 Vacant Land

In the several Vacant Land analyses conducted for COAH over the past 12 months, the Center divided the State into five geographic and regional units in order to recognize differences in regulatory and policy land use constraints imposed by the three regional planning agencies versus other areas of the State, as well as the availability and use of data sources of differing quality and detail:

- Meadowlands
- Pinelands
- Highlands Planning Area
- Highlands Preservation Area
- Rest of State

The most current version of the Draft State Plan Policy Map was provided by the Office of Smart Growth (OSG) and used to delineate State Planning Areas and the boundaries of the Meadowlands and Pinelands. The Highlands boundaries were downloaded from its web site. The three regional areas were extracted from the LU/LC base map and addressed separately as described in this report. A number of municipalities partly located in the Meadowlands and Pinelands were split into two parts, and vacant land was computed separately for each section based on rules appropriate to that area.

A number of studies of vacant land at the municipal, county, regional and state level have been conducted in recent years by different organizations using differing methodologies and spatial data sets. The Center felt that it was critical for COAH to use the most current and accurate spatial data available, and that it use a set of assumptions and methodologies that were supported by OSG and the Department of Environmental

Protection (DEP). To this end a meeting was held in May 2007 with representatives from OSG, DEP, COAH, the Center and the U Penn Team, to discuss what data was available and how it should be used to produce the most accurate estimate of vacant land under current State regulation and land use policies.

It was agreed that vacant land outside of the New Jersey Highlands, Pinelands and Meadowlands (“Rest of State”) would be calculated by the Center using spatial files made available by OSG, DEP and the NJ Department of Agriculture. The DEP’s 2002 LU/LC spatial file would be used as the base file, and the following spatial data would be removed/subtracted from it to obtain vacant lands available for future development (see attached LU/LC Dictionary):

1. All lands within the legislated boundary lines of the New Jersey Highlands, Pinelands and Meadowlands;
2. Lands already developed (IDs 1 – 5 in Dictionary);
3. Undeveloped-Unavailable Lands (IDs 10 & 11);
4. Undeveloped Wetlands (ID 9);
5. Public open space, parks, etc. (from OSG);
6. Private open space (from OSG);
7. Preserved farmlands (from NJ Department of Agriculture);
8. Buffers around C-1 streams (calculated by Center);
9. Developed areas within LU/LC code 1700 (from DEP); and
10. Upper Wetlands Boundary/Upper Wetlands Limit (from DEP).

The lands that were removed in this process included those that were already developed; waters and wetlands where development is either not permitted or highly restricted under current DEP rules, including 300 foot buffers around all Category One streams and their primary tributaries; parks, and privately and publicly acquired lands for open space or land conservancy purposes; preserved farmlands; and other lands deemed by DEP to be unavailable for development pursuant to current environmental rules and regulations. The Center subsequently expanded the above list of constrained lands to remove floodplains and riparian zones described in the Flood Hazard Area Control Act Rule (N.J.A.C. 7:13) adopted on November 5, 2007.

1.1.1 Meadowlands

The New Jersey Meadowlands Commission has a comprehensive and up-to-date spatial database of the entire District which identifies developed, constrained and vacant land at the individual parcel level. A detailed review of this spatial database by Meadowlands Planning staff indicated that several undeveloped parcels are right-of-ways, roads, water or otherwise not vacant. After these adjustments and consideration of the new Flood Hazard Area rule, it was determined that there are only 224 acres of vacant buildable land remaining in the Meadowlands.

1.1.2 Pinelands

The New Jersey Pinelands Commission has an extensive spatial database that supports its Comprehensive Management Plan Land Capability Map, including parcel level detail on constrained and federal owned lands. However, it does not specifically identify vacant

lands. The Center therefore used the same Rest of State methodology and data sources to create an initial spatial analysis and map for the Pinelands planning staff to review and compare with their own in-house studies.

The Center subsequently removed lands constrained under the recently adopted Flood Hazard Area Control Act (see Sections 3.1.1 above) and other lands identified by the Pinelands Planning staff as being constrained and unavailable for development. This resulted in an estimate of 220,268 acres of undeveloped and unconstrained vacant land in the Pinelands.

1.1.3 Highlands Planning Area

With concurrence from DEP, the Highlands Council and COAH, the Highlands were divided into the two regional areas for purposes of determining vacant land. A number of towns were split into two parts, and vacant land was computed separately for each section based on rules appropriate to the Planning and Preservation Areas.

The Center used the Rest of State vacant land methodology and data sources to create an initial spatial analysis of vacant land for the Planning Area. It then subtracted or removed a hydrology layer of stream buffers, using a downloaded copy of the *Highlands Open Waters Protection Area* spatial file from the Highlands web site, a steep slopes layer, using a downloaded copy of the *Slope Greater Than 15 Percent, Undeveloped* spatial file and an updated *Open Space* spatial file on the same web site, to create a final vacant land spatial file. It was determined that the *Highlands Open Waters Protection Area* spatial layer already represents those lands constrained under the recently adopted Flood Hazard Area Control Act. Total vacant land in the Planning Area was estimated to be 104,479 acres.

1.2 Developed Lands

Of specific interest to today’s study is that “developed land” in all of these regions was defined as all lands located within the following standardized Anderson Land Use Codes according to the DEP 2002 LU/LC spatial database:

1 Residential	LU2002_code	Label_02
	1110	RESIDENTIAL, HIGH DENSITY, MULTIPLE DWELLING
	1120	RESIDENTIAL, SINGLE UNIT, MEDIUM DENSITY
	1130	RESIDENTIAL, SINGLE UNIT, LOW DENSITY
	1140	RESIDENTIAL, RURAL, SINGLE UNIT
	1100	RESIDENTIAL
	1150	MIXED RESIDENTIAL
2 Non-Residential	LU2002_code	Label_02
	1200	COMMERCIAL/SERVICES
	1300	INDUSTRIAL
	1500	INDUSTRIAL/COMMERCIAL COMPLEXES
	1600	MIXED URBAN OR BUILT-UP LAND
	7300	EXTRACTIVE MINING
3 Other - Military	LU2002_code	Label_02

1211 MILITARY RESERVATIONS

4 Other - Transitional

LU2002_code	Label_02
7500	TRANSITIONAL AREAS
7400	ALTERED LANDS
7430	DISTURBED WETLANDS (MODIFIED)

5 Other - Plat

LU2002_code	Label_02
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES
1410	MAJOR ROADS
1419	BRIDGE OVER WATER
1440	AIRPORT FACILITIES
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)
1462	UPLAND ROW (undeveloped)
1463	UPLAND ROW (undeveloped)
1499	STORM WATER BASIN
1701	OTHER URBAN OR BUILT-UP LAND (developed)
1710	CEMETARY
1711	CEMETARY ON A WETLAND
1800	RECREATIONAL LAND
1804	ATHLETIC FIELDS (SCHOOLS)
1810	STADIUMS, CULTURAL CENTERS & ZOOS
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA

NOTE: The code "1701" was assigned by NCNBR and is not a standard Anderson LULC code. Richard Grabowski of the NJDEP used 2002 aerial imagery to identify lands in the "1700" category that should be considered developed. These developed "1700" lands have been given the new designation "1701"

In total, the DEP 2002 LU/LC analysis identifies 1,415,207 acres across the State as being developed, and after all of the adjustments described above the Center estimated that there are 1,012,692 acres of undeveloped and unconstrained (vacant) land.

1.3 Parcel Based Spatial Data

Local governments in New Jersey have responsibility for managing and regulating three aspects of privately owned land:

- Property ownership registration and the recording of related legal documents for public access and review;
- Property tax assessment;
- Land use zoning, development regulation, and the issuance of building and construction permits.

These tasks are usually handled by different departments within the local governmental and computerized database management systems are frequently isolated from each other, despite managing various aspects of the same pieces of property. The systems are frequently unable to relate data common to a single parcel of land such as whether it is developed or not and how it is zoned.

With the development of geographic information systems (GIS) over the past ten years, many cities and counties began digitizing their property tax maps and used digital ortho

rectified photography and planimetric data from state and federal agencies to create accurate parcel based spatial maps of their communities that included roads, water bodies and other important geographic features. The process is sometimes slow and costly, as old paper property maps generally lack geospatial coordinates and scanning them creates digital maps with boundary lines that sometimes disagree with ortho photos and other data sources due to different spatial scales.

Although many counties, such as Morris, Somerset and Hunterdon counties have developed accurate county-wide spatial maps that cover hundreds of thousands of individual parcels, others, such as Middlesex County, have decided that the cost of collecting the data and preparing and maintaining a county-wide database outweighs the potential benefit. No statewide database has been developed to date, although the New Jersey Office of GIS maintains a listing of parcel files that have been created by Atlantic, Bergen, Burlington, Camden, Cumberland, Gloucester, Hunterdon, Mercer, Monmouth, Morris, Ocean, Salem, and Warren counties. The list indicates that 15 of the State's 21 counties have completed full and reasonably accurate spatial databases.

In addition to creating an accurate spatial map the individual parcels have to be linked to municipal property tax or MOD IV information. This is largely a manual process, since the digitizing of the paper tax maps does not automatically capture the Block & Lot or street address attributes of each parcel. Once completed, the property tax database and parcel based map can be linked or even merged into a single database that enables the user to identify those parcels that should be considered "developed" because the tax records indicated the existence of improvements (buildings). Similarly parcels can be identified that are most likely "undeveloped" because they are coded in the MOD IV Property Class Attribute as "1 – Vacant" or "3B – Farm Qualified."

This system appears to be much better than relying on ortho photos to identify developed and undeveloped lands, but the process is not perfect. As noted on Morris County's web site, "The record joining process is not always complete, however. Morris County's GIS contains several parcel polygons that have no matching tax records. Likewise, several tax record parcels exist wherein the records have no parcel polygons associated with them. Unmatched records occur for several reasons; some mismatches are caused by physical errors in recordkeeping or geocoding, some mismatches are due to records being out of date in either the GIS or the tax records, and other mismatches are a result of working with New Jersey's Tax Record system."¹

In addition, the underlying software and data are limited. MOD IV, the assessment administration system currently used in New Jersey, was developed 25 years ago by a private vendor and is considered outdated by the State because:²

- Data is not timely or easily accessible
- Integration with other systems is difficult and costly
- Functionality is limited
- Sharing of data is cumbersome

¹ <https://morrisgis.co.morris.nj.us/parcelMaintenance.jsp>

² <http://millville.org/treasury/taxation/index.html?pamsvol/history.htm~mainFrame>

To address these limitations, the Division of Taxation contracted with Tyler Technologies, Inc. of Dallas, Texas in 2005 to develop and implement a statewide Property Assessment Management System (PAMS) which will integrate, streamline, and standardize the business functions at all levels of government to administer the local property tax code and share information with each other. This new system, which will operate over the Internet and provide public access to a large amount of property tax and sales data is expected to be rolled out in late 2008 or early 2009, with the full statewide conversion expected to be completed in 2010.

2.0 Methodology

As noted earlier, COAH requested the Center to conduct a pilot study using Somerset County data to determine how and why the vacant land results might differ through the use of these two different methods for identifying developed land, and what its impact might be on development capacity statewide. The most direct method of determining if and where lands within developed parcels are being incorrectly identified as undeveloped according to the 2002 DEP LU/LC analysis is to overlay the parcel based spatial layer on the LU/LC layer. This would permit a visual examination of each parcel that MOD IV indicates is developed (not coded 1 or 3B) to see if the LU/LC layer is indicating the presence of undeveloped land. However, this would be a huge time consuming manual process and could not be applied on a statewide basis because of cost and the current lack of accurate and uniform MOD IV data.

As an alternative, the Center tested the use of a variety of mathematically derived algorithms and ArcGIS software tools to determine if we could accurately theorize when a parcel was “developed” relying only on parcel size and DEP’s LU/LC data. In an earlier pilot study using parcel, MOD IV and LU/LC data for Bernards Township, a “percent developed ratio” was created to test whether a given parcel was developed. Every parcel was classified as developed if the percentage of developed area (based on LU/LC data) over the gross parcel area was greater than 45%. This single value caused a higher than desired level of error because it did not address different development patterns and vast array of parcel sizes.

After much testing, the Center has developed what it believes is a reasonably accurate means of estimating the amount of land that is classified as undeveloped according to the DEP’s LU/LC analysis, but which is in fact is developed or unavailable for development according to local property tax information. The algorithm utilizes the same percent developed ratio approach as tested in Bernards, but applies different percentages to each of four groupings of parcels based on their size:

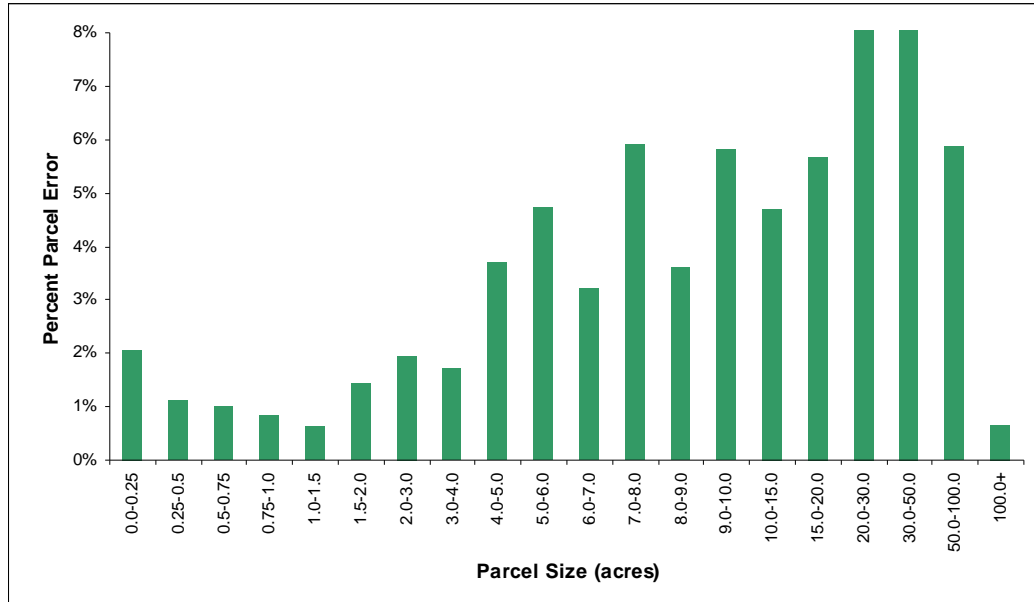
- Parcels of less than 0.5 acres in size, a threshold value of 90% developed land is used; i.e., any parcel with 90% or more of its area classified as developed per the DEP LU/LC data is considered fully developed.
- Parcels greater than or equal to 0.5 acres and less than 2.0 acres in size use a value of 70% developed land. This takes into consideration that as the parcel size increases a greater portion of the land area will be left as grass, woods, etc. (show as undeveloped).

- Parcels greater than or equal to 2.0 acres and less than 7.0 acres in size use a value of 60% developed land.
- Parcels greater than or equal to 7.0 acres in size use a value of 80% developed land.

2.1 Temporal MOD IV Error

MOD IV data is based on property tax information collected and recorded by different municipalities and individuals over varying periods of time. The data provided by Somerset County is dated 2006, but some data may be older than that. The DEP’s LU/LC data was collected through ortho photography in 2002. Thus, there is as much as a four year temporal difference between some of the data being compared, and MOD IV’s classification of parcels as developed versus the LU/LC’s indication that none of the parcel is developed could largely be the result of the development having occurred after the DEP’s 2002 fly-over. To more accurately measure the accuracy of its model, the Center removed from its computations all lands that MOD IV classified as developed and LU/LC classified as totally undeveloped. This removed 2,161 parcels or 1.76% of the 122,753 parcels the MOD IV was indicating were developed in 2006 – a total of 5,359 acres.

The percentage of parcels misclassified because of temporal differences varied widely with the size of the parcels, with the greatest difference (5-8%) occurring with parcels of 7 acres or more.



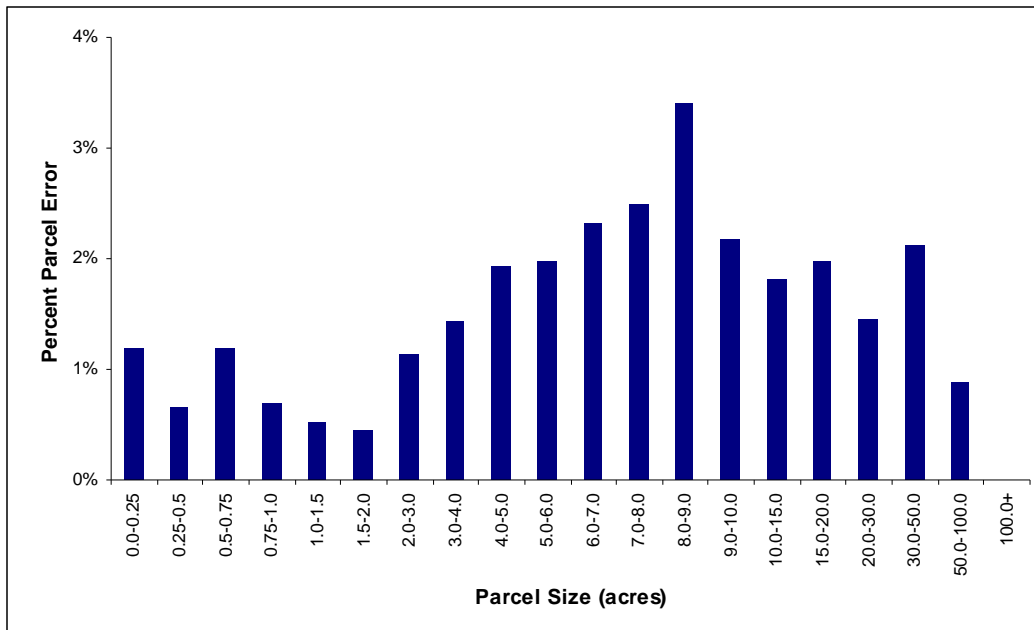
2.2 Model Error

The above combinations of percent developed ratio and parcel size threshold were optimized so as to minimize “over” and “under” errors in predicting existing developed parcels versus the MOD IV data. The “over” error results when the model predicts that a parcel is developed and the MOD IV data indicates that it is undeveloped. The “under”

error results when the model predicts that a parcel is undeveloped and the MOD IV (after adjustment for temporal errors) indicates that it is developed.

2.2.1 Over-Estimation Error

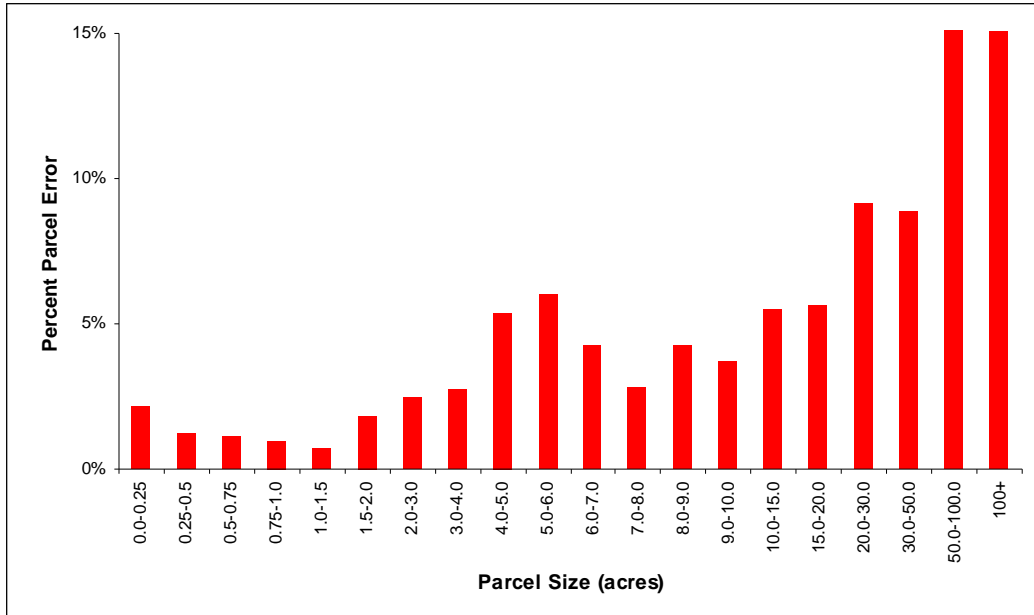
The Center’s model identified 428 parcels (total area of approximately 256 acres) as being developed, out of 42,663 parcels that the MOD IV data indicated were undeveloped – an over-estimation error rate of 1.00%. It identified 328 parcels of less than 5 acres in size as being developed, out of 37,477 classified by the MOD IV data as undeveloped – an error of 0.88%. However, the model’s error rate increased to a range of 2%-4% for parcels larger than 7 acres.



2.2.2 Under-Estimation Error

The Center’s model identified 2,327 parcels as being undeveloped out of the 120,592 parcels classified by MOD IV as developed (after removal of temporal error) – an under-estimation error of 1.93%. This was an under-estimate of about 10,892 acres. But there is a large difference in the error rates and acreage differences between small and large parcel sizes. The model identified 2,067 parcels of less than 5 acres in size as being undeveloped, out of 116,678 classified by the MOD IV data as developed – an error of 1.77% and about 194 acres.

However, the model’s error rate increased to a range of 10-20% for parcels larger than 20 acres, with a total under-estimate of about 9,603 acres. We do not believe that this is an accurate assessment of the model’s accuracy because it does not consider the possibility that many of these large parcels could be sub-divided under current or future zoning. As an example, 23 parcels of 100 acres or more represent 5,187 acres of the under-estimate identified – an average of 226 acres per parcel. We therefore did not adjust the model’s results to consider this potential error.



3.0 Results

The following results were obtained using the four algorithms described above.

3.1 *Developed and Undeveloped Land*

The current methodology, which is based solely on DEP’s 2002 LU/LC identification of developed land, indicates that 80,269 acres of land in Somerset County is developed. The Center’s model estimates that 97,880 acres should be shown as developed, an increase of 17,612 acres or about 21.9%.

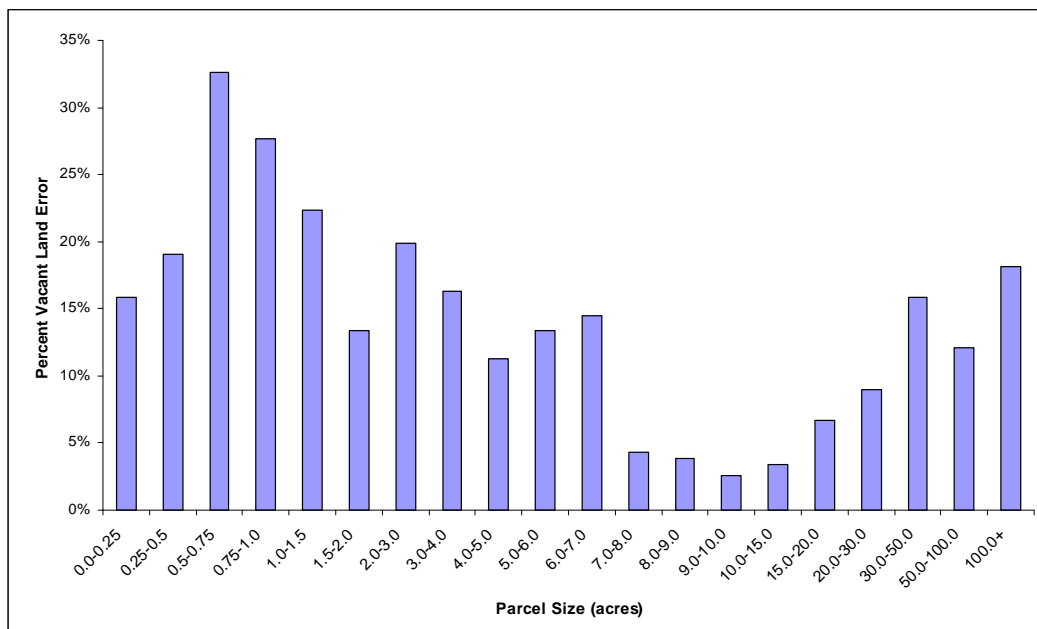
Municipality	LU/LC Developed (Acres)	Model Estimate (Acres)
Bedminster Township	2,754	5,325
Bernards Township	7,546	8,240
Bernardsville Borough	3,357	3,623
Bound Brook Borough	848	912
Branchburg Township	5,972	6,999
Bridgewater Township	11,999	13,910
Far Hills Borough	717	892
Franklin Township	11,504	14,936
Green Brook Township	1,594	1,780
Hillsborough Township	11,385	15,479
Manville Borough	1,171	1,287
Millstone Borough	173	186
Montgomery Township	7,727	8,922
North Plainfield Borough	1,587	1,643
Peapack-Gladstone Boro	1,022	1,376
Raritan Borough	923	975
Rocky Hill Borough	220	256

Somerville Borough	1,248	1,303
South Bound Brook Boro	348	443
Warren Township	5,722	6,748
Watchung Borough	2,451	2,646
Total	80,268	97,880

3.2 Vacant Land

Vacant land is defined as those lands which are undeveloped and not environmentally or otherwise constrained from future development, based on current State or regional agency regulations and policies. Land can therefore be classified as undeveloped, but may not be vacant because of environmental or other constraints. The Center’s spatial analysis found that 10,572 acres of the newly identified developed land overlapped with lands already constrained, and thus only 7,040 of new developed lands translates into a reduction in vacant land. The model estimates that there are 40,716 acres of vacant land in the county, versus is the 47,103 acres on current LU/LC data – an error of 14.9%.

Although this amount of error is much less than that noted above in the LU/LC developed land analysis, it is still sizable. The largest percent of error largely occurs in parcels of from 0.50 acres to 1.5 acres, and can generally be described as the backyards of developed residential parcels. A large amount of error also occurs in the identification of green areas surrounding large housing and office complexes.



3.3 Buildout Capacity

In the most recent buildout capacity analysis prepared for COAH (May 2008), the Center estimated that a total of 25,169 residential dwelling units could be constructed on the county’s approximate 47,103 acres of vacant land. After adjusting for the lower 40,063 acres of vacant land estimated by the model and related revisions to the calculation of capacity under the new DEP Water Quality Management Rules, the Center estimates that only 20,918 units could be built. This is a reduction in residential capacity of 4,251 units

or 16.9%. Similarly, the county's non-residential development capacity would be reduced by almost 5 million square feet (15.4%) to 27.3 million square feet. See attached table for detail by municipality.

4.0 Discussion

It is obvious and reasonable that there is and will be differences between the land use spatial data collected via state-wide flyovers or satellite imagery and parcel based data augmented by recently collected property tax information. The protocol used by DEP's contractors to convert ortho-photo images to classifications of developed versus undeveloped land and the objectives of the analysis itself are not necessarily intended to provide the most accurate identification of developed land, versus its characteristics using the Anderson LU/LC codes. The current program is operated by the State's environmental protection agency and not its land use planning organization. In addition, there will also always be temporal differences; i.e., the DEP's 2007 flyover analysis will not be available until 2010 at the earliest.

However, the Center and COAH do not currently have access to a state-wide parcel based spatial database that has been prepared on a consistent based under strict quality control – quality assurance processes, and much of the related MOD IV property data that is available is faulty. As an interim measure, the Center's model could be used in combination with the DEP's LU/LC data and county prepared parcel data to prepare a better estimate of developed and thus vacant land in large areas of the state, but the model should be tested in several other counties with good MOD IV data to ensure that it can be more widely applied.

Vacant Land and Buildout Capacity by Municipality

Municipality	Vacant Land Current (acres)	Vacant Land Updated (acres)	Dwelling Units Current	Dwelling Units Updated	Floor Area Current (sq. ft.)	Floor Area Updated (sq. ft.)
BEDMINSTER TWP	4,623	3,723	1,244	934	3,826,894	3,210,120
BERNARDS TWP	1,776	1,529	758	645	1,434,067	1,281,132
BERNARDSVILLE BORO	2,511	2,324	602	534	2,458,170	2,288,141
BOUND BROOK BORO	7	2	7	7	36,413	9,863
BRANCHBURG TWP	3,064	2,640	1,933	1,703	1,350,668	1,181,731
BRIDGEWATER TWP	3,152	2,433	3,583	2,709	3,949,096	2,988,646
FAR HILLS BORO	1,190	1,138	252	252	1,123,047	1,080,675
FRANKLIN TWP	7,614	6,054	5,595	4,364	7,535,245	5,862,082
GREEN BROOK TWP	381	328	313	268	381,740	322,252
HILLSBOROUGH TWP	10,245	8,871	4,562	4,010	3,091,879	2,711,921
MANVILLE BORO	41	31	150	115	259,002	195,548
MILLSTONE BORO	99	99	17	17	5,769	5,762
MONTGOMERY TWP	6,924	6,237	2,425	2,206	1,080,058	987,910
NORTH PLAINFIELD BORO	37	25	148	99	146,673	94,899
PEAPACK-GLADSTONE BORO	1,475	1,322	454	418	1,459,307	1,442,382
RARITAN BORO	195	180	606	564	1,725,292	1,597,276
ROCKY HILL BORO	68	54	83	67	41,689	34,459
SOMERVILLE BORO	66	58	323	286	799,829	708,038
SOUTH BOUND BROOK BORO	4	1	11	2	7,993	2,164
WARREN TWP	2,578	2,112	1,124	877	482,357	380,570
WATCHUNG BORO	1,053	902	979	841	1,046,326	897,322
Totals	47,103	40,063	25,169	20,918	32,241,514	27,282,894
Change		7,040		4,251		4,958,621
		14.9%		16.9%		15.4%

LU/LC Data Dictionary

**Developed Land
ID
#**

1 Residential	LU2002_code	Label_02
	1110	RESIDENTIAL, HIGH DENSITY, MULTIPLE DWELLING
	1120	RESIDENTIAL, SINGLE UNIT, MEDIUM DENSITY
	1130	RESIDENTIAL, SINGLE UNIT, LOW DENSITY
	1140	RESIDENTIAL, RURAL, SINGLE UNIT
	1100	RESIDENTIAL
	1150	MIXED RESIDENTIAL
2 Non-Residential	LU2002_code	Label_02
	1200	COMMERCIAL/SERVICES
	1300	INDUSTRIAL
	1500	INDUSTRIAL/COMMERCIAL COMPLEXES
	1600	MIXED URBAN OR BUILT-UP LAND
7300	EXTRACTIVE MINING	
3 Other - Military	LU2002_code	Label_02
1211	MILITARY RESERVATIONS	
4 Other - Transitional	LU2002_code	Label_02
	7500	TRANSITIONAL AREAS
	7400	ALTERED LANDS
7430	DISTURBED WETLANDS (MODIFIED)	
5 Other - Plat	LU2002_code	Label_02
	1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES
	1410	MAJOR ROADS
	1419	BRIDGE OVER WATER
	1440	AIRPORT FACILITIES
	1461	WETLAND RIGHTS-OF-WAY (MODIFIED)
	1462	UPLAND ROW (undeveloped)
	1463	UPLAND ROW (undeveloped)
	1499	STORM WATER BASIN
	1701	OTHER URBAN OR BUILT-UP LAND (developed)
	1710	CEMETARY
	1711	CEMETRAY ON A WETLAND
	1800	RECREATIONAL LAND
	1804	ATHLETIC FIELDS (SCHOOLS)
	1810	STADIUMS, CULTURAL CENTERS & ZOOS
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	

NOTE: The code "1701" was assigned by NCNBR and is not a standard Anderson LULC code. Richard Grabowski of the NJDEP used 2002 aerial imagery to identify lands in the "1700" category that should be considered developed. These developed "1700" lands have been given the new designation "1701"

Undeveloped Land - Available

	LU2002_code	Label_02
6 Undeveloped-Other	1700	OTHER URBAN OR BUILT-UP LAND (undeveloped - see Note above))
	1741	PHRAGMITES DOMINATED URBAN AREA
	7600	UNDIFFERENTIATED BARREN LANDS
	1214	FORMER MILITARY; INDETERMINATE USE
7 Undeveloped-Agriculture	2100	CROPLAND AND PASTURELAND
	2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS
	2300	CONFINED FEEDING OPERATIONS
	2400	OTHER AGRICULTURE
	2260	CRANBERRY FARMS
8 Undeveloped-Forest	4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)
	4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)
	4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)
	4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)
	4230	PLANTATION
	4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)
	4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)
	4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)
	4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)
	4410	OLD FIELD (< 25% BRUSH COVERED)
	4411	PHRAGMITES DOMINATED OLD FIELD
	4420	DECIDUOUS BRUSH/SHRUBLAND
	4430	CONIFEROUS BRUSH/SHRUBLAND
	4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND
	4100	DECIDUOUS FOREST
	4200	CONIFEROUS FOREST
	4310	MIXED WITH CONIFEROUS PREVALENT (> 50% Coniferous)
	4320	MIXED WITH DECIDUOUS PREVALENT (> 50% Deciduous)
	4400	BRUSH/SHRUBLAND
	4500	SEVERE BURNED UPLAND FOREST
9 Undeveloped-Wetlands	1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE
	2140	AGRICULTURAL WETLANDS (MODIFIED)
	2150	FORMER AGRICULTURAL WETLAND-BECOMING SHRUBBY, NOT BUILT-UP)
	6210	DECIDUOUS WOODED WETLANDS
	6220	CONIFEROUS WOODED WETLANDS
	6231	DECIDUOUS SCRUB/SHRUB WETLANDS
	6232	CONIFEROUS SCRUB/SHRUB WETLANDS
	6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)
	6234	MIXED BRUSH AND BOG WETLANDS, CONIFEROUS DOMINATE
	6240	HERBACEOUS WETLANDS

6241 PHRAGMITES DOMINATED INTERIOR WETLAND
 6251 MIXED FORESTED WETLANDS (DECIDUOUS DOM.)
 6252 MIXED FORESTED WETLANDS (CONIFEROUS DOM.)
 6500 SEVERE BURNED WETLANDS
 8000 MANAGED WETLANDS (Modified)
 6221 ATLANTIC WHITE CEDAR WETLANDS

Undeveloped Land - Unavailable

10 Undeveloped-Unavailable Wetlands

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Label_02

6110 SALINE MARSHES
 6111 SALINE MARSH (low marsh)
 6112 SALINE MARSH (high marsh)
 6120 FRESHWATER TIDAL MARSHES
 6130 VEGETATED DUNE COMMUNITIES
 6141 PHRAGMITES DOMINATED COASTAL WETLANDS
 7100 BEACHES
 7200 EXPOSED ROCK

11 Undeveloped-Unavailable Water

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Label_02

5410 TIDAL RIVERS, INLAND BAYS AND OTHER TIDAL WATERS
 5411 OPEN TIDAL BAYS
 5420 DREDGED LAGOON
 5430 ATLANTIC OCEAN
 5100 STREAMS AND CANALS
 5200 NATURAL LAKES
 5300 ARTIFICIAL LAKES