# APPLICATION OF GIS-BASED MULTICRITERIA ANALYSIS TO PRIORITIZATION OF COASTAL PARCELS ON NEW YORK COAST FOR PRESERVATION

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***Coastal GeoTools, Myrtle Beach, March 4, 2009***

# Study Area: New York Coastal Counties

# STUDY OBJECTIVE

**Objective**

Assemble existing parcel data from coastal counties of New York State that will be used by Long Island Sound Study (LISS) and New York Department of Environmental Conservation (NYSDEC) in conservation of the **most significant** remaining unprotected and undeveloped parcels.

- **Task**

1. Compile Geographic Information System (GIS) database on LIS coastal parcels for NY counties (*primary data*);
2. Compile GIS database on LIS Stewardship areas, coastline, tidal and freshwater wetlands, hydrologic network, main roads, public lands (*secondary data*).
3. Develop GIS-based methodology for categorization of undeveloped parcels according to their conservation values.

# Coastal boundary (NYSDEC) and towns in NY and CT

# GIS database on LIS coastal parcels for NY counties (*primary data*)

**Database**

- To identify undeveloped parcels using property class codes associated with parcel records.
- To identify quality of the GIS data and associated database that in turn will affect the quality of the final assessment product.
- To ensure the quality of parcel data and create comprehensive data documentation.

**Data Sources**

- New York State Office of Real Property Services (NYSORPS)
- NY state counties (under license agreement with NYSDEC and willing to share data)
- Regional non-profit organizations (TNC, North Shore Alliance )

**Categories**

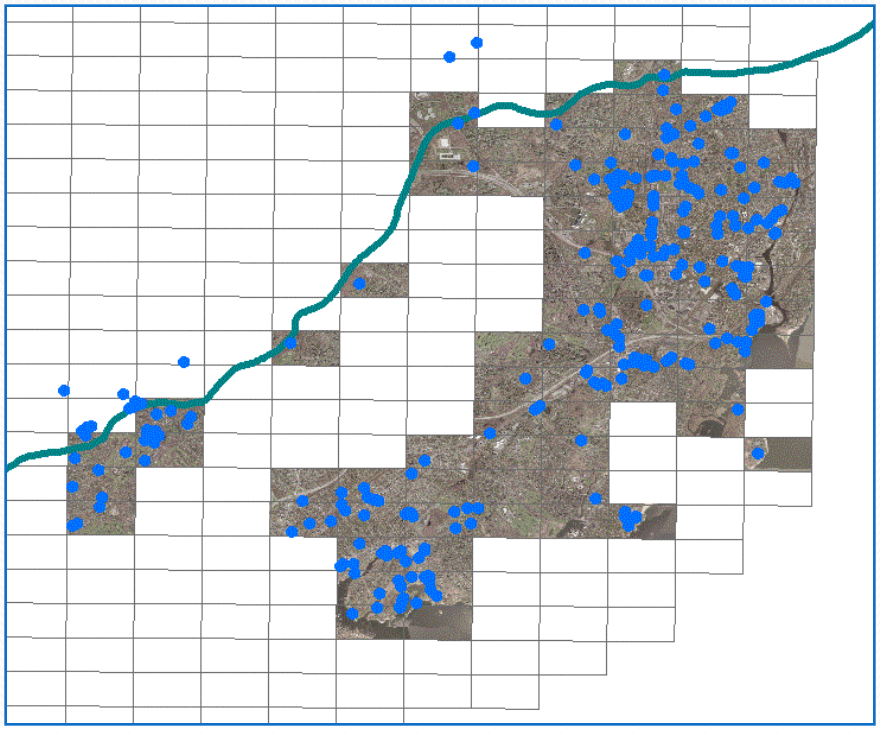
- Vacant
- Conservation easements
- Agriculture

# Parcel Data Structure

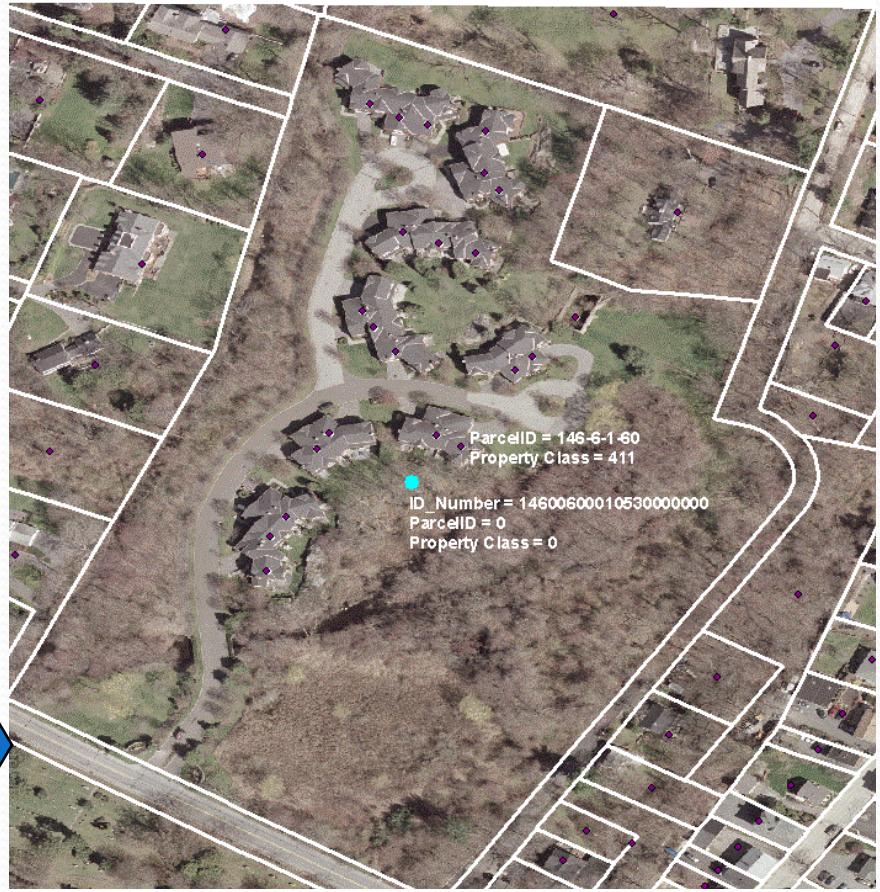
| | |
|---|---|
| FID | 404 |
| Shape | Point |
| AREA | 0 |
| PERIMETER | 0 |
| WEST_ | 14381 |
| WEST_ID | 14382 |
| MUNI_CODE | 551000 |
| PARCEL_ID | 3281 |
| SWIS | 551000 |
| SBL | 0000020497000201 |
| PRINT_KEY | 2-497-0201 |
| SCHOOL | 551000 |
| ROLL_SECT | 1 |
| PROP_CLASS | 411 |
| OWNERSHIP | |
| HOME_CODE | |
| CUR_LND_A | 85000 |
| CUR_TOT_A | 481600 |
| DBOOK | 0 |
| DPAGE | 0 |
| EAST | 689681 |
| NORTH | 752325 |
| FIXEAST | 689681 |
| FIXNORTH | 752325 |
| LOC_NUM | 197 |
| LOC_NAME | Drake Ave |
| OWNER1 | Drake One Company Llc |
| OWNER2 | |
| ADDRESS1 | 524 North Ave |
| CITY_STATE | New Rochelle NY |
| ZIP5 | 10801 |
| ZIP4 | |
| FRONT_FEET | 0 |
| DEPTH | 0 |
| ACRES | 2.3 |
| EASECODE | |
| NBHDCODE | 0 |
| ZONING_COD | 0 |
| BUILD_STY | |
| YR_BUILT | |
| SFLA | 0 |
| SITE_USE_C | |
| ERRCODE | 0 |
| ERRX | 0 |
| ERRY | 0 |
| SWIS_CODE | 551000 |
| TOWN | 1000 |
| POLYGONID | 0 |
| SCALE | 1 |
| ANGLE | 0 |

property class code

# COMMON ERRORS WITH PROPERTY DATA



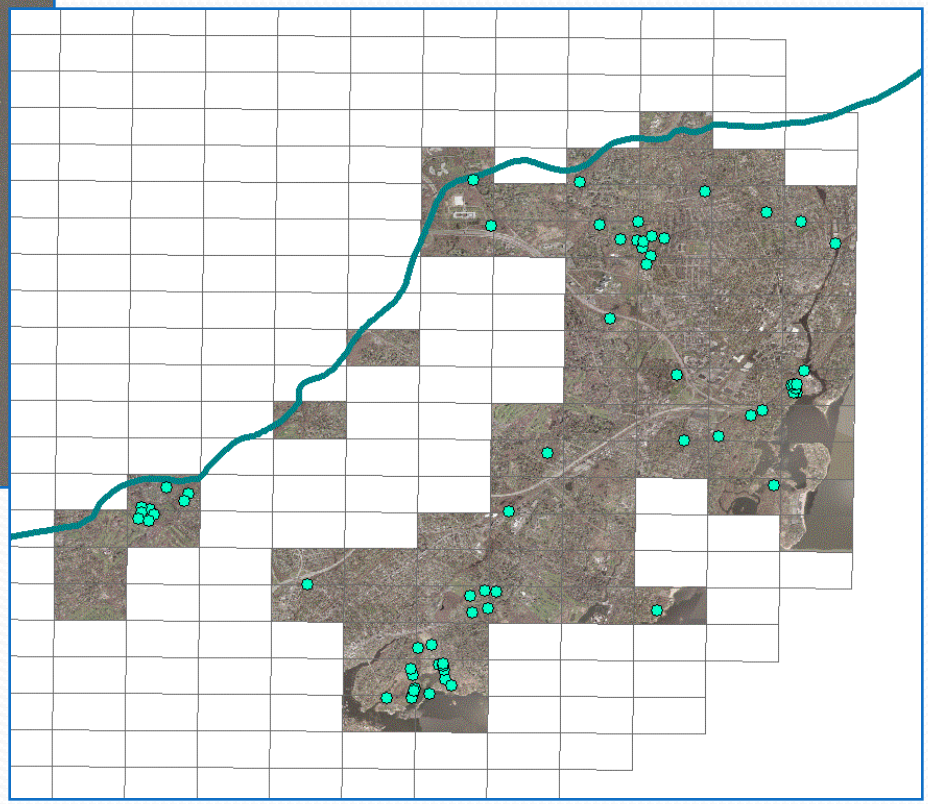
Points are centroids of property with Property Class code = 0




Blue point is a centroid of the property with Property Class code = 0. Small dark red points on the top of roofs of houses are specific tax map units containing Property Class code = 411. White lines are property boundaries.

# COMMON ERRORS WITH PROPERTY DATA

An example of the centroid (blue point) with Property Class code = 0. Surrounding centroids in red color have Property Class = 210



Results of editing when parcel data were checked using orthophotography; the number of parcel data with Property Class = 0 reduced from 331 to 67.

# COMMON ERRORS WITH PROPERTY DATA

Vacant parcels with erroneous large areas (2599 – 9983 acres). See cars on highway for scale.

False vacant parcel

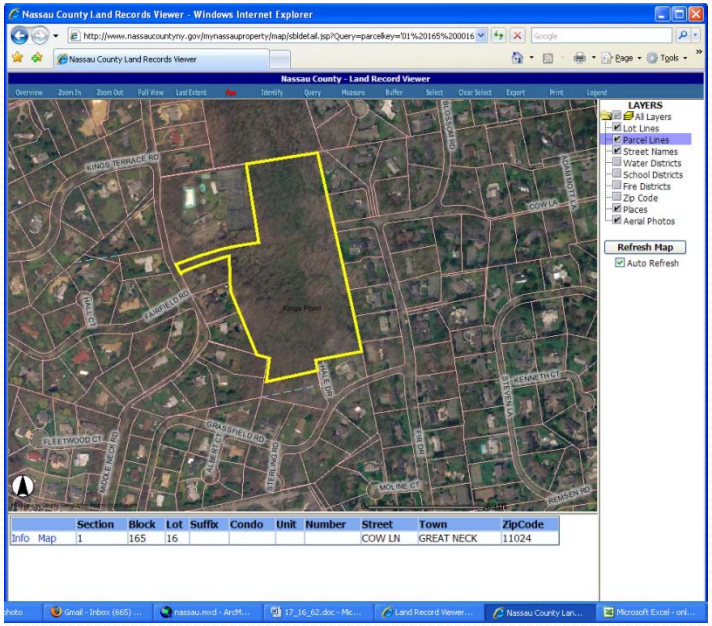
Verified vacant parcel

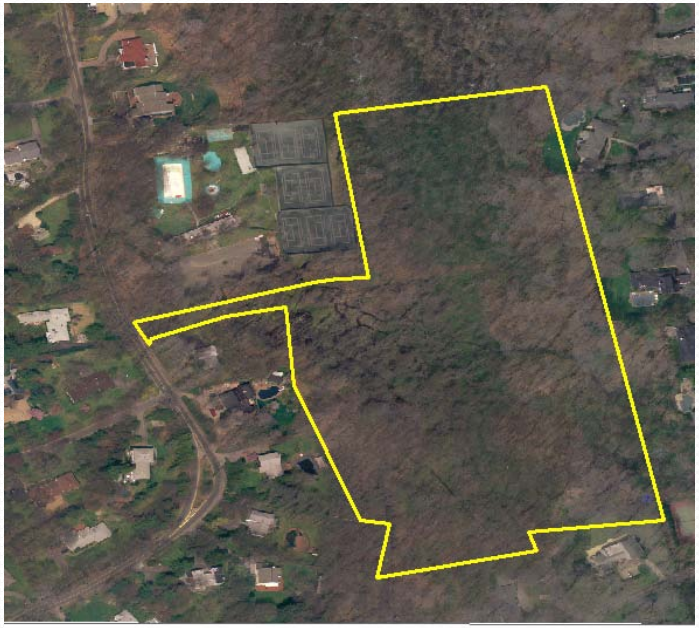
# Underwater property

Bronx

Stevenson (1914) mentioned 1894 official document stating that "… charter of the City of New York grants to the city land under water embraced by projected streets in public use or which may hereafter be opened for public use. … It has also been claimed that certain colonial charters vested the title of lands under water within their boundaries in the towns or cities to which they were granted to the exclusion of any title in the state."

# DIGITIZING UNAVAILABLE DATA



**A**. Nassau County web-based Tax Mapping Interface

**B.** Manually digitized vacant parcel

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# Natural Features (secondary data):

- Identification of the secondary data will affect the final classification of undeveloped parcels according to conservation needs.
- The presence or absence of one or more secondary data will raise or lower the significance of conservation need.
- The proximity to the feature is a physical measure of the variable significance in the prioritization process.

# Natural Features (secondary data):

**Secondary Data:**

| DATASET: | SOURCE: |
|---|---|
| LIS Stewardship Areas | LISS |
| public lands | NYSDEC, RPA |
| waterfronts | USGS |
| wetlands | FWS, NYSDEC |
| hydrologic network (streams) | USGS |
| waterbodies (lakes, ponds) | USGS |
| roads | NYSDOT |
| coastline | NOAA |

# Prioritization of Parcel Data According to their Conservation Value:

**Evaluation Criteria**: primary data (parcels), secondary data (natural features)

↓

**Variables (attributes)**: areas, proximities (distances)

↓

**Criteria Weights**: secondary data (natural features) spatial matrix with weights

↓

**Normalization of Variables; assigning Weights; calculating a Decision Score**

↓

**Sensitivity Analysis & Field Verification**: "how property selections are affected by changes in weights?" & "which modeling scenario is better?"

↓

**Recommendation**: evaluating results of sensitivity analysis and field verification; assessment of alternative weights.

# Criteria Weights

| DATASET: | Criteria Weight (examples) |
|---|---|
| • LIS Stewardship Areas | 8 |
| • public areas | 3 |
| • coastline | 8 |
| • wetlands | 4 |
| • hydrologic network (streams) | 2 |
| • waterbodies (lakes, ponds) | 3 |
| • primary roads | 2 |
| • areas of vacant parcels | 8 |

# Normalization of Criteria Scores and Calculation of Decision Score

| Vacant Parcel ID | Criterium $_j$ | Criterium $_j$ (normalized score) | Weight $_j$ | Decision Score (D) = Σ (Criterium $_j$ * Weight $_j$ ) |
|---|---|---|---|---|
| 1 | 0 | 0 | 3 | 0 |
| … | 500 | 1 | 3 | 3 |
| … | 12 | 0.024 | 3 | 0.07 |
| j | 34 | 0.068 | 3 | 0.2 |

**Normalization:**

Linear scale (range from 0 – 1):

<u>Example:</u> $X_{ij} = X_{ij} / X_j \max$ OR $X_{ij} = X_j \min / X_{ij}$

**Decision Score:**

$D_i = \Sigma_j (\text{Criterium}_j * \text{Weight}_j)$

**NOTE:** Areas are normalized by MAX and Proximities (distances) by MIN

## Normalization of Criteria Scores: examples

**Normalization by maximum**

Areas are normalized by maximum. For example, after GIS analysis area range (in acres) is 5 – 1255 acres. In this case, parcel with area = 5 acres will receive normalized value = 5 / 1255 = 0.00398; parcel with maximum area of 1255 will receive normalized value = 1255 / 1255 = 1. Therefore, while selecting priorities, parcel with largest area will receive the maximum score.

**Normalization by minimum**

Distances are normalized by minimum. For example, after GIS analysis distances from parcels to wetlands range from 1 – 7751 meters. In this case, parcel that has minimum distance of 1 meter will receive normalized value = 1 / 1 = 1; parcel with larger distance will receive normalized value = 1 / 7751 = 0.000129. Therefore, while selecting priorities, parcel with shortest distance will receive the maximum score.

# Scenarios for assigning priority values to vacant parcels in the decision-making process

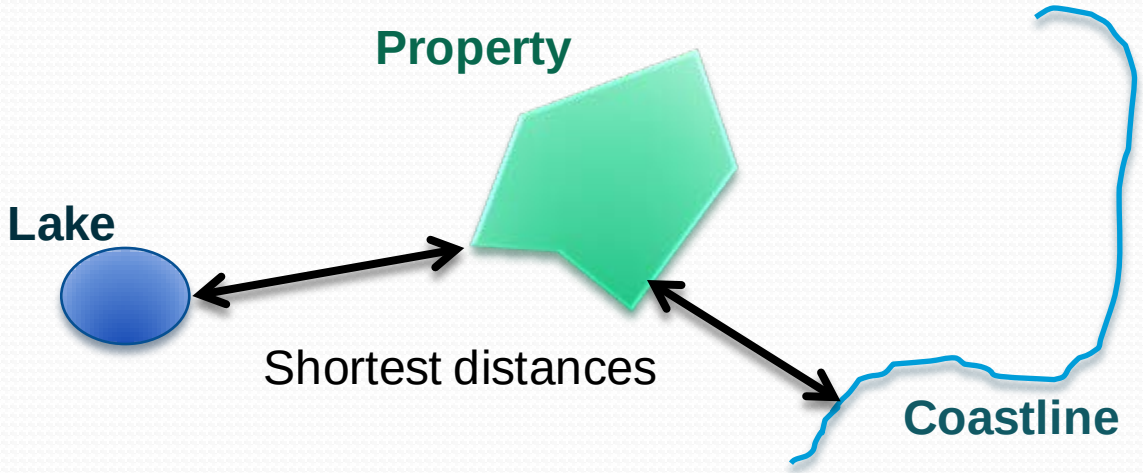
| Variables/ Scenarios | Influence by size (price) | Proximity to natural features | Coastal proximity | Protection by the government | Influence by transport (accessibility) | Protecting large areas close to the coast |
|---|---|---|---|---|---|---|
| Area | 8 | 3 | 1 | 1 | 1 | 8 |
| Coastline | 1 | 3 | 8 | 1 | 1 | 8 |
| Wetlands | 1 | 8 | 1 | 1 | 1 | 3 |
| Streams | 1 | 8 | 1 | 1 | 1 | 3 |
| Lakes | 1 | 8 | 1 | 1 | 1 | 3 |
| Public | 1 | 3 | 1 | 8 | 8 | 3 |
| Stewardship | 1 | 3 | 1 | 8 | 1 | 3 |
| Roads | 1 | 3 | 1 | 1 | 8 | 3 |

# Scenarios for assigning priority values to vacant parcels in the decision-making process

| Variables/ Scenarios | Considering mostly natural features and size | Influence by waterbodies | Considering recreational activities |
|---|---|---|---|
| Area | 8 | 4 | 8 |
| Coastline | 4 | 8 | 8 |
| Wetlands | 4 | 8 | 3 |
| Streams | 4 | 4 | 3 |
| Lakes | 4 | 8 | 3 |
| Public | 1 | 3 | 8 |
| Stewardship | 1 | 3 | 8 |
| Roads | 1 | 3 | 8 |

# GIS Analysis

1. Update areas
2. Correct topological and geometrical errors in data
3. Verification of property classes
4. Digitizing data
5. Merging data and updating attribute table records
6. Creating automated script (AML) to calculate proximities and create output file for further calculations



# Framework of analysis and decision making

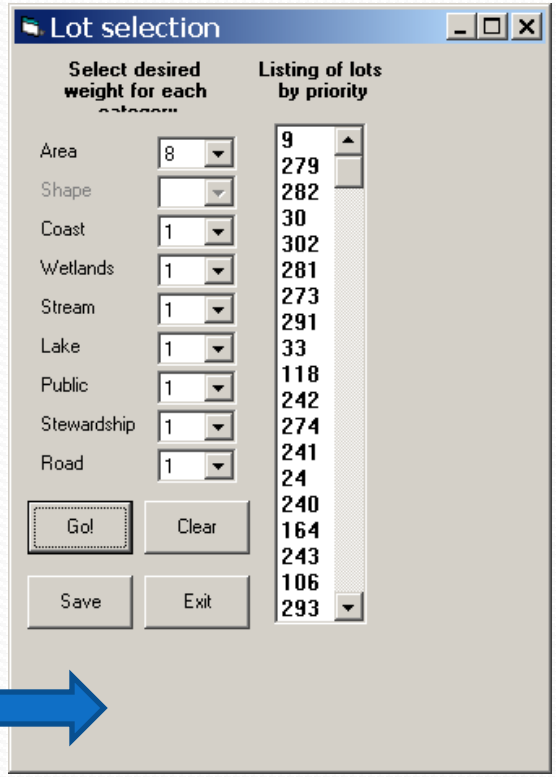
## Output from GIS Analasys (proximities and area)

| | A | B | C | D | E | F | G | H | I |
|---|---|---|---|---|---|---|---|---|---|
| 1 | parcellD | Dist_Coast | Dist_Streams | Dist_Water | Dist_Public | Dist_Roads | Dist_Steward | Dist_Wetlands | AreaSqFt |
| 2 | 197 | 1123 | 6370 | 552 | 3716 | 550 | 9819 | 1200 | 765995.1 |
| 3 | 198 | 395 | 5155 | 1722 | 5275 | 654 | 11448 | 2264 | 1114168.1 |
| 4 | 199 | 1445 | 31430 | 4556 | 7762 | 19025 | 40399 | 852 | 1551941.7 |
| 5 | 200 | 1732 | 32543 | 2992 | 6196 | 20119 | 38878 | 188 | 1117712.2 |
| 6 | 201 | 4282 | 35035 | 3637 | 3930 | 24045 | 36368 | 2085 | 688793.6 |
| 7 | 202 | 110 | 1706 | 2306 | 11654 | 510 | 17733 | 2039 | 1217473.5 |
| 8 | 203 | 110 | 1706 | 2306 | 11654 | 510 | 17733 | 2039 | 1201812.3 |
| 9 | 204 | 0 | 4915 | 3512 | 9013 | 0 | 36578 | 1 | 1489616.6 |
| 10 | 205 | 1576 | 5533 | 4283 | 10413 | 434 | 36079 | 4345 | 818446.1 |
| 11 | 206 | 1 | 3900 | 88 | 5345 | 0 | 11509 | 302 | 843763.5 |
| 12 | 207 | 1732 | 32543 | 2992 | 6196 | 20119 | 38878 | 188 | 862010.8 |
| 13 | 208 | 0 | 166 | 33 | 2454 | 24309 | 2454 | 1 | 4372060.4 |
| 14 | 209 | 1095 | 538 | 481 | 2709 | 23557 | 4186 | 400 | 845700.1 |
| 15 | 210 | 12638 | 8430 | 0 | 0 | 639 | 11697 | 1217 | 3519391.2 |
| 16 | 211 | 12038 | 7937 | 0 | 0 | 639 | 11095 | 1368 | 2593057.9 |
| 17 | 212 | 12993 | 8759 | 789 | 1549 | 650 | 12056 | 1521 | 873440.7 |

## Normalized data

| | A | B | C | D | E | F | G | H | I | J |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | LOT_ID | AREA | SHAPE | COAST | WETLANDS | STREAM | LAKE | PUBLIC | STEWARDSHIP | ROAD |
| 2 | 1 | 0.01845 | 0 | 0.0025510 | 0.00307692 | 0.0003385 | 0.0005531 | 0.00020929 | 0.0000726 | 0.000447427 |
| 3 | 2 | 0.03787 | 0 | 1.0000000 | 0.00019168 | 0.0001407 | 0.00024722 | 0.00015415 | 0.0000504 | 0.000172236 |
| 4 | 3 | 0.02899 | 0 | 0.0005198 | 0.00039078 | 1 | 0.00030349 | 0.00019417 | 0.0000788 | 1 |
| 5 | 4 | 0.06419 | 0 | 1.0000000 | 0.0025974 | 0.0003421 | 0.00042301 | 0.00035174 | 0.0000813 | 0.002967359 |
| 6 | 5 | 0.03536 | 0 | 1.0000000 | 0.0025974 | 0.0003421 | 0.00042301 | 0.00035174 | 0.0000813 | 0.002967359 |
| 7 | 6 | 0.02427 | 0 | 0.0040486 | 0.00026767 | 0.000189 | 0.00020665 | 0.00034235 | 0.0000910 | 0.002178649 |
| 8 | 7 | 0.02034 | 0 | 0.0070922 | 0.00037411 | 0.0002439 | 0.00048356 | 0.00840336 | 0.0003708 | 1 |
| 9 | 8 | 0.02144 | 0 | 0.0070922 | 0.00037411 | 0.0002439 | 0.00048356 | 0.00840336 | 0.0003708 | 1 |
| 10 | 9 | 1 | 0 | 1.0000000 | 0.00526316 | 0.0017271 | 0.00090909 | 1 | 1.0000000 | 1 |
| 11 | 10 | 0.02352 | 0 | 1.0000000 | 0.025 | 0.000269 | 0.00136799 | 0.0030303 | 0.0030303 | 0.000244141 |
| 12 | 11 | 0.01942 | 0 | 0.0001624 | 0.00090744 | 0.0003794 | 0.00038256 | 0.00068634 | 0.0001556 | 0.000688231 |
| 13 | 12 | 0.04726 | 0 | 1.0000000 | 0.00763359 | 0.0001213 | 0.0011274 | 0.00724638 | 0.0081967 | 0.000434783 |
| 14 | 13 | 0.03 | 0 | 0.0001048 | 0.00069348 | 0.00062 | 0.00271739 | 0.00021155 | 0.0000991 | 0.0006035 |
| 15 | 14 | 0.02002 | 0 | 0.0000774 | 1 | 1 | 0.00328947 | 0.00015295 | 0.0000753 | 0.000590319 |
| 16 | 15 | 0.06251 | 0 | 0.0000774 | 1 | 1 | 0.00328947 | 0.00015295 | 0.0000753 | 0.000590319 |
| 17 | 16 | 0.02883 | 0 | 0.0001533 | 1 | 0.0002716 | 0.00055494 | 0.00054855 | 0.0001093 | 1 |

## Decision making tool



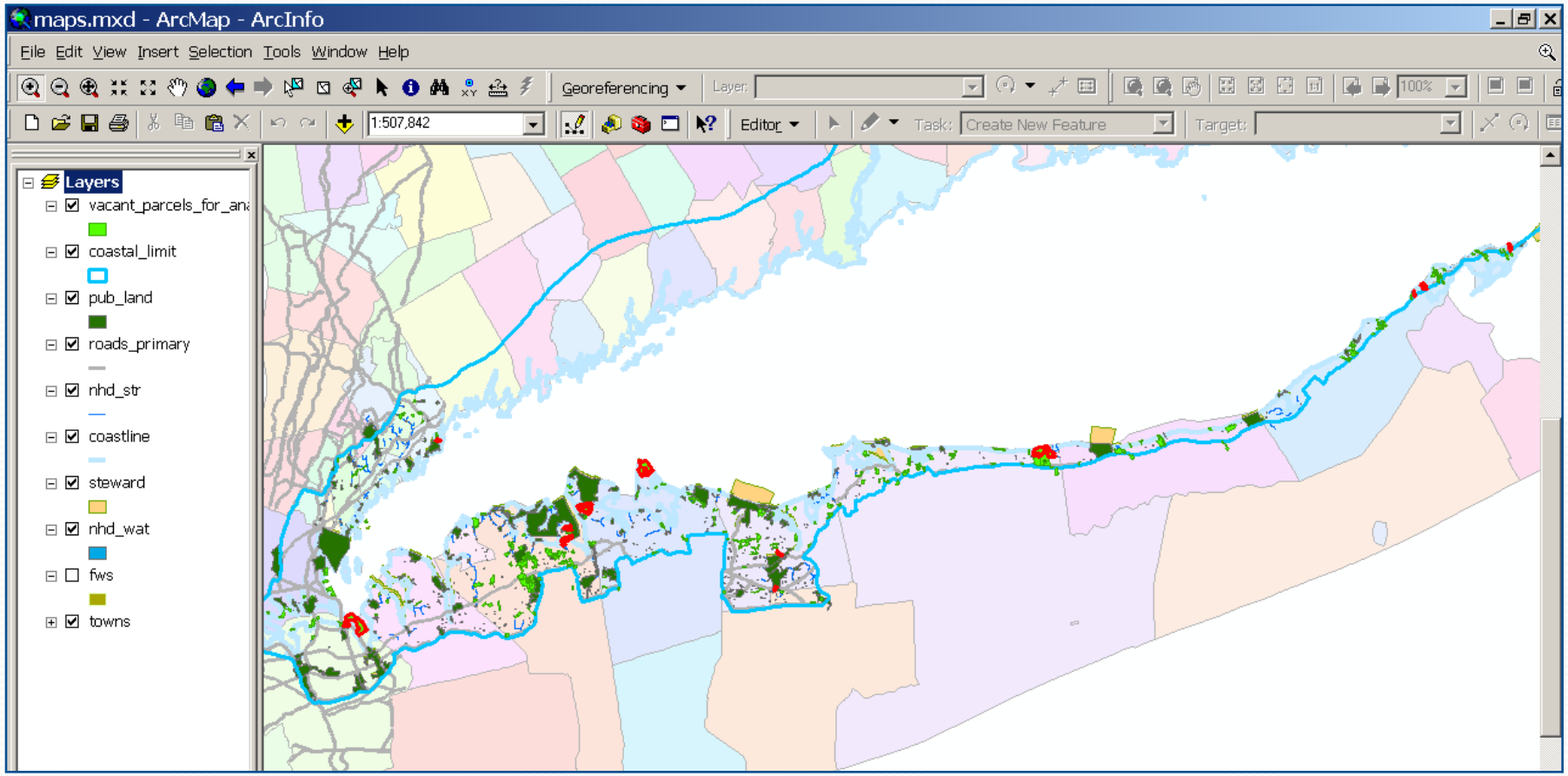
# GIS Analysis: Selection of specific variable and number of records

Attributes of vacant_parcels_for_analysis_not_coincide_public

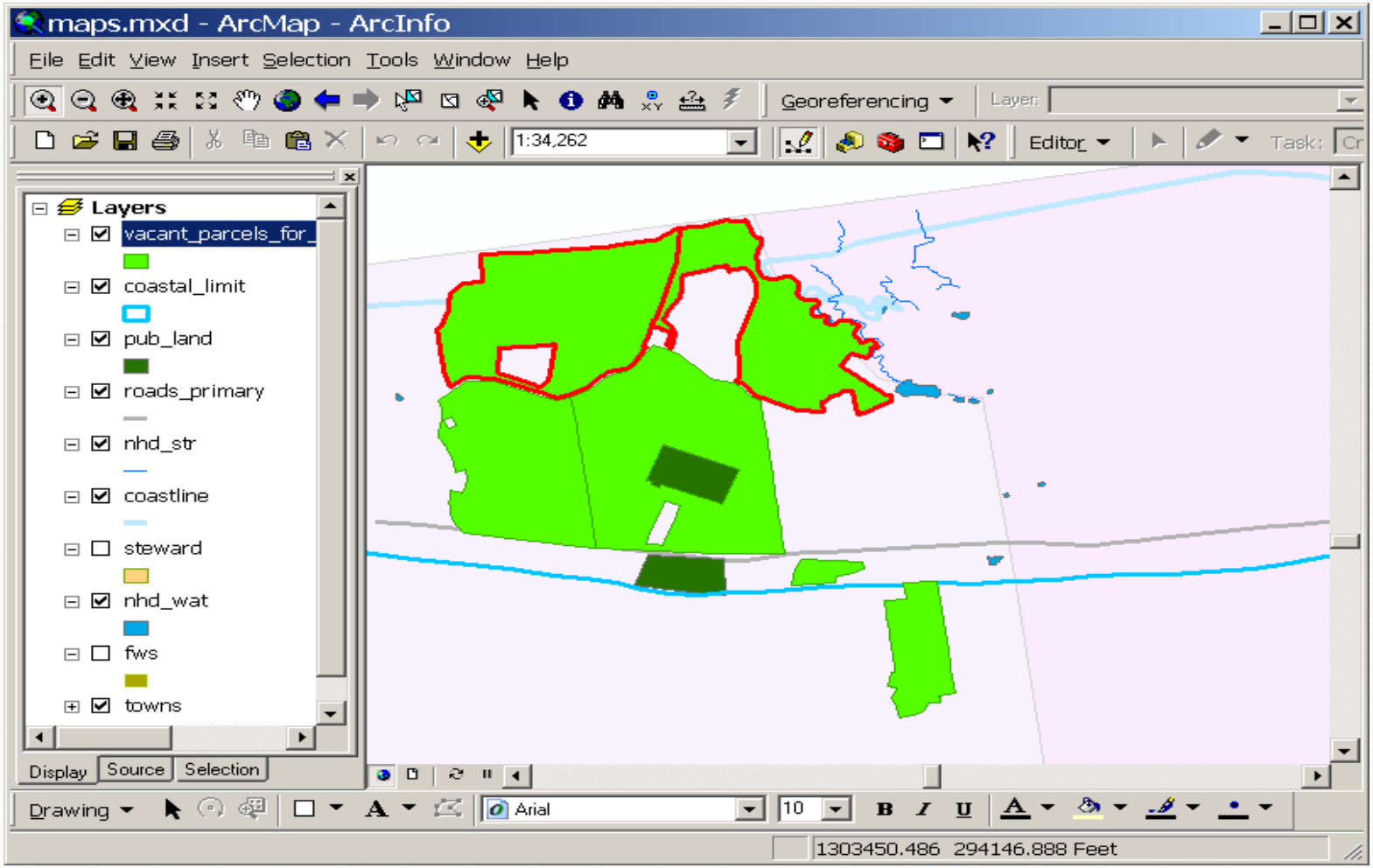
| FID | Shape * | Prior_Type | TOWN | TOWNNAME | CO_NAME | Perimeter | Acres | num_lena | AreaSqFt | Prio_Equal | Prio_Area | Prio_Coast | Prio_Stew | Coinc_Pub |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 102 | Polygon | Open Space | Smithtown | SMITHTOWN | Suffolk | 5405.754075 | 22.732173 | 302 | 990213.5 | 1 | 5 | 68 | 1 | 0 |
| 217 | Polygon | | WestEnd | | Suffolk | 4121.3747 | 13.544263 | 118 | 589988.1 | 2 | 11 | 75 | 6 | 0 |
| 119 | Polygon | | | | | 31681.970542 | 547.7417 | 9 | 23859628.5 | 3 | 1 | 1 | 2 | 0 |
| 83 | Polygon | Open Space | Huntington | HUNTINGTON | Suffolk | 14875.883568 | 226.664253 | 282 | 9873494.9 | 4 | 4 | 2 | 7 | 0 |
| 92 | Polygon | Open Space | Huntington | HUNTINGTON | Suffolk | 11604.597269 | 106.326524 | 292 | 4631583.4 | 5 | 6 | 4 | 8 | 0 |
| 82 | Polygon | Open Space | Huntington | HUNTINGTON | Suffolk | 11604.597269 | 106.326524 | 281 | 4631583.4 | 6 | 7 | 3 | 9 | 0 |
| 91 | Polygon | Open Space | Huntington | HUNTINGTON | Suffolk | 9824.455273 | 87.514824 | 291 | 3812145.7 | 7 | 10 | 5 | 10 | 0 |
| 44 | Polygon | Open Space | Oyster Bay | OYSTER BA | Nassau | 7811.582096 | 61.724305 | 242 | 2688710.7 | 8 | 14 | 6 | 11 | 0 |
| 134 | Polygon | | Rye City | | Westchester | 5632.14908 | 20.210755 | 24 | 880380.5 | 9 | 15 | 7 | 3 | 0 |
| 244 | Polygon | | | | | 3502.928594 | 13.879368 | 164 | 604585.3 | 10 | 17 | 8 | 51 | 0 |
| 42 | Polygon | Open Space | Oyster Bay | OYSTER BA | Nassau | 3601.262762 | 15.90639 | 240 | 692882.3 | 11 | 16 | 9 | 53 | 0 |
| 45 | Polygon | Open Space | Oyster Bay | OYSTER BA | Nassau | 2763.129795 | 11.144951 | 243 | 485474.1 | 12 | 18 | 10 | 52 | 0 |
| 206 | Polygon | | EastEnd | | Suffolk | 5280.51659 | 10.944164 | 106 | 476727.8 | 13 | 19 | 11 | 12 | 0 |
| 85 | Polygon | Open Space | Huntington | HUNTINGTON | Suffolk | 29814.434911 | 401.980858 | 284 | 17510286.2 | 14 | 3 | 13 | 13 | 0 |
| 80 | Polygon | Open Space | Huntington | HUNTINGTON | Suffolk | 29814.434911 | 401.980858 | 279 | 17510286.2 | 15 | 2 | 12 | 14 | 0 |
| 196 | Polygon | | EastEnd | | Suffolk | 6651.596782 | 32.862482 | 96 | 1431489.7 | 16 | 22 | 14 | 54 | 0 |
| 139 | Polygon | | Brookhaven | | | 17028.991115 | 222.67041 | 30 | 9699523.1 | 17 | 8 | 15 | 55 | 0 |
| 104 | Polygon | Open Space | Huntington | HUNTINGTON | Suffolk | 14871.479146 | 226.662148 | 304 | 9873403.2 | 18 | 9 | 16 | 15 | 0 |
| 142 | Polygon | | | | | 20820.478387 | 148.340443 | 33 | 6461709.7 | 19 | 13 | 17 | 56 | 0 |
| 43 | Polygon | Open Space | Oyster Bay | OYSTER BA | Nassau | 11378.187978 | 99.641727 | 241 | 4340393.6 | 20 | 20 | 18 | 57 | 0 |
| 205 | Polygon | | EastEnd | | Suffolk | 7552.146091 | 60.78134 | 105 | 2647635.2 | 21 | 23 | 19 | 58 | 0 |
| 81 | Polygon | Open Space | Huntington | HUNTINGTON | Suffolk | 7384.515513 | 41.284084 | 280 | 1798334.7 | 22 | 26 | 21 | 16 | 0 |
| 86 | Polygon | Open Space | Huntington | HUNTINGTON | Suffolk | 7384.515513 | 41.284084 | 285 | 1798334.7 | 23 | 27 | 20 | 17 | 0 |
| 198 | Polygon | | EastEnd | | Suffolk | 6849.654298 | 28.497043 | 98 | 1241331.2 | 24 | 30 | 22 | 59 | 0 |
| 176 | Polygon | | WestEnd | | Suffolk | 3015.383752 | 9.955153 | 76 | 433646.5 | 25 | 39 | 23 | 4 | 0 |
| 214 | Polygon | | WestEnd | | Suffolk | 9913.725678 | 34.073268 | 114 | 1484231.6 | 26 | 28 | 24 | 60 | 0 |
| 7 | Polygon | Agricultural | Southold | SOUTHOLD | Suffolk | 12471.519377 | 34.196892 | 204 | 1489616.6 | 27 | 29 | 25 | 61 | 0 |
| 204 | Polygon | | EastEnd | | Suffolk | 11723.856529 | 31.610694 | 104 | 1376961.8 | 28 | 31 | 26 | 62 | 0 |
| 199 | Polygon | | EastEnd | | Suffolk | 6680.671707 | 11.922244 | 99 | 519333 | 29 | 40 | 27 | 63 | 0 |
| 132 | Polygon | | Town of Rye | | Westchester | 6467.947892 | 23.565058 | 22 | 1026493.9 | 30 | 32 | 79 | 64 | 0 |
| 249 | Polygon | | | | | 4809.002749 | 20.352075 | 172 | 886536.4 | 31 | 34 | 78 | 5 | 0 |
| 150 | Polygon | | WestEnd | | Suffolk | 5285.06603 | 22.991698 | 41 | 1001518.4 | 32 | 33 | 28 | 18 | 0 |
| 203 | Polygon | | EastEnd | | Suffolk | 4036.302211 | 19.875546 | 103 | 865778.8 | 33 | 35 | 29 | 66 | 0 |
| 131 | Polygon | | New Rochelle | | Westchester | 8739.535243 | 19.450884 | 21 | 847280.5 | 34 | 36 | 80 | 65 | 0 |
| 135 | Polygon | | Mamaroneck | | Westchester | 9392.808009 | 17.634219 | 26 | 768146.6 | 35 | 37 | 81 | 67 | 0 |
| 200 | Polygon | | EastEnd | | Suffolk | 4597.375923 | 16.81847 | 100 | 732612.6 | 36 | 38 | 30 | 68 | 0 |
| 253 | Polygon | | | | | 3454.565238 | 12.609397 | 177 | 549265.3 | 37 | 41 | 82 | 70 | 0 |
| 140 | Polygon | | Brookhaven | | | 5293.749901 | 12.412622 | 31 | 540693.8 | 38 | 42 | 31 | 69 | 0 |
| 154 | Polygon | | WestEnd | | Suffolk | 3815.776377 | 11.936919 | 45 | 519972.2 | 39 | 44 | 32 | 20 | 0 |
| 130 | Polygon | | New Rochelle | | Westchester | 3197.35968 | 11.365414 | 20 | 495077.4 | 40 | 45 | 33 | 19 | 0 |
| 164 | Polygon | | WestEnd | | Suffolk | 5475.674334 | 17.614754 | 63 | 767298.7 | 41 | 50 | 34 | 72 | 0 |

Record: 0 Show: All Selected Records (23 out of 277 Selected) Options

# GIS Analysis: Visualizing (red color) selected vacant properties according to variable and number of records

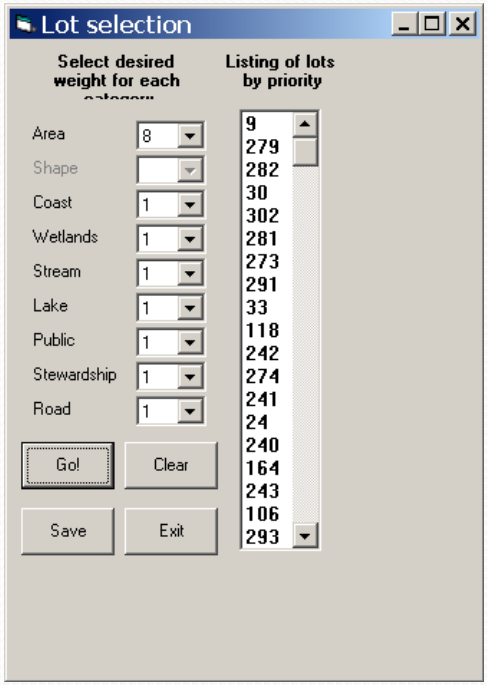


# GIS Analysis: Closer examination

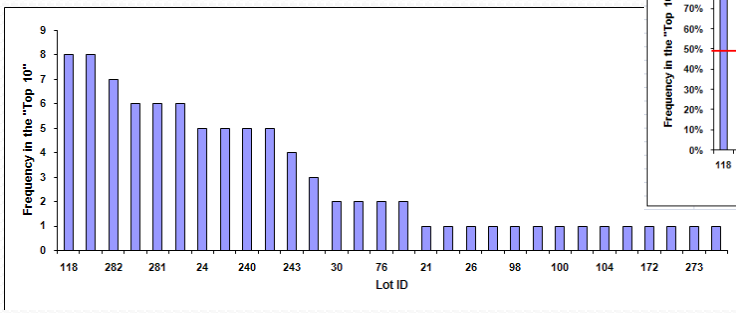


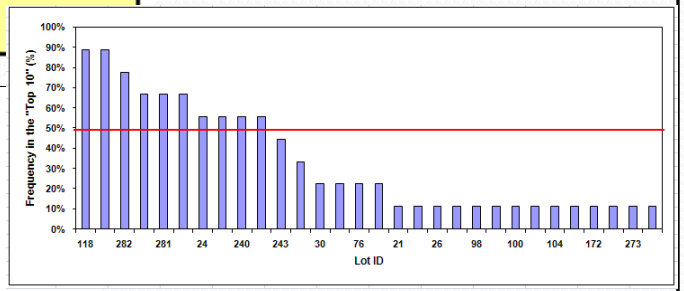
# Sensitivity Analysis: Frequency Based

| | B | C | D | E | F | G | H | I | J |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 101111111 | 801111111 | 108111111 | 101811111 | 101181111 | 101118111 | 101111811 | 101111181 | 101111118 |
| 2 | 302 | 9 | 9 | 302 | 302 | 302 | 302 | 302 | 302 |
| 3 | 118 | 279 | 282 | 118 | 118 | 118 | 118 | 9 | 118 |
| 4 | 9 | 282 | 281 | 282 | 164 | 282 | 9 | 24 | 9 |
| 5 | 282 | 30 | 291 | 281 | 240 | 281 | 282 | 279 | 105 |
| 6 | 281 | 302 | 242 | 291 | 243 | 291 | 281 | 280 | 98 |
| 7 | 291 | 281 | 24 | 242 | 30 | 242 | 291 | 76 | 204 |
| 8 | 242 | 273 | 164 | 164 | 33 | 24 | 242 | 172 | 104 |
| 9 | 24 | 291 | 240 | 240 | 22 | 164 | 24 | 86 | 99 |
| 10 | 164 | 33 | 243 | 243 | 21 | 240 | 106 | 118 | 103 |
| 11 | 240 | 118 | 106 | 106 | 26 | 243 | 76 | 282 | 100 |




| Lot ID | First 10 | Frequency, % |
|---|---|---|
| 118 | 8 | 89% |
| 302 | 8 | 89% |
| 282 | 7 | 78% |
| 9 | 6 | 67% |
| 281 | 6 | 67% |
| 291 | 6 | 67% |
| 24 | 5 | 56% |
| 164 | 5 | 56% |
| 240 | 5 | 56% |
| 242 | 5 | 56% |

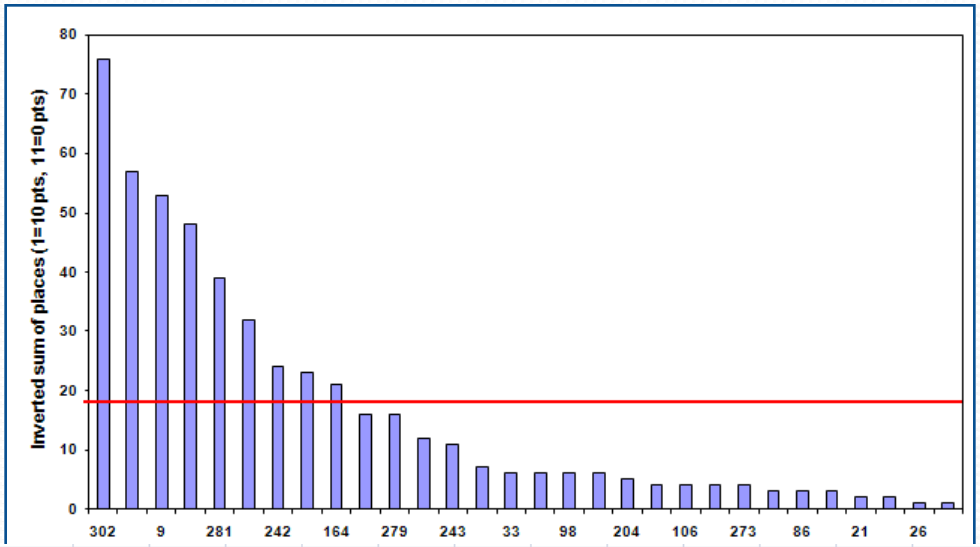


# Sensitivity Analysis: Position (place) & Probability based

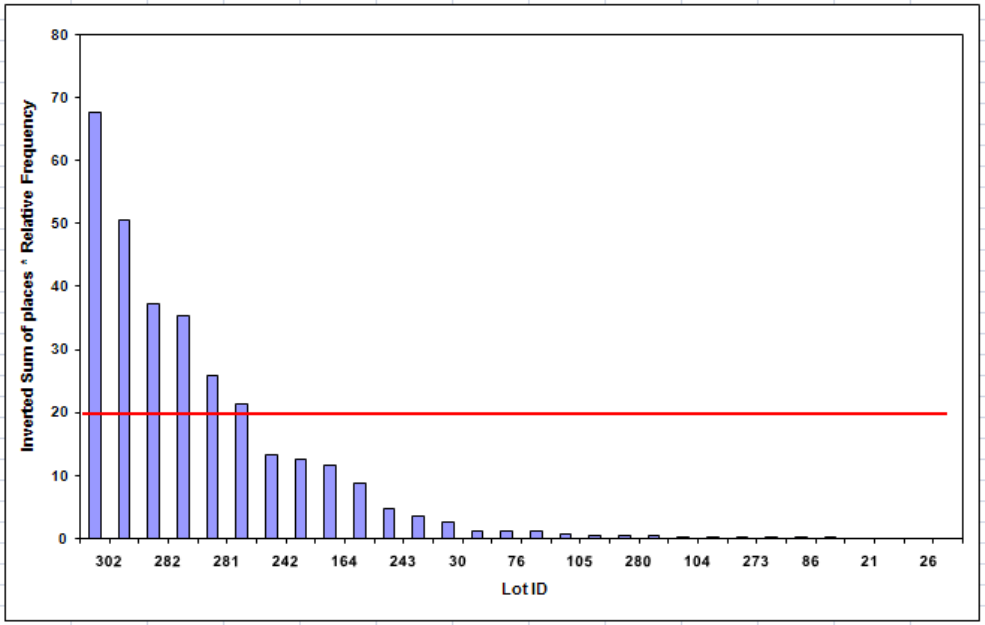
Position score

| Lot ID | nversed sum of places (1=10, 11=0) |
|---|---|
| 302 | 76 |
| 118 | 57 |
| 9 | 53 |
| 282 | 48 |
| 281 | 39 |
| 291 | 32 |
| 242 | 24 |
| 24 | 23 |
| 164 | 21 |

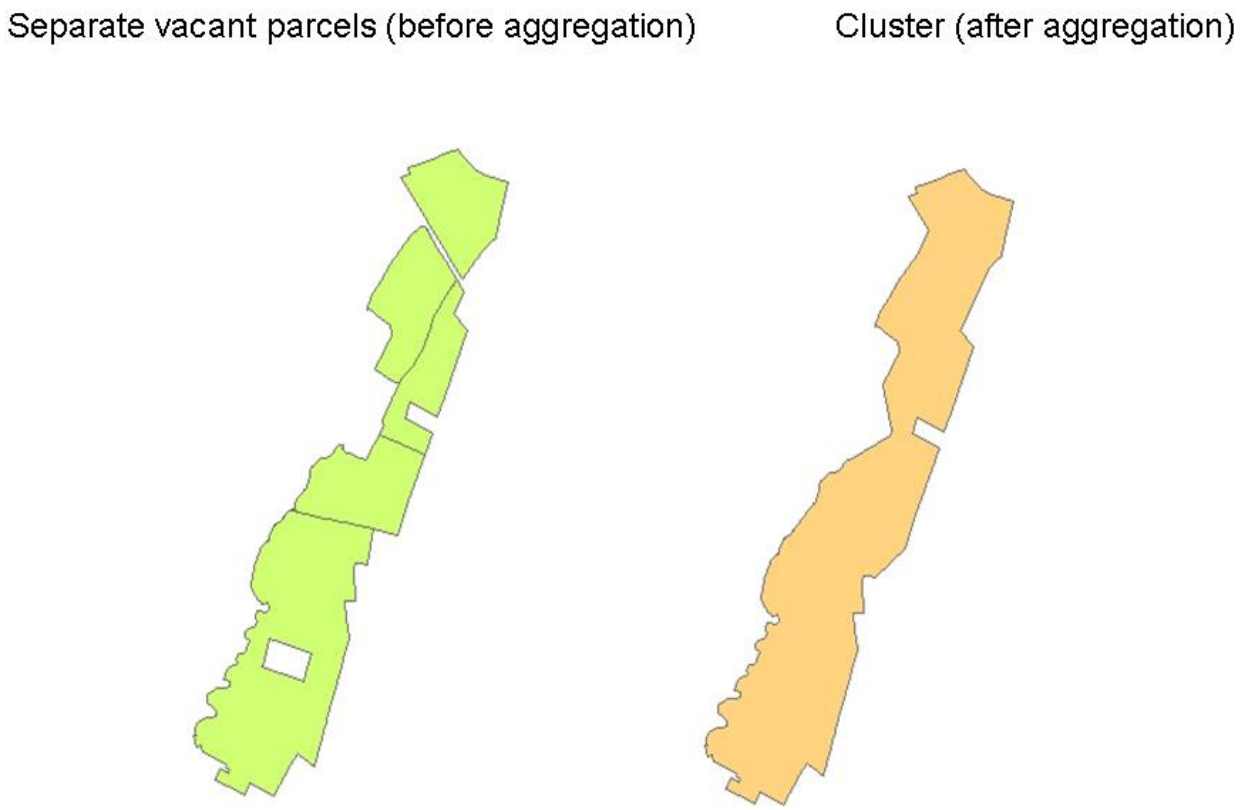



Position & Probability

| Lot ID | Inv.Sum x Freq. % |
|---|---|
| 302 | 67.56 |
| 118 | 50.67 |
| 282 | 37.33 |
| 9 | 35.33 |
| 281 | 26.00 |
| 291 | 21.33 |



# Alternative management approach: clusters




Analysis of patterns of coastal vacant parcels shows a potential “clustering pattern” when several identified vacant parcels either share common boundary or are located within very short distance (30 – 300 feet).

# CONCLUSIONS:

- Currently, more than 700 coastal land parcels available for conservation in New York area within Long Island Sound were identified and prioritized on the basis of selected spatial criteria.

- Alternative management approach can be based on considering clusters of vacant land instead of separate land parcels.

- Conducted study showed that successful application of presented methodology requires:

  1. Identifying conservation goals and translating them into GIS language using spatial variables from multi-criteria GIS model.
  2. Free access to the parcel data from coastal communities;
  3. Interaction between state and local conservation partners;