GIS-Supported Abandoned Property Assessment for a Countywide Land Bank Project

Creating a Legacy for Data Sharing and Collaboration

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In order to return vacant properties to productive use and improve neighborhood quality of life, Hamilton County, OH established the Land Reutilization Corporation (HCLRC) to acquire, maintain, and transfer properties (Landbank). The Landbank must acquire properties through data records maintained by various county and municipality agencies, which are in different formats and stored in different locations. The presenters represent three agencies collaborating in developing a GIS-supported Abandoned Property Assessment Application, which provides a solution to aggregate, compare, and analyze data using GIS spatial functions. A database management system was created to streamline the data gathering and a decision support model was developed to enhance the existing vacant property assessment and selection. An additional and valuable benefit of this application is that more organizations participate in the legacy data sharing model in the county (CAGIS). The experience we have gained in this process will also be useful for the audience.

When confronted with large complex problems it is necessary to have accurate, pertinent data in order to address the problem in an informed manner. However, data are not always readily accessible because of the number of agencies involved in preparing and managing the data. Therefore, one needs to create a data sharing system to make more informed decisions.

The abandonment of property is a large, complex problem that requires current, accurate, relevant, and accessible data (Hillier et al. 2003). While records are generally kept in many local governments, these datasets are not centrally located, digital, or combinable with each other. By working with each of the different record keepers many of the relevant datasets are integrated in a system that allows groups the ability to make improved decisions based on actual data for questions related to property abandonment. This system also streamlines the daily workflow of the record keepers and allows users access to detailed, up-to-date information.

The newly created Land Banking Authority in Hamilton County has a specific set of requirements to pursue the acquisition of a property. Datasets exist, albeit in a disjointed, inaccessible manner. In order to aid the land bank in its property selection process a GIS-Supported Abandoned Property Assessment Application was created.

BACKGROUND

Abandoned property poses problems for local governments, communities, and individuals alike. It results in the deterioration of infrastructure, the loss of property value, and the spread of distress and decline generally (Grigsby et al. 1987). The problems linked to the abandonment of property are social, physical, economic, and environmental. The ramifications of abandoned property reach far beyond the borders of the property line into neighboring parcels, neighborhoods, and entire communities (Samsa 2008). Combating the problem of property abandonment and its related problems is extremely difficult because there is no single cause.

One method of dealing with property abandonment is to utilize the powers granted to a land bank authority. Redevelopment and renewal of abandoned properties is often well handled by land bank authorities (Alexander, 2005). Land banks have been used in the past for many different purposes including the accumulation of parcels for large scale projects, to guide land use planning, and to spur development in communities.   In Ohio, legislation was recently passed allowing 41 counties the right to organize land banks which could acquire, hold, and distribute abandoned properties (LeMaster 2012). Access to information about the current state of the specified region is required in order to make wise decisions that will benefit the community in the present as well as into the future.

Both the data related to abandoned properties and the other social, economic, and physical data needed to make decisions about property accumulation could be maintained in a cohesive system. As the area involved is a parcel based system this could be organized and maintained using a geographic information system (GIS). This system could offer the benefit of digitizing records for easy searching and visualization as well as potentially reduce the workload of some of the record keeping agencies involved. This system could also offer the opportunity to digitize and automate repeatable processes in order to improve efficiency and reduce time and effort researching properties. The benefits of such a system could be quickly realized for the many groups involved with a system that was well designed and developed.

MULTI-AGENCY INVOLVEMENT

In order to create a system that allows for the sharing of currently collected data and help lead to better decisions about what should be done with abandoned property in Hamilton County, multiple agencies were required to cooperate and collaborate. While Hamilton County has been ahead of many of its peers in the art of digital data collection and sharing, it was still unable to fulfill all of the requests of the new land banking authority with its current tools. The new land bank was able to act as the driving force to get many of the Hamilton County departments, which held the needed data, to agree to participate in the development of a data sharing system.

In Hamilton County Ohio the legislation that was recently passed by the state for counties to create land banks was used to create the Hamilton County Land Reutilization Corporation (HCLRC). This organization is tasked with undertaking projects that "improves community quality of life, reduces blight and nuisance problems, stabilizes and revitalizes neighborhoods, and raises property values" (HCLRC 2013). One method at the HCLRC's disposal is the ability to acquire properties with tax delinquency with a clear title and resell them to interested, responsible owners (LeMaster 2012). In Hamilton County the need for such an organization is dire due to the high number of abandoned properties. However, this large quantity of properties poses a problem as much as an opportunity for the HCLRC.

The HCLRC needed to know which properties were available for taking as well as general information about the properties themselves such as where they were located, the state of the property, the zoning, etc. Different local government agencies within Hamilton County maintain different data sets relevant to the questions of property abandonment. The major providers of information related to property abandonment are the Hamilton County Auditor, the Hamilton County Sherriff, and the Hamilton County Clerk of Courts. While all three maintain data about the same properties their systems for doing so were different and not easily brought together. Table 1 below displays the different agencies and what data each was responsible for maintaining as well as why this data was important to the project.

The Hamilton County Land Bank had recognized the need for access to data that different departments of Hamilton County held but it had no way of reconciling the different systems into an integrated easy-to-use system.   Cincinnati Area Geographic Information System (CAGIS) is an award-winning organization in Hamilton County that was created in response to the 1987 Smale Commission Report which called for a GIS solution to help maintain information about infrastructure and service delivery (CAGIS 2013). Today it has morphed into an innovative machine helping Hamilton County and City of Cincinnati governments with the development of technology solutions for various problems. The desire of the HCLRC for access to data related to property abandonment and community information is echoed by many entities in Hamilton County. CAGIS already has working relationships with some of the government agencies. Building off of the CAGIS platform, a management solution was developed that would allow the HCLRC, and potentially in the future other groups, access to a large comprehensive database organized around a GIS.

Table 1: Departmental Sources of Data for Abandoned Property Assessment

Data	Description	Source	Rationale
Tax Delinquency	Amount owed on property taxes to the county	Hamilton County Auditor	Property owners are required to pay property taxes to local governments and districts. Failure to do so can result in legal action against the property owner.
Forfeited Property	Unsold property from the Forfeited Land	Hamilton County Sheriff	Property where the owner failed to pay taxes and that has already been forfeited to the city through failure to sell at multiple sheriff's sales
Property Owner	Current owner of the property	Hamilton County Auditor	The HCLRC already owns some property and getting more property near these sites is often beneficial.
Tax Foreclosure	Legal proceedings against a property	Hamilton County Clerk	Properties that are already in tax foreclosure are not available for the HCLRC because another entity is trying to take claim to the property.
Certified Tax Delinquent Year	Year property was certified tax delinquent	Hamilton County Auditor	Once a property is certified tax delinquent the HCLRC can attempt to acquire the property through tax foreclosure.

GIS-SUPPORTED ABANDONED PROPERTY ASSESSMENT APPLICATION

Determining the state of the properties in Hamilton County requires a system that would be able to organize and maintain data in an easily searchable and comprehensive format as well as help in the decision making process. As the data are parcel-based it makes sense to use a GIS as the organizing and visualizing tool. All of the parcels in Hamilton County were already accounted for in a digital format from CAGIS's work with the County Engineer and the County Auditor. This helped lay the ground work for the database management where the additional information necessary to answer questions related to property abandonment could be maintained. The final part of the application was a decision support model which combines all of the requirements the HCLRC needs into an easy to use tool.

Database Management System

The database management system allows for the storage and maintenance of a large quantity of data, coming from many different agencies, and easy retrieval of data in different combinations. The structure of the database management system was developed to be able to do all of these things. In addition, it was made flexible so that as other agencies come on board and new features are needed it is not difficult to adjust the system.

The information contained in the system had to satisfy three considerations – the legal and physical status, and the regional context. The HCLRC must determine which, if any, parcels satisfied the legal requirements for acquisition. The needs of different acquisition projects would require properties in different locations with different size, zoning, and other requirements. Finally, the HCLRC must be able to determine if a single parcel acquisition satisfies the HCLRC's mission and is really enhancing the county in the best way possible.

Decision Support Model

The model was specially designed to specifically attend to the needs of the HCLRC. Using the data maintained in the database management system a model was developed that addressed the legal requirements of the HCLRC. It was developed to be more flexible in points that were variable while at the same time providing a consistent result for components that were inflexible. It provides options for how the area of interest should be selected because the area will vary depending on the specific project the HCLRC is doing the investigation for. It also allows for the user to input the amount of delinquency as this may change with each project. Finally the output can be saved in different locations to allow for ease of sharing the data within the organization.

Three options are offered for how the area of interest can be selected. This was required as the HCLRC is sometimes able to work with interested parties so that a ready owner is prepared to take ownership as soon as possible. Often this is a community group who must focus on their respective neighborhood or jurisdiction. Other times the HCLRC has identified an area that is a target area and so wants to narrow the search to only parcels in that area. The three options are detailed below.

The first option for selecting the area of interest is by neighborhoods. The city of Cincinnati is divided into 52 neighborhood districts that are delineated by Statistical Neighborhood Approximations based on census blocks, block groups, and tracts. The area of interest can be selected to be a single or multiple neighborhoods. The second option for selecting the area of interest is to draw a polygon around the area of interest. This option allows the user to draw a polygon of any shape around the area of interest. A final option for selecting the area of interest is the extent function which makes it possible to use the extent of the map viewer to set the area of interest. Each of these options will only query parcels that are in the selected area of interest.

The level of tax delinquency changes often because property owners may make late payments at any point and are allowed to make partial payments. The land bank needs to find properties that have been abandoned by owners who have no interest in saving the properties from being taken. While larger amounts of tax delinquency may indicate a larger likelihood that the owner is not going to return this is not a guaranteed proxy. For this reason a delinquency threshold that is set by the user is included in the model. This can range from $0 to any other amount, although it would be impractical to select a threshold of $0 as it would include all properties. A threshold of too large may exclude all abandoned properties from being considered.

Steps for the User

The model is simple to use and is created to be as intuitive as possible for the user. Only three options were required by the HCLRC and these are easily selected by the buttons on the Property Selection Toolbar or in the dialog box once the button is clicked. There are three ways of selecting the area of interest (neighborhood(s), polygon, or extent), all of which are found on

the Property Selection Toolbar . Once the area of interest is chosen and delineated the following steps are the same for each of the three dialogues. Below is a short list of steps for the user.

1. *Neighborhood(s):*

    a. Click the Neighborhood(s) button ▣ on the Property Selection Toolbar.

    b. Next select a single neighborhood or multiple neighborhoods by checking the box next to the desired neighborhood(s).

    c. Input the amount of delinquency that is required for the current investigation.

    d. Finally, select a location for the output of the model.

    e. Click 'OK'.

    f. View output on map.

Figure 1: Property Selection by Neighborhood Dialogue
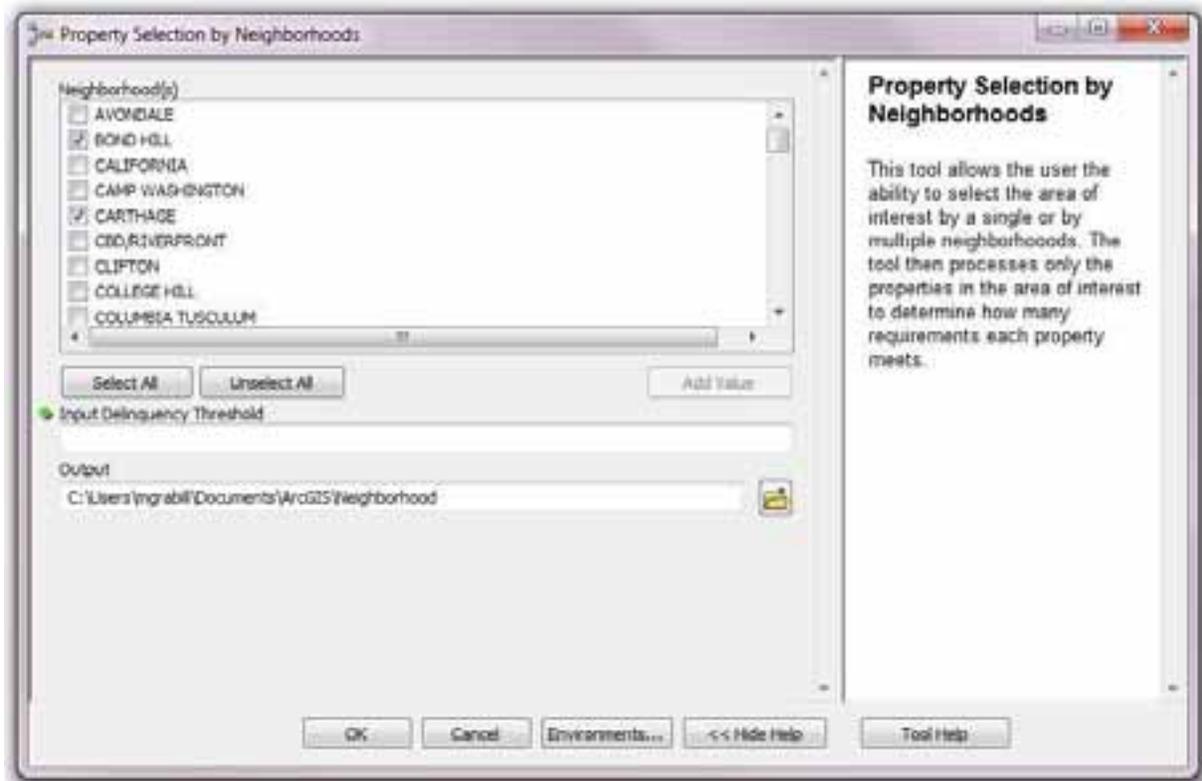
2. *Polygon:*

    a. Click the Polygon button ▣ on the Property Selection Toolbar.

    b. Click on the 'Feature Class' in the dialog that opens.

    c. Draw a polygon by clicking at each desired point in the map viewer and double clicking to close the polygon.

    d. Input the amount of delinquency that is required for the current investigation.

    e. Finally, select a location for the output of the model.

    f. Click 'OK'.

    g. View output on map.
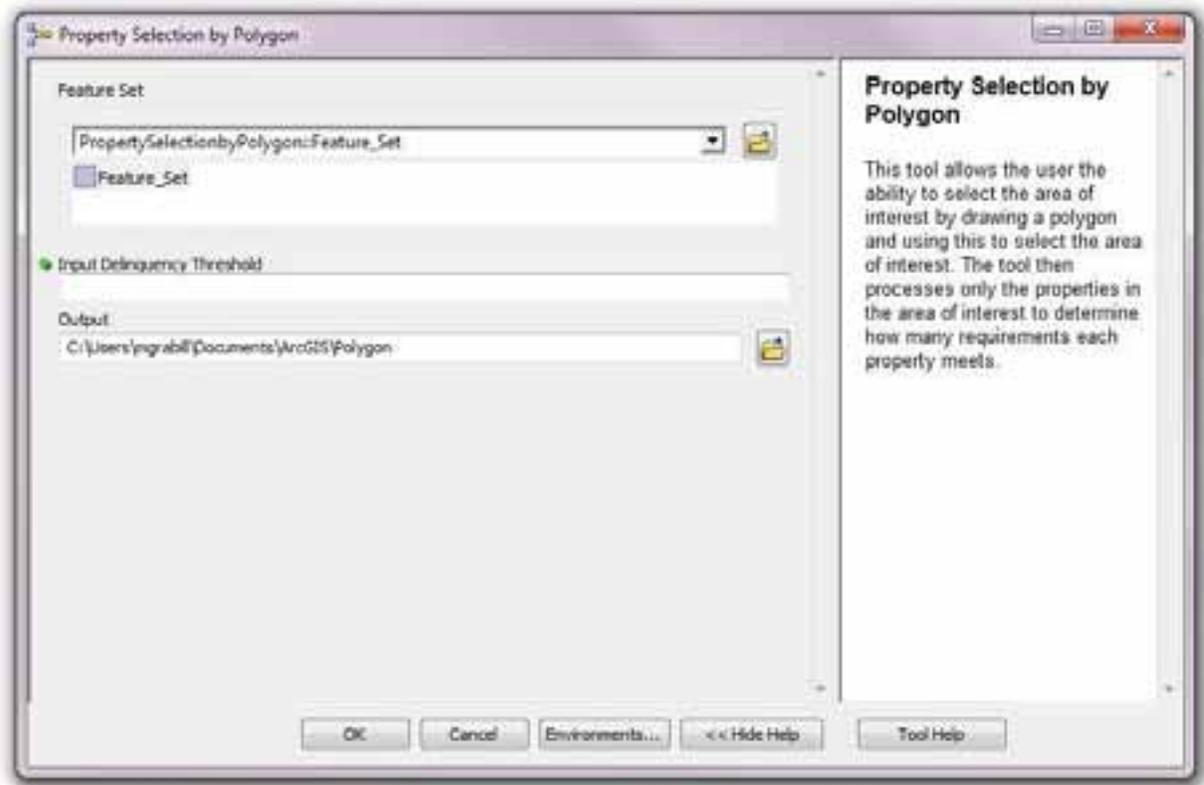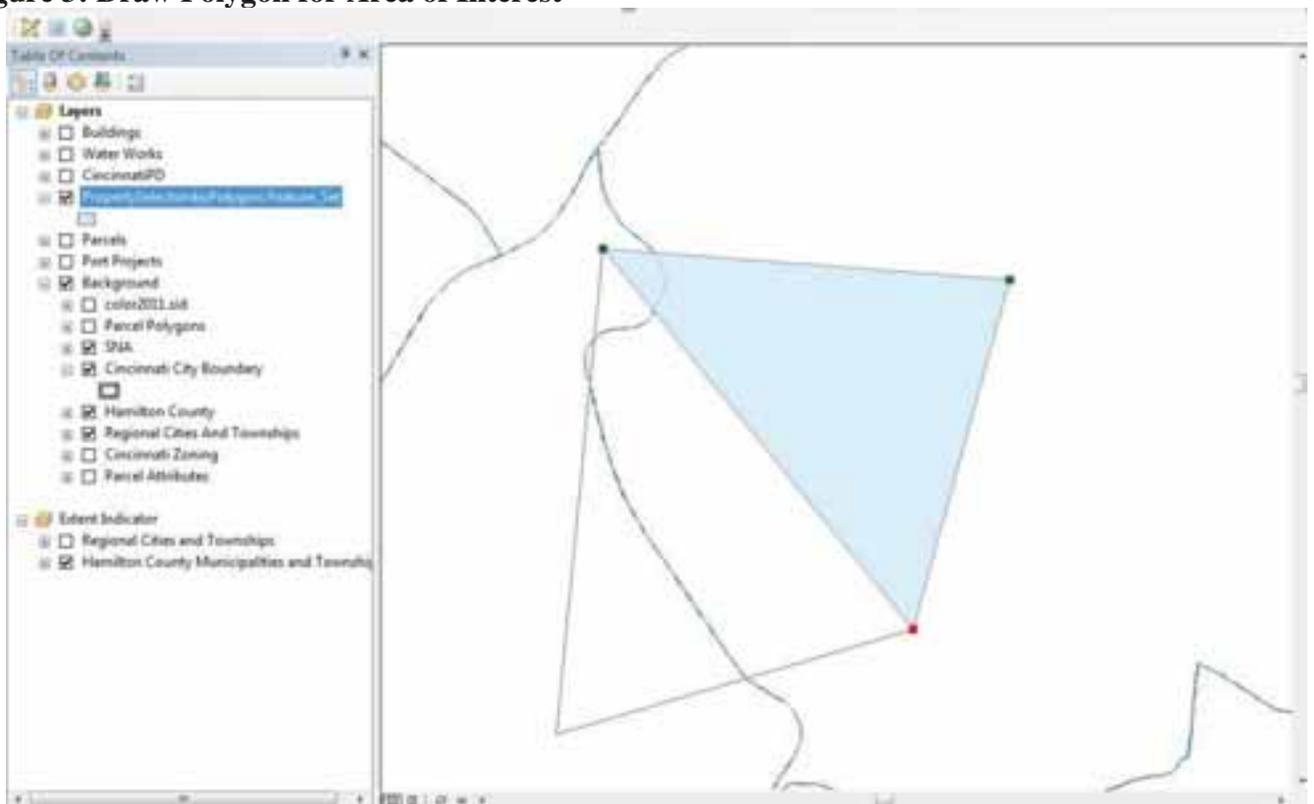
Figure 2: Property Selection by Polygon Dialogue Box

Figure 3: Draw Polygon for Area of Interest

3. *Extent:*

      a. Click the Extent button ⬤ on the Property Selection Toolbar.

      b. Use the dropdown list to select 'Same as Display'.

      c. Input the amount of delinquency that is required for the current investigation.

      d. Finally, select a location for the output of the model.

      e. Click 'OK'.

      f. View output on map.

Figure 4: Property Selection by Extent Dialogue
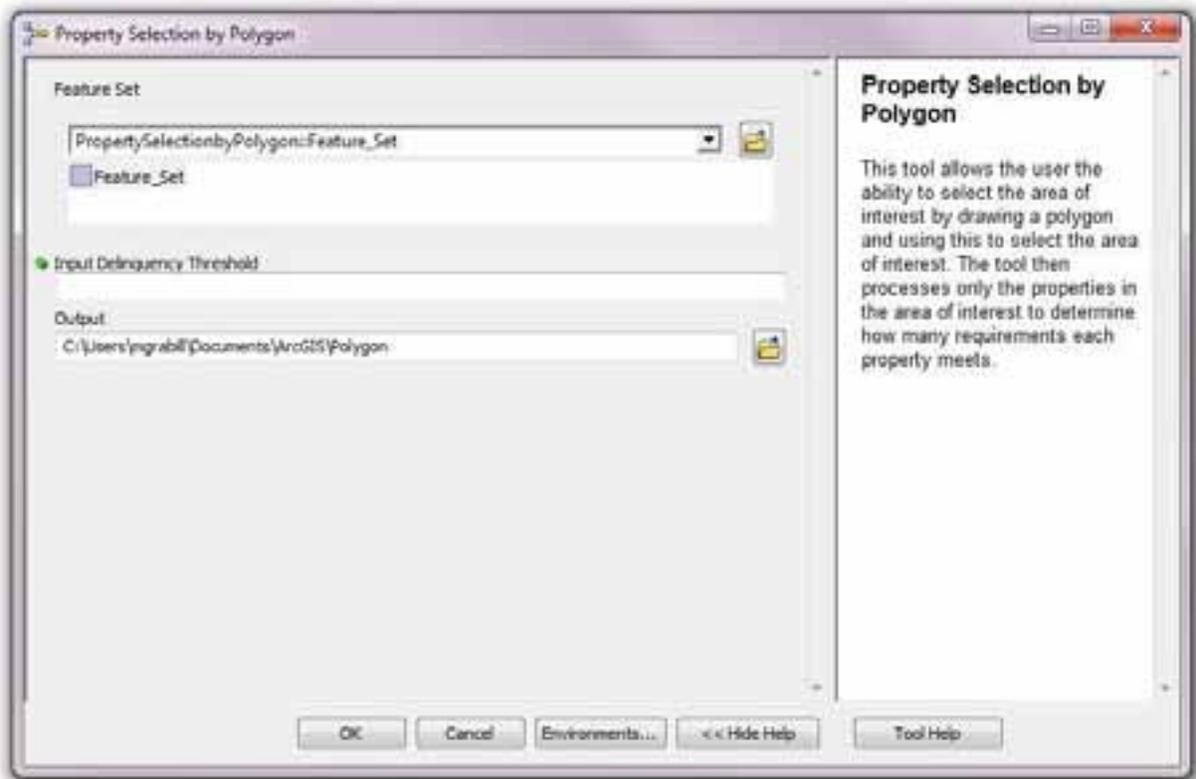
Figure 5: Select 'Same as Display' from Dropdown List
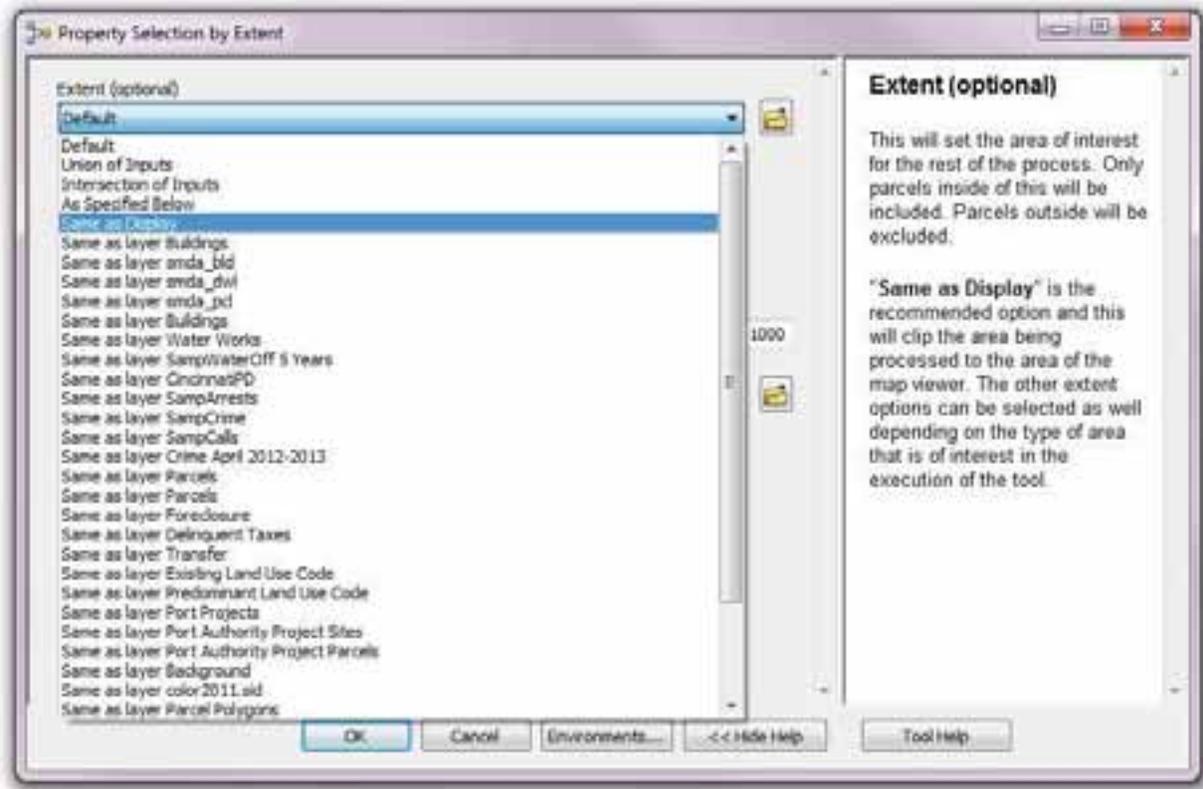
Model Progression:

Below are the steps the model follows to arrive at its final output (for a visual representation see

Figure 6). Each step is based on information gathered and maintained by the database. One step in the model is derived from both the collected information and the spatial location of parcels and their proximity to other parcels. In Table 1 is a list of all of the requirements that the HCLRC must satisfy in order to take a property as well as the agency responsible for collecting the data. Through the combination of well-maintained, digital data and a model based on the needs of the HCLRC this tool can be used repeatedly to get consistent results efficiently and help the HCLRC achieve its mission.

1. The area of interest (that was selected in one of three ways above by the user) is used to clip the parcels of interest from all of the parcels of Hamilton County.
2. Next a field is created for Requirements (the number of requirements that the parcel record satisfies according to the model).
3. Then each parcel is queried to determine if it is delinquent (a delinquency greater than $1 and if so its Requirements field is assigned a '1'.
4. Next the delinquent parcels are queried to determine those has a delinquency amount greater than the threshold amount input by the user (the Requirements Field is assigned a '4').
5. Then the large delinquency parcels are queried to determine those are forfeited. If a parcel is forfeited then its Requirements Field is assigned a '7'.
6. Then the large delinquency and forfeited parcels are queried to determine those already owned by the HCLRC. If a parcel is already owned by the HCLRC then its Requirements Field is assigned an '8'.
7. Next, using the select by location function, all delinquent parcels in the area of interest are selected if they are within 60 feet of a parcel that was assigned a '4', '7' or '8' in the Requirements Field. The Requirements field of these records is changed to '3'.
8. Then the parcels that have been assigned a '3' or '4' are queried to determine if these are currently in the tax foreclosure process. If the parcel is not currently in the tax foreclosure process it is assigned a '5' if it previously had a '3' in the Requirements Field and a '6' if it previously had a '4' in the Requirements Field.
9. Finally the model creates an output that displays the symbology (based on an imported layer file, see

Figure 7) of the parcels based on the number of requirements met (see Figure 8). Also, parcels with a '5' (a delinquent parcel below the delinquent threshold but within 60 feet of a large delinquent parcel and is not currently in the tax foreclosure process), '6' (a large delinquent parcel that is not currently in the tax foreclosure process), or '7' (a forfeited large delinquent parcel) are selected for further investigation.

Figure 6: Property Selection Tool Flow Chart

In Area of Interest = 0   Delinquent = 1   > Threshold and in Tax Foreclosure = 4   Proximate to '4', '7', '8' and in Tax Foreclosure = 3
Proximate and not in Tax Foreclosure = 5   > Delinquency Threshold & not in Tax Foreclosure = 6   Forfeited = 7   Owned = 8
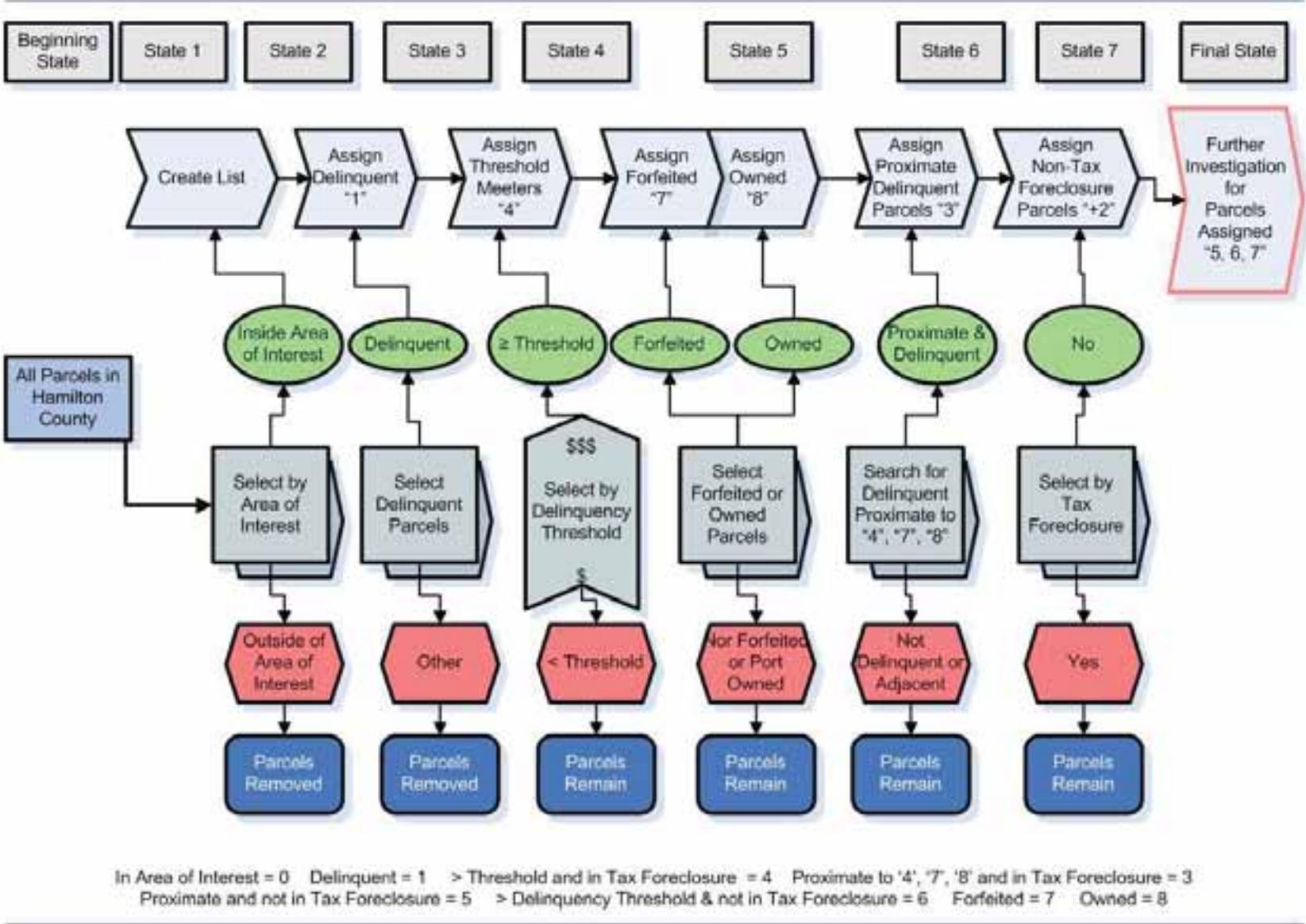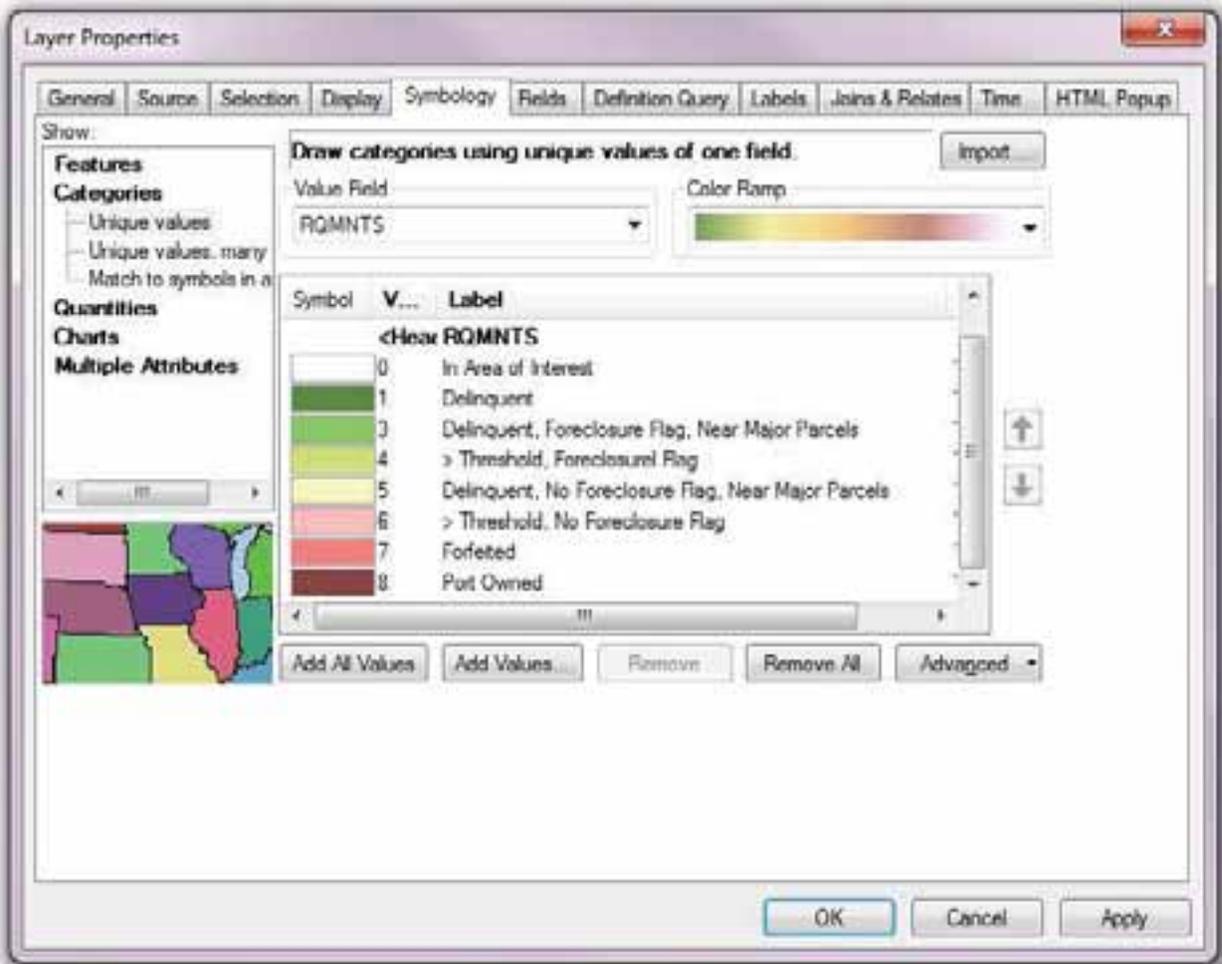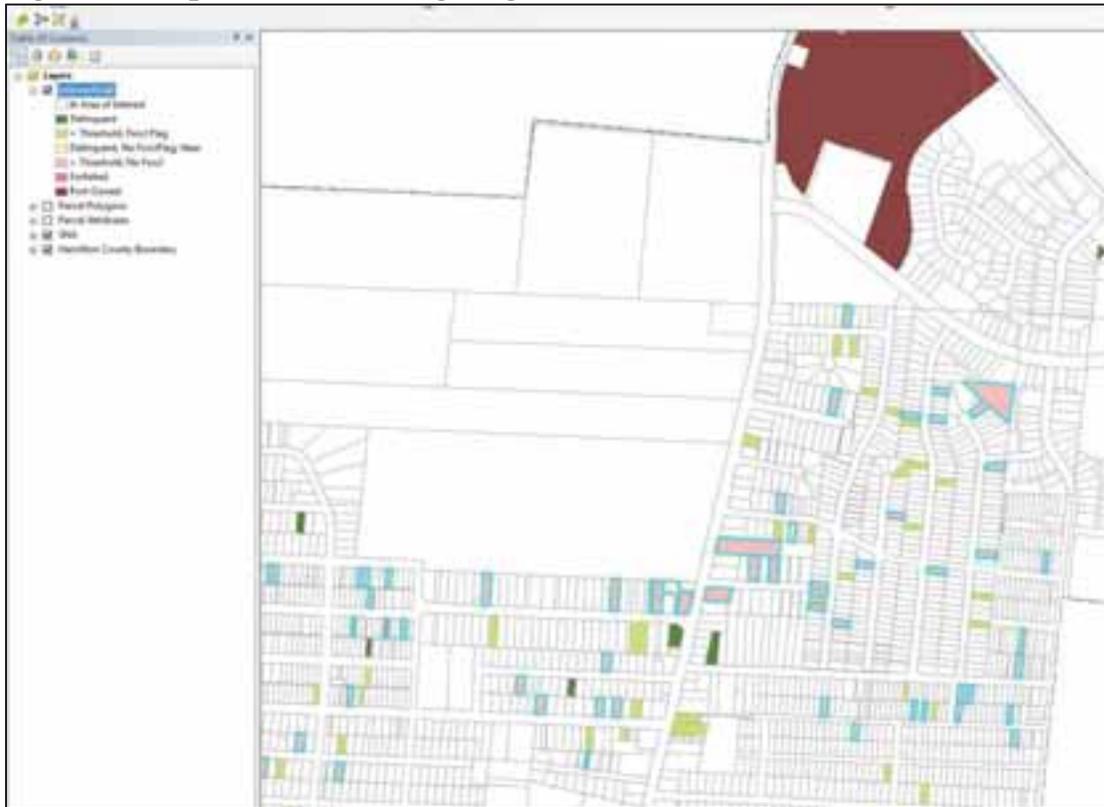
Figure 7: Layer Symbology for Final Output of Property Selection Tool

Figure 8: Output of Model Using Neighborhood Selection Tool

DISCUSSION

In creating the GIS-Supported Abandoned Property Assessment Application many more benefits were realized than were originally expected. The HCLRC only wanted easy access to information to be able to answer questions about property abandonment. CAGIS was able to see that a much more comprehensive system could be created that would give the HCLRC information that updated as the different agencies went about their daily work. By combining all of the data in one management system and offering a tool that would return results that followed a consistent and logical process the HCLRC was guaranteed an innovative technology solution.

One of the first benefits of the GIS-Supported Abandoned Property Assessment Application is the streamlining of data gathering for better efficiency. In the past the information was disjointed and located in many different locations, some on the web and some only available in physical form. Through the creation of the database management system many of these datasets were brought together to be easily searchable. With the information residing together it is now possible to get a more comprehensive understanding of each parcel as well as the county as a whole with a reduced amount of time and energy spent hunting down the necessary data.

A second benefit is the improvement on the system of assessment leading to more consistency. The decision support model is a tool that repeats the same process every time, using the same sources of information, and is always in the most up-to-date form available. This uniformity has allowed for a system of assessment that was previously at risk of being exposed to human error to be transformed into a tool that will always produce consistent outcomes. An

improved consistency can encourage more confidence in the assessment of which parcels to select for inclusion in the land bank and allow for a more logical valuation.

A third benefit is that it enhanced the legacy system of data sharing to provide for more collaboration as Hamilton County moves forward. Already there has been interest shown by parties beyond the HCLRC for additional access to information about property and the community in general. Also, through discussion with some agencies about the technology solutions that CAGIS can provide more interest has been shown for collaboration among the different departments. The creation of a database management system that is supported by a GIS makes this all the more possible in the future.

In Hamilton County many of the necessary components for making the GIS-Supported Abandoned Property Assessment Application were already in place. The different government agencies had been collecting data on information relevant to abandoned property issues for a long time. CAGIS had been developing the technology to allow for data sharing, storage, and maintenance since the 1980s. The impetus of the need for data by the HCLRC set out what exactly the structure of the application needed to look like. By understanding what currently existed in the county and what was needed the Database Management System and the Property Selection Model were created to fulfill a void. All of these different components were brought together by the push of the HCLRC to help enhance the legacy of data sharing in Hamilton County.

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