

MASSACHUSETTS DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT

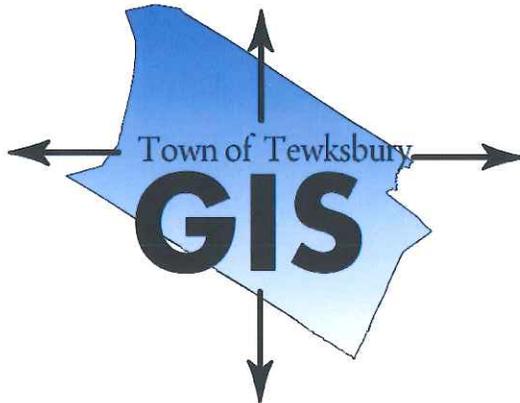


GIS Peer Report for Tewksbury, MA

Peer to Peer Technical Assistance Program

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2/28/2008



This report was produced for the Town of Tewksbury through a Peer to Peer Technical Assistance Grant from the Massachusetts Department of Housing and Community Development.

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A SPECIAL THANKS TO THE TOWN OFFICIALS

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Town of Tewksbury, Massachusetts
GIS Needs Assessment
Peer to Peer Technical Assistance Program
February 2008

Article I. INTRODUCTION

This report was produced for the Town of Tewksbury, Massachusetts through the Town's participation in the Department of Housing and Community Development (DHCD) Peer-to-Peer Technical Assistance Grant Program. The Town contracted with Peer Assistant, John Mangiaratti, GIS Coordinator for Westford, MA, to assist the Community Development Department with their efforts to set up and activate Tewksbury's GIS system and to train staff in its use and management. This report will serve as guide to establish initial goals, priorities, and implementation strategies for Tewksbury GIS. The recommendations in this report are based on the analysis of information obtained from correspondences with Town officials, discussions with consultants that have worked in Town, and comparisons with neighboring communities.

Geographic Information Systems (GIS) is an essential resource for municipal government. It is a software-based information management tool that is used to organize, maintain, and analyze geographic-based information. Many communities use GIS to maintain their digital tax maps, maintain their zoning maps, and to keep track of infrastructure assets such as roads, underground pipes, buildings, and waterways. GIS is also used to provide access to information, such as assessing data, land use, and permitting records. The access to this information can assist decision makers and improve the customer service capabilities of the Town. When a town maintains a functional GIS website, the public is allowed access to a great

deal of information. The public is able to gain information through the website 24 hours per day. This also reduces time that staff spends dealing with property related questions.

There are three essential factors needed to operate a successful municipal GIS program:

- 1) A person or group designated to manage the program
- 2) Current data – parcels and planimetrics, which serve as the foundation for the GIS system, are the data most crucial to a successful program
- 3) A public GIS website or publicly available mapping information

Article II. Summary of the Existing GIS Program

The three key factors mentioned above can be achieved in Tewksbury in the short term for little or no cost. However, a strategic plan and sustainable funding strategy needs to be developed in order to maintain the system for the future. [See Section 4.02 for short term and long-term recommendations]

Over the past ten years, the Town of Tewksbury obtained GIS data and developed different pieces of a GIS program. The Town relied on support from consultants and agencies such as the Northern Middlesex Council of Governments for the GIS related projects. Because the projects were for individual departments and were not through a unified GIS department, there was duplication of efforts and the GIS data was not properly maintained.

In the late 1990's the Town of Tewksbury acquired a full set of planimetric data from a flyover project. The project was originally contracted as part of the sewer project. The consultant used the planimetrics as a base map for sewer drawings. The data features roads, buildings, trees, contours, and water features that were developed from interpretation of aerial photography. The planimetrics are currently being used in Tewksbury's GIS system; however, they are of limited value due to their age and lack of maintenance. Most municipalities update their data quarterly to avoid having to pay for another flyover project. In Tewksbury, updating the planimetrics would be a difficult and labor-intensive task. Depending on the success of regional efforts (see Appendix C), it might be more cost effective to use a new aerial imagery to update the planimetrics.

The Town has recently shown an increased commitment to GIS technology. They have done so by seeking the consult of a Peer Assistant and by hiring a staff person to work directly on GIS projects. The new GIS staff person will improve the department and system drastically. The devoted staff person will focus on maintaining the system and its data, learn and incorporate trends and advances in GIS industry, and complete projects for departments using GIS technology. The effective implementation of this system will open the doors between departments as well as between departments and the general public.

Section 2.01 Existing GIS Staff, Data, and Applications

The following items are basic observations about the GIS system in Tewksbury.

- 1) During this project all of the Tewksbury GIS data was converted from shapefiles to geodatabases. Geodatabases are the preferred storage format because they load faster, are easier to manage and provide greater functionality. The orthophotos that were obtained from MassGIS have also been stored in a geodatabase because they will load faster. All the data is currently stored on one employee workstation with a shared drive that is accessible to other employees.
- 2) The current GIS program includes the occasional services of a part-time staff from the Engineering Department. This newly created position called Project Manager is tasked with conducting construction inspections for Engineering projects and working on the Town's GIS system when time permits.
- 3) The Assessing Department regularly uses GIS information and they work closely with a GIS vendor. The Planning and Building Departments have staff that regularly access GIS data. The Public Works Department and MIS Department also have GIS users in their office.
- 4) The digital parcels are currently maintained by the consultant Full Circle Technologies (FCT). FCT uses the parcels as the foundation for the online GIS viewer that is used by the Assessing Department. These parcels were last updated in 2005. The Assessing Department does not have digital tax maps but the paper maps are updated annually.
- 5) An Adobe PDF version of the Town Zoning Map is available for download on the website. This zoning layer was created by NMCOG during the Masterplan process and was updated by the Town Engineer in 2005. The maps are currently being updated by NMCOG as part of the Open Space Plan.
- 6) The Engineering Department has a basic map application that can be used to create maps using a standard layout. The Town is contracting with Camp Dresser, McKee Inc. (CDM) for the sewer project. As part of that contract they have received a sewer system GIS layer and updates to the water distribution GIS layer.
- 7) The Police Department has a GIS based AVL application. Police also utilizes IMC dispatch software which contains various crime and incident mapping features. It has also deployed the use of Reverse911 software for emergency notifications.
- 8) The Town owns five software licenses for ESRI ArcView 9.2. The annual maintenance contract entitles the town to technical support and software upgrades.

- 9) The Town uses VectorEyes to view Assessors data and some GIS layers including parcels and orthophotos. The Assessing Department uses Vision Appraisal Software for their Assessing Database and utilizes an application called VectorEyes to view parcel information. This website is publicly available but is primarily used by the Assessing Department. The website allows the user utilize basic map tools including zoom and pan to browse the parcel data, planimetrics, and aerial photographs. The user can also utilize multiple search options including search by street address and search by parcel number. The site also offers the ability to query the parcels by lot size and assessed value. Once you select a parcel you can view, print or export the assessor information and you can also do a query to find the parcel abutters. An abutters list can be printed or exported as a spreadsheet.

Section 2.02 Online GIS Viewers

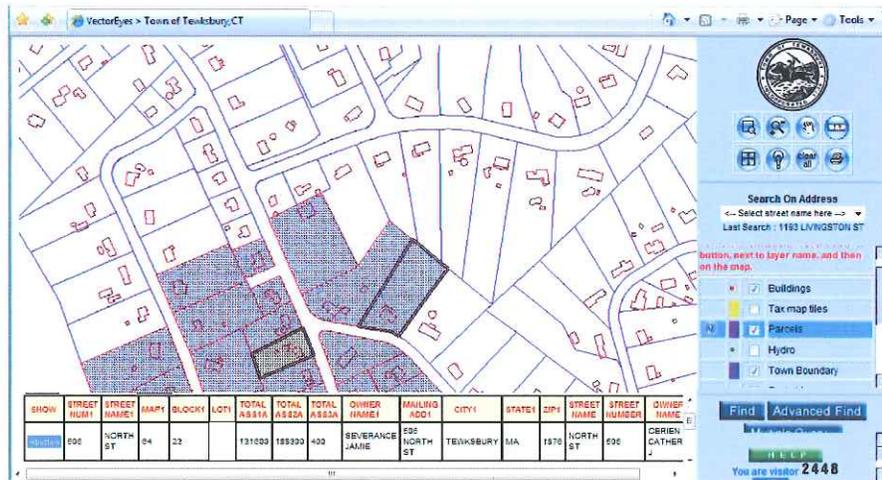
A common misperception about GIS is that is a “fancy toy” for public officials and it is not a good use of public funding. Oftentimes residents notice funds spent on GIS but are not exposed to the many benefits and advantages of the technology. This misperception could quickly change if GIS was made available to the public. The Town of Tewksbury has not provided public access to the GIS because of privacy concerns. However, privacy concerns can easily be addressed by controlling the information that is available, not by shutting the public out all together. Online GIS viewers can provide various levels of access and even password protection so the Town can control the information that is available publicly.

There are many online mapping systems on the internet that anyone can access for free. These sites are operated by commercial companies and their data is update frequently. These systems such as Google Maps, Microsoft Virtual Earth and MapQuest are ideal for driving directions or general property viewing. The disadvantages of these systems are the lack of specific property information and their inability to link with town databases. The Commonwealth of Massachusetts also provides a very powerful GIS viewer called “Oliver” that can be accessed for free by anyone. These systems provide general information but they do not provide the level functionality or information that local government staff would need on a daily basis.

The VectorEyes online viewer has some of the functionality that could be useful to the Town but the data is has not been maintained. The Town should reinvest time and energy into updating its existing GIS databases and posting them on the VectorEyes website. See below for descriptions of online resources.

1) **VectorEyes**

<http://38.100.244.102/sites/gis/tewksbury/index.htm>



Tewksbury Assessing Department uses an online GIS viewer called VectorEyes. This online GIS resource is hosted off site by Full Circle Technologies. Providing a link to this through the Towns website would create a gateway to valuable information for property owners, real estate professionals, and numerous other residents.

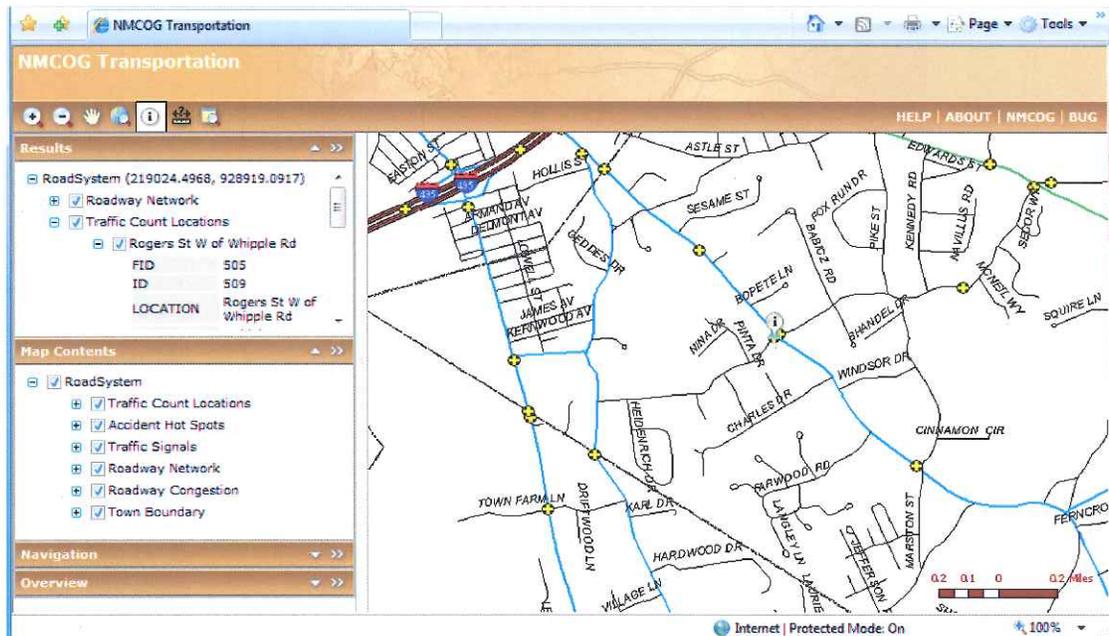
2) **MASSGIS Online mapping** <http://www.mass.gov/mgis/mapping.htm>

Oliver

http://maps.massgis.state.ma.us/massgis_viewer/index.htm

MassGIS offers more than 15 individual online thematic maps for various purposes. There is a DEP Title 5 Setbacks Map, Wetlands Map, NHESP Priority and Estimated Habitat Map, Topography Map, and others. Oliver is the comprehensive State of Massachusetts online GIS viewer. It contains all of the information included in the individual theme maps and every other data source that the state maintains. Users can print and export maps from this site.

- 3) NMCOG Roadway Network <http://68.162.254.127/Web/NMCOG%20Disclaimer.htm>



The NMCOG Transportation Network Interactive Mapping Database was created using data from MassHighway and MassGIS. This interactive online map shows information about the streets in each of the communities represented by NMCOG. This also displays traffic accident data from 2004 to 2006 that was collected by the Department of Transportation.

- 4) Massachusetts Site Finder <http://www.massachusettsitefinder.com>

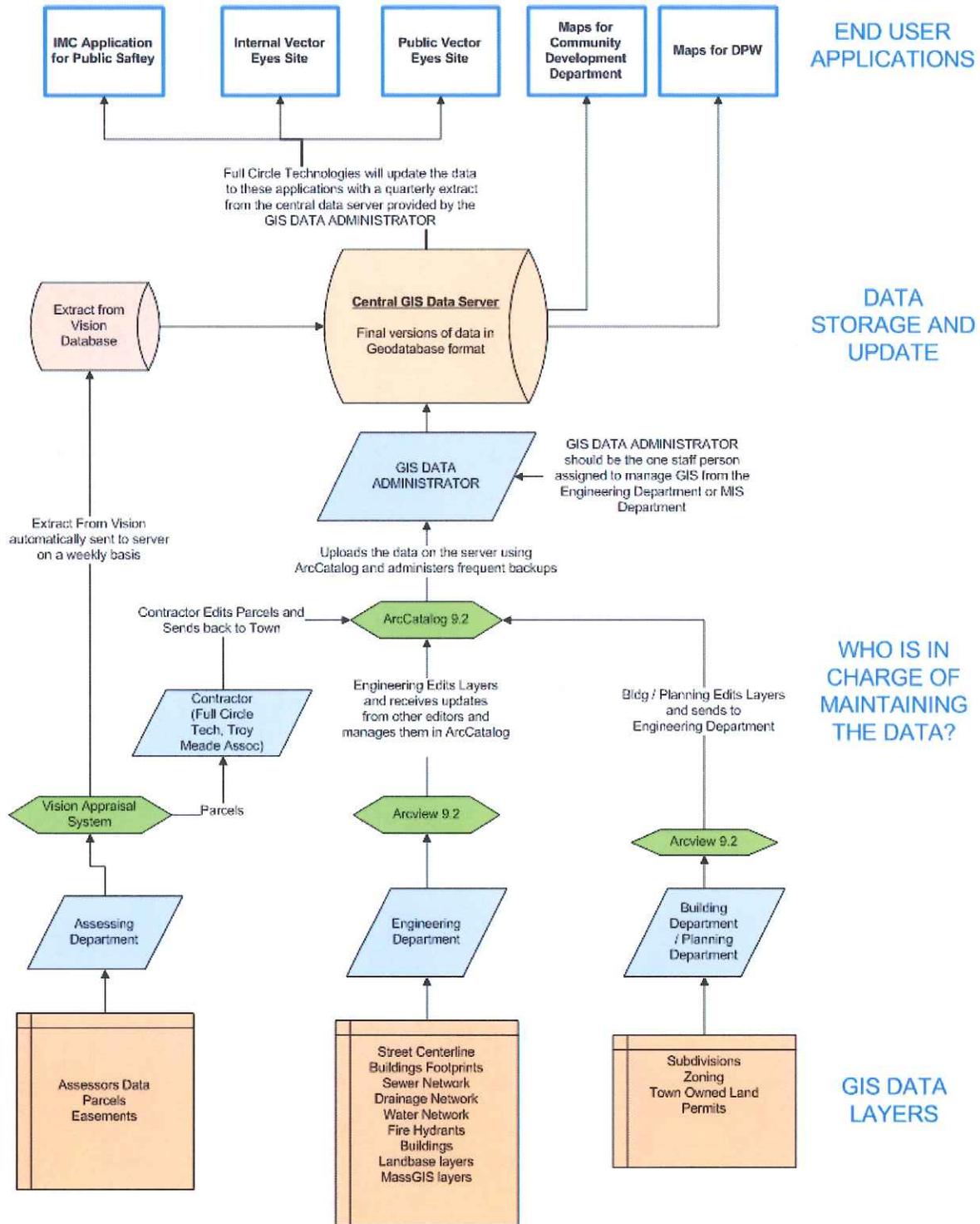
This site would be beneficial for business and economic development portion of the Town's website. This website was developed through a partnership between the Commonwealth of Massachusetts and the Massachusetts Alliance for Economic Development, a member of the Massachusetts Business Resource Team.

ARTICLE III. GENERAL RECOMMENDATIONS FOR GIS PROGRAM

Section 3.01 Data Update and Maintenance Procedures

The diagram below outlines a proposed workflow for the updating and maintenance of the Town's GIS systems. The model describes the flow of data from the updating of each layer to the updating of the end user applications. The proposed end user applications are listed on the top of the chart and the only applications that are currently deployed are the internal online GIS viewer and the IMC application for Police with basic mapping information.

Proposed Workflow for Tewksbury GIS Data.



Section 3.02 Development of a GIS Homepage on the Town Website

The Town should create an online presence for the GIS program by creating and maintaining an informational website. The site should include maps for download and general information about Tewksbury GIS. The homepage can serve a local resource and serve as a space to make GIS related announcements such as completion of projects or other exciting news. This will help improve the public image of GIS program and show residents and staff that GIS is an important part of Tewksbury.

(a) Post the Mission Statement for the GIS Program

A recommended mission statement is shown below...

The mission of the Town of Tewksbury GIS Program is to promote, and develop a geographic information system resource for local decision makers and the general public. In pursuing its mission, the GIS has been designed to:

- Protect sensitive information that needs to be secure for privacy or public safety reasons.
- Provide user-friendly, public access to GIS data.
- Provide robust user applications for town staff.
- Maintain data in compliance with state and federal standards and compatible with other GIS in Northern Middlesex region.

(b) Include a link to online GIS viewers

See section 2.02

(c) Display Tewksbury GIS Logo

A logo is a good way to give your GIS product a “brand” and to help make the GIS program look more official. Below are a few sample logos that could be adopted for the Tewksbury GIS program.



(d) Sample of GIS websites in the region

<http://www.westfordma.gov/gis>

<http://www.billericadpw.org/gis.asp>

http://www.northreadingma.gov/Pages/NReadingMA_GIS/index

<http://www.lowellma.gov/services/gis>

Section 3.03 Recommended Policies

The following policies should be considered by the Town.

(a) Digital Data Submission Policy

- 1) Digital Plan submission requirements in Planning, Building and other applications. A sample of language that could be used...

Excerpt from the Town Westford Planning Board Application

The Applicant shall provide the Planning Department with five (5) sets of full sized and five (5) sets of reduced copies of the final set of approved plans as well as a digital copy of the final set of approved plans prior to the issuance of a building permit. The digital copy of the final set of approved plans must follow the four requirements listed below"

- i. All plans and specifications must be submitted electronically. Acceptable file formats include: AutoCAD *.dwg, AutoCAD *.dxf, ArcView *.shp, ArcGIS Geodatabase, or image files such as .TIF or JPEG. The files must be identical to the printed plan and contain all information included on the written plan. Upon project completion a digital submission of the "as-built" plan is required prior to receiving a Certificate of Completion from the Building Department.
- ii. All digital mapping data must be delivered in the Massachusetts State Plane Coordinate system with a horizontal datum of NAD83 and vertical datum of NGVD88.
- iii. Documentation of the data format must be provided with a description of the CAD layers and list of the types of features placed in each layer. Submission of multiple files must also include a list of the files and their purpose.
- iv. The data submitted must include documentation on the method used to gather the data, the name of the person(s) responsible for preparing the data, contact information, an estimation of the horizontal and vertical accuracy, and the date of data capture. All media shall be free from any and all defects and viruses, and labeled as to their contents.

- 2) "Tewksbury GIS Ready"

It recommended that "Tewksbury GIS Ready" data should be defined as:

- Data delivered digitally in GIS shapefile or geodatabase format.
- The data shall be in the NAD1983 MA State Plane Coordinate System.
- The data shall be delivered in a way that would create minimal work for the Town staff when they update the GIS system as determined by the Engineering Department.

(b) GIS Data Distribution Policy

- 1) It is recommended that the town make all GIS Data available to the public except for certain layers for security reasons. Private parties may obtain GIS layers for a fee based on the cost of duplication according to Mass General Law. The GIS layers provided will be in a GIS format and shall cover the entire town except for the orthophotos which are available in tiles.
- 2) It is recommended that the town create a policy document that outlines data distribution policy and includes necessary disclaimers.
- 3) Use a disclaimer that is approved by Town Counsel. Disclaimer should be printed on all maps and attached to all digital files that are produced by the Town of Tewksbury. Below is a sample disclaimer used in the Town of Westford, MA.

TOWN OF WESTFORD
PUBLIC RECORD RESPONSE - DISCLAIMER

Pursuant to M.G.L. Chapter 66, §10, the Town of Westford hereby produces the following information: GIS
Data Information – Mapping System

In maintaining its GIS Data, the Town of Westford has made every effort to ensure the accuracy, currency and reliability of the content thereof however, errors can occur. It is expressly understood and agreed that in producing this information, the Town of Westford, its officials, agents, servants and employees does not warrant or guarantee the information it has provided, nor does it accept responsibility for any errors contained therein. In no event will the Town of Westford, its officials, agents, servants and employees be deemed or held obligated, liable, or accountable for any loss or damage incurred or resulting from the use of the information provided.

Section 3.04 Potential Fees

The following proposed fees are general recommendations that have not been analyzed in comparison to the Town's current fee structure. The purpose of these fees is to ensure long term viability of the GIS system and create revenue sources to offset operating costs. In order to effectively manage a fee based system the Town should clearly define Tewksbury's Data Distribution Policy. A recommended Data Distribution Policy is included in this report in Section 3.03 (b).

(a) Digital Data Fees

- 1) GIS Data can be distributed to the public for a fee that represents the cost to the town. The fee is based on the lowest qualified person's salary that is capable of creating a duplicate of the information.
- 2) Make data available for purchase...
 - a) A full set of GIS Data including Parcels, Planimetrics, and Town geodatabases should be available for purchase for approximately \$30.00. See Commonwealth of MA Opinion in Appendix E.
- 3) Requests for customization to the data should be billed at \$40.00 per hour. Customization includes, reducing the coverage area of the data, converting to CAD, and/or merging datasets.

(b) Printed Map Fees

- 1) A selection of standard maps should be available for free download from the website.
- 2) A list of the maps available for purchase should be posted in the office. Standard maps or basic locus maps should be available for \$2 for 11"x17" or \$5 for 24"x36" maps.
- 3) Customized maps should be billed at \$40 per hour.

(c) Permitting Fees

Permitting fees are necessary because each new building and subdivision requires updates to the GIS system and creates more work for the Town staff. Fees can help offset the cost of maintenance of the GIS system. It can also encourage applicants to submit digital versions of plans and "Tewksbury GIS- ready" data in order to receive a fee waiver.

(i) Building Permits

- 1) Require a GIS update fee for all permits that create a change to the exterior of the building or landscape of the property (Addition, demo, curb cut)
- 2) \$20 - \$80 GIS fee for a Building, Demolition, or Exterior Alteration Permit
- 3) \$10 curb cut permit GIS fee

**** Allow a full waiver of any GIS fee if data is submitted "Tewksbury GIS-ready" in NAD1983 MA State Plane Feet coordinate system. See Section 3.03(a)2) for definition of "Tewksbury GIS-ready".

(ii) Planning Board Applications

- 1) Require a GIS update fee for any Planning Board application that requires a parcel update (subdivision, easement, etc)
- 2) GIS Fee per new subdivision lot or merger - \$25 - \$100
- 3) GIS Fee for a site plan - \$40 per Acre

**** Allow a full waiver of any GIS fee if data is submitted "Tewksbury GIS-ready" in NAD1983 MA State Plane Feet coordinate system. See Section 3.03(a)2) for the definition of "Tewksbury GIS-ready".

(d) Stormwater Runoff Fees

The Town of Reading, MA and other municipalities have introduced a Stormwater Runoff Fee. They are using the storm water fees to fund capital expenditures for drainage system mapping (GIS layer), illicit discharge detection, and general drainage system infrastructure improvements. (For more info see Appendix F)

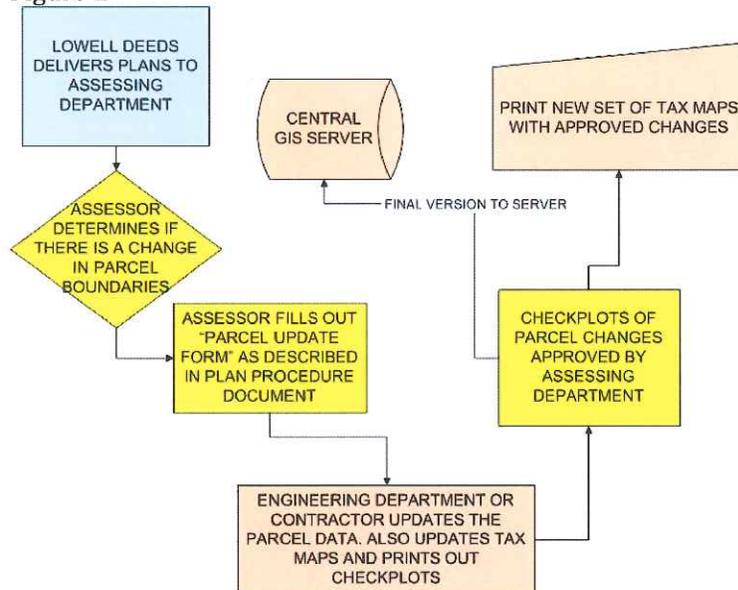
ARTICLE IV. DETAILED RECOMMENDATIONS

Section 4.01 Departmental Recommendations

(a) Assessing Department

- 1) The Assessing Department should develop a scheduled procedure that updates the central GIS server with current assessment data from the Vision Appraisal System. It could be customized to send a weekly extract to the central GIS server so the applications will have the most current data.
- 2) Currently the Town contracts with a vendor who updates the hard copy tax maps every year. The Town also contracts with a different vendor to update the digital parcels. This is a duplication of efforts and in the future the Town should try to use one vendor to update the digital parcels and then use them to produce the hard copy paper maps.
- 3) The Assessing Department should work with the GIS staff to develop a procedure for updating the Town's parcel GIS layer. The flow chart in Figure 1 below shows an example of how the process could work. (Also see Appendix D for an example of procedure used in Westford, MA)

Figure 1



Yellow objects indicate work to be done by ASSESSING.
Red objects indicate work to be done by ENGINEERING.

(b) Building Department

- 1) The Building Department in collaboration with the Planning Department should maintain the following GIS data: Subdivisions, Zoning, Town Owned Land, and Permits (see diagram in Section 3.01.)
- 2) Geocode the building and demolition permits in town to use in maps that can be used to analyze development

(c) Engineering Department

- 1) The Engineering Department should maintain the following databases: Street Centerline, Buildings Footprints, Sewer Network, Drainage Network, Water Network, Fire Hydrants, Buildings, Landbase layers and MassGIS layers, also parcels if the Assessing Department decides not to use a vendor (see diagram in Section 3.01.).
- 2) Utilize existing contracts to assist with development of GIS data. The current contract with your consultant may provide flexibility in future deliverables. It is recommended that you discuss the possibility of receiving updated GIS utility networks as part of the ongoing contract. The consultant has the software required to develop complex geometric networks that can be used to store the water, sewer, and drainage system GIS data. The software that you have can maintain data in these networks but it does not have the functionality to create them.
- 3) Expand the use of GIS in tracking the progress of the sewer project. Track the status of permits and inspections using information from the permit tracking databases. Create a GIS layer for sewer hookups by geocoding the address information from the sewer applications. Use this info to produce project update maps.
- 4) Collaborate with the Public Works Department to conduct an outfall and drainage channels data collection projects using GPS. Divide the Town into tiled sections and go out and GPS locate outfalls and drainage ditches in each section based on time available. It may take two years to survey all of the sections but it will ensure that you have the entire town covered.

(d) Fire Department

- 1) Create a “First Responder Map Atlas” using current GIS data from the Town and MassGIS. This could include fire hydrants, buildings, ponds, hazardous sites, and other relevant information.
- 2) Update fire department GIS maps with underground storage tanks and create a new datalayer from the DEP HAZMAT spills spreadsheet.
 - a) Fire Department currently employs the use of a map system in their vehicles to give responders access to fire hydrant location information. The department would like to update these GIS systems with more current and accurate information. They would also like to use GIS for pre-planning operations and develop databases for underground storage locations and hazardous material storage. The Commonwealth of Massachusetts maintains a GIS layer for underground storage facilities (<http://www.mass.gov/mgis/ust.htm>) and also the most current data on HAZMAT spills can be downloaded from the DEP website as a spreadsheet and converted into a GIS layer (<http://db.state.ma.us/dep/cleanup/sites/search.asp>).
- 3) Map the Hydrants that haven’t been “adopted” and put a map on the website to show residents.
 - a) Fire Department is involved in an “Adopt-a-Hydrant” program. A map could used to track which hydrants have been adopted and which remain. This visual representation might encourage residents to participate in the program if they notice hydrants near their house that aren’t marked. This would also be an opportunity to confirm the locations of every fire hydrant in Town.

(e) Management Information Systems (MIS) Department

- 1) Dedicate a central GIS server to be used as the Town's central GIS data repository.
 - a) Storing data on local machines causes versioning issues and creates a risk of loss if not backed up properly
- 2) Dedicate one staff person in MIS or Engineering Department as the GIS DATA ADMINISTRATOR and give them full access to the central GIS server. Also consider giving this person full administrative privileges on GIS workstations so they can manage the GIS data and install GIS software when necessary.
- 3) Take advantage of the option to have an internal GIS site using the application that was created by Full Circle Technologies (FCT). The application is currently on a public server hosted by FCT and they have the ability to host a mirror site with greater functionality for internal use only.
- 4) Consider reconfiguring the Town's licensing with ESRI.
 - a) It is recommended that the Town purchase a single use ArcEditor and a floating ArcView license and discontinue four of the existing five single use ArcView licenses
 - i) By maintaining five single use licenses of ArcView you are spending annual fees on licenses that aren't being used.
 - ii) Given the current users of GIS in Town the optimal licensing would allow for one power user and two or three part time users. The ArcView license level does not give enough editing functionality for the one power user in town.
 - iii) Purchasing a single use ArcEditor and a floating ArcView will serve the needs of the town in addition to the one existing ArcView single use for a computer off of the town network.

(f) Planning Department

- 1) Create a Town Owned Land Inventory Map. This map can be created using town records and the parcel data set. The map and associated GIS database could be used to keep track of the land that is owned by different departments or boards and the acreage.
- 2) Continue to work with NMCOG to update data layers relating to Planning.
 - a) The Planning Department has worked closely with NMCOG in recent years for GIS related projects that contributed to the Masterplan and also the Regional Open Space Plan. It is recommended that this collaboration continue

(g) Police Department

- 1) The IMC Dispatch currently uses basic data from the Town's GIS. It might be helpful to include more of the Town and MassGIS data into the IMC mapping application. Work with the vendor to develop a schedule of regular updates to the data.
- 2) Create GIS data layers for Police operations such a patrol districts and reporting quadrants that can be used to create maps for analysis.
- 3) Geocode the License to Carry permits that are issued in Tewksbury and load that data into IMC to show residences likely to contain firearms.

Section 4.02 Prioritized Summary of Recommendations

(a) Short-Term

- 1) Dedicate a central server to store GIS data and schedule a weekly backup. Reorganize all data and folders related to GIS and store on a central server. Convert all shapefiles to feature classes within geodatabases. [Section4.01(e)]
- 2) Designate one full time staff member as the GIS DATA ADMINISTRATOR and give full access to central GIS server and all GIS workstations [Section 4.01(e)].
- 3) Consider participating in the regional flyover project administered by NMCOG that will provide oblique images and 4" pixel orthophotos. This data can be used to automatically update the Towns planimetrics. Review other flyover projects [Appendix C.]
- 4) Create a public facing online GIS system. This can be implemented under the existing agreement with FCT. [see section4.01(e)]
- 5) Combine the process of updating tax maps and digital parcels. Produce tax maps digitally instead of updating the paper tax maps and digital parcels separately. [Section 4.01(a)]
 - a) Update the digital parcels to MassGIS level II standards. [see MassGIS website]
- 6) Reconfigure ESRI licensing for optimal use by town staff. [Section 4.01(e)]
- 7) Create a GIS home page with mission statement, general info, links and contact information. [Section 3.02]
- 8) Consider formal GIS training for GIS DATA ADMINISTRATOR and other power users
- 9) Formalize a data update procedure as seen in the flow chart in [Section 3.01]
- 10) Create template map layouts for easy printing of custom maps in sizes 8 ½ x 11 and 11x17 and 24x36.
- 11) Create a new Street Index Map using current data from MassGIS. (Make pdf version available online)
- 12) Create a Town Owned Land Map using parcel data and distribute to Town Boards and Departments so they can verify their land holdings. [Section 4.01(f)]
- 13) Update hydrant data using orthophotos or other means.
- 14) Request Navteq Geocoding software from MassGIS to use as a geocoding tool.
- 15) Create an outfall GIS layer with the Town's GPS equipment [Section4.01©5]

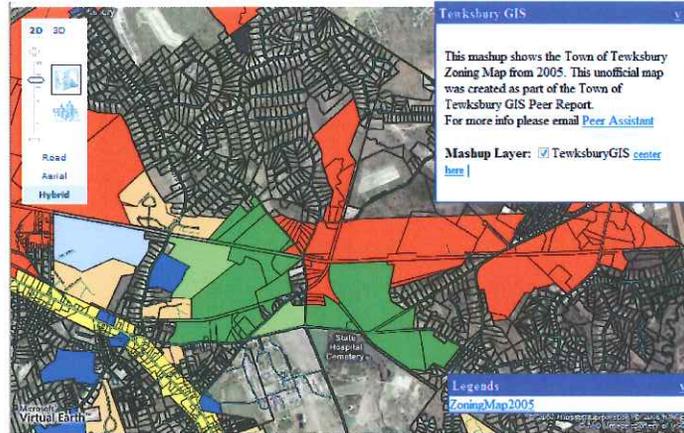
(b) Long- Term Recommendations

- 1) Create a GIS Administrator, GIS Coordinator or other position dedicated to the development and maintenance of the GIS program.
- 2) Enhance and Promote GIS resources available to the public.
 - a) The Town needs improve the GIS related services available to the Town staff and residents on the town website. This would create visibility for the technology and encourage people to consider it more of an asset. This is something that would have an instant impact and could be done with little effort or funding considering the numerous GIS resources that currently exist.
- 3) Establish a GIS Committee or other structured group of decision makers to set policy for the GIS Program.
 - a) It is recommended that the Town create a GIS Committee to set policy and clearly define the expectations for the Town's GIS program. The existing GIS staff would be required to refer to the committee for all policy matters and for direction on projects.
 - i) The committee shall consist of at least three Officials from Community Development Department and The Town Assessor and a no more than one resident that isn't also a town employee.
- 4) Provide Maps Available for Download
 - a) Tewksbury has multiple sources of information that could be mapped and made available on the Town website which would raise awareness of the importance of GIS information. With little effort or funding the Town could create basic maps with critical information, such as Voting Districts, School Enrollment Zones, Street Index, and Town Points of Interest.

5) Utilize Open Source Options

- a) The GIS industry is rapidly evolving and one of the most positive changes is the availability of free online resources for GIS mapping. Google, Microsoft, Yahoo and other companies have created applications that can be customized and used for little or no cost. These applications do not have the analysis and data manipulation abilities that the traditional GIS applications. See below for examples.

This “mashup” of the zoning was created with a free application called MapCruncher.

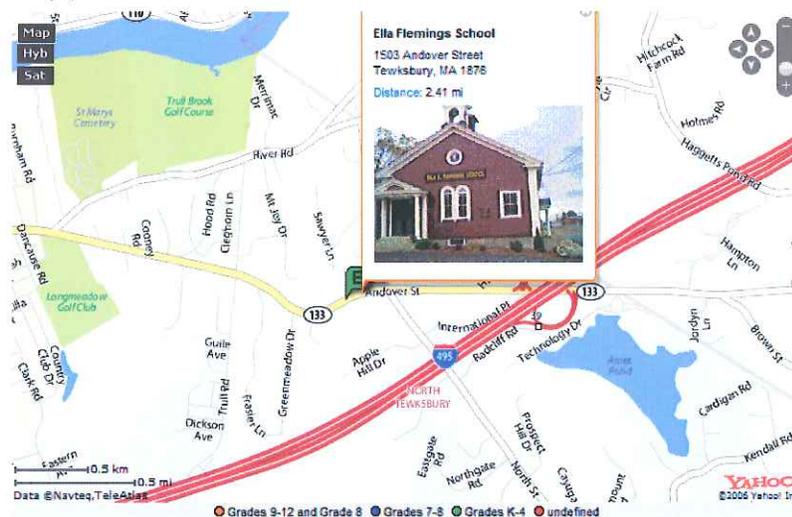


<http://www.olivestreetenterprises.com/Tewksbury/zoning.html>

The map below of Tewksbury public school locations was created using a free web service called

BatchGeocode.com

This map shows the location public schools in Tewksbury, click on the name for a direct link to the schools homepage.



<http://www.batchgeocode.com/map/?i=1cfab52e56bfb0812c1e904d4392edc5>

Article V. Glossary of Terms

Accuracy:

1) The closeness of an estimated (measured or computed) value to a standard or accepted value of a particular quantity, i.e., relates to the quality of the result.

2) With regards to numbers in a mathematical table or those produced by a computer Accuracy may mean: (a) the number of significant digits in the numbers, (b) the order of magnitude of the least significant digit. (See also Precision)

Application program or package:

A set of computer programs designed for a specific task.

Arc:

A line connecting a set of points that form one side of a polygon.

Area:

A fundamental unit of geographical information. *See polygon.*

Attribute:

Non-graphic information associated with a point, line, or area element in a GIS.

CAD:

Computer-Aided Drafting (Design)

Character:

An alphabetical, numerical or special graphic symbol that is treated as a single unit of data.

Clipping:

A graphic process of cutting lines and symbols off the edge of a display area.

Contour:

A line connecting points of equal elevation.

Coordinate System

There are two types of coordinate systems: geographic and projected. Geographic coordinate

systems use latitude and longitude coordinates on a spherical model of the earth's surface. Projected coordinate systems use a mathematical conversion to transform latitude and longitude coordinates that fall on the earth's three-dimensional surface to a two-dimensional surface.

Data Model:

A data model is an abstract representation of the data used by an organization, such that a meaningful interpretation of the data may be made by the model's readers. The data model may be at a conceptual, external or internal level (as defined by ANSI).

Database management systems (DBMS):

A set of computer programs for organizing the information in a database. Typically, a DBMS contains routines for data input, verification, storage, retrieval, and combination.

Database:

A collection of interrelated information, usually stored on some form of mass-storage system such as magnetic tape or disk. A GIS database includes data about the position and the attributes of geographical features that have been coded as points, lines, areas, pixels or grid cells.

Digital elevation model (DEM):

A quantitative model of landform in digital form. Also digital terrain model (DTM).

Digital:

The ability to represent data in discrete, quantized units or digits.

Digitizer:

A device for entering the spatial coordinates of mapped features from a map or document to the computer.

ESRI:

Software company produces applications and solutions that many governmental organizations use to maintain their GIS information.

Element:

A fundamental geographical unit of information, such as a point, line, area, or pixel. May also be known as an entity.

Feature Class:

A GIS layer stored in a geodatabase that can be used as an overlay or map feature (ie: parcels, streets, ponds)

File:

A collection of related information in a computer that can be accessed by a unique name. Files may be stored on tapes or disks.

Flow Chart:

A flow chart is a diagram that shows the progression of steps in an analysis. Flow charts are an essential part of a GIS analysis. They allow the GIS user to plan an analysis before executing it, so that unclear steps or missing data are visible. When complete, a flow chart can help others to understand how the analysis was done and provide a model for future GIS users to follow. (see Geodatabase)

Font:

Symbolism used for drawing a line or representing typefaces used for displaying text.

Format:

The way in which data are systematically arranged for storage in a computer and for transmission between computers, or between a computer and a device. Standard format systems are used for many purposes.

Geodatabase:

http://welcome.warnercnr.colostate.edu/class_info/nr505/nr505_06/biocomplexity/team8/data.html - Geodatabase

A database or file structure used primarily to store, query, and manipulate spatial data. Geodatabases store geometry, a spatial reference system, attributes, and behavioral rules for data. Various types of geographic datasets can be collected within a geodatabase, including feature classes, attribute tables, raster datasets, network datasets, topologies, and many others. Geodatabases can be stored in IBM DB2, IBM Informix, Oracle, Microsoft Access, Microsoft SQL Server, and PostgreSQL relational database management systems, or in a system of files, such as a file geodatabase.

Geographic Information System (GIS):

A system of capturing, storing, checking, integrating, analyzing and displaying data about the earth that is spatially referenced. It is normally taken to include a spatially referenced data base and appropriate applications software.

Geo-referencing:

The process of delimiting a given object, either physical (eg. a lake) or conceptual (eg. an administrative region), in terms of its spatial relationship to the land; the geographic reference thus established consists of points, lines, areas or volumes defined in terms of some coordinate system (usually latitude and longitude, or UTM northings and eastings, and elevation). The background framework pertinent to geo-referencing includes: NTS and BCGS grids and related features.

Geocoding:

The activity of defining the position of geographical objects relative to a standard reference grid. Using a referenced locator to plot our points on a map from a table.

Geographics or geographic projection:

Representation of the earth's surface as a projection onto rectangular lines of latitude and longitude.

Global Positioning System:

A system of earth satellites, each providing precise time and position information which enables a GPS receiver to compute the distance to each satellite. The distance measurements of at least three satellites are required to fix the receivers position in latitude and longitude. Measurements from a fourth satellite are required to provide vertical (altitude) positioning .

Image analysis:

The processing and interpretation of graphic images held in digital form.

Input device:

A hardware component for data entry such as a digitizer, keyboard, scanner, tape drive.

Interpolate:

To estimate the value of an attribute at an unsampled point from measurements made at surrounding sites.

Parcel:

A tract of land, being all or part of a legal estate usually shown on tax maps.

Latitude:

Angular distance, expressed in degrees and minutes, along a meridian north or south of the equator.

Legend:

The part of the drawn map explaining the meaning of the symbols used to code the depicted geographical elements.

Longitude:

The angular distance east or west from a standard meridian to another meridian on the earth's surface; expressed in degrees and minutes.

Line:

One of the basic geographical elements, defined by at least two pairs of *XY* coordinates.

Map:

Cartography; a hand-drawn or printed document describing the spatial distribution of geographical features in terms of a recognizable and agreed symbolism. Digital; the collection of digital information about a part of the earth's surface.

Map projection:

The basic system of coordinates used to describe the spatial distribution of elements in a GIS

MetaData:

Metadata is data about data. It typically includes information such as currency, accuracy, extent, custodianship, and collection methodology. Meta-data is typically stored in data models, dictionaries, schemas and other representations.

Modeling:

1. The representation of the attributes of the earth's surface in a digital database. 2. The studying of landscape processes using mathematical algorithms written in computer code.

Modem:

A modulator-demodulator device that allows data to be converted into a form whereby they can be transmitted as a set of pulses down a cable and then re-assembled at the other end.

Network:

1. Two or more interconnected computer systems for implementation of specific functions.
2. A set of interconnected lines (arcs, chains, strings) defining the boundaries of polygons.

Node:

The point at which areas (lines, chains, strings) in a polygon network are joined. Nodes carry information about the topology of the polygons.

Overlay:

The process of stacking digital representations of various spatial data on top of each other so that each position in the areas covered can be analysed in terms of these data.

Peripheral Devices:

Hardware not part of the central computer e.g. digitizers and plotters

Pixel:

Contraction of picture element; smallest unit of information in a grid cell map or scanner image.

Plotter:

A device for outputting hard-copy representations of data e.g maps p>

Polygon:

A multi-sided figure representing an area on a map.

Projection:

The representation on a plane surface of any part of the surface of the earth.

Raster:

A regular grid of cells covering an area.

Redundancy:

The duplication of data in the database to improve the ease and speed of access to data, with the risk that changes may cause conflicting values.

Relational database:

A method of structuring data in the form of sets of records or tuples so that relations between different entities and attributes can be used for data access and transformation.

Resolution:

The smallest spacing between two display elements; the smallest size of feature that can be mapped or sampled.

Rubber sheeting:

The transformation of spatial data to stretch or compress them to fit with other data

Scale:

The relation between the size of an object on a map and its size in the real world.

Scanner:

A device for converting images from maps, photographs, or from part of the real world into digital form automatically.

Shapefile:

A legacy storage format for ESRI ArcView databases.

Sliver:

A gap formed when two lines which should be contiguous are slightly separated in a graphical representation or map.

Thematic map:

A map displaying selected kinds of information relating to specific themes, such as soil, land-use, population density, suitability for arable crops, and so on. Thematic information may be represented as labelled polygons, lines or points, choropleth maps, isolines, etc.

Tile:

A part of the database in a GIS representing a discrete part of the earth's surface. By splitting a study area into tiles, considerable savings in access times and improvements in system performance can be achieved.

Topographic map:

A map showing natural and man-made features as well as relief, often in the form of contours.

Topography:

The configuration of a planetary surface including its relief and the position of its natural and man made features.

Topology:

The way in which geographical elements are related to each other. The topology of the data must be defined before GIS analysis can be performed.

Transform:

The process of changing the scale, projection, or orientation of a mapped image.

Window:

A usually rectangular area that is used to view or to transform the original map.

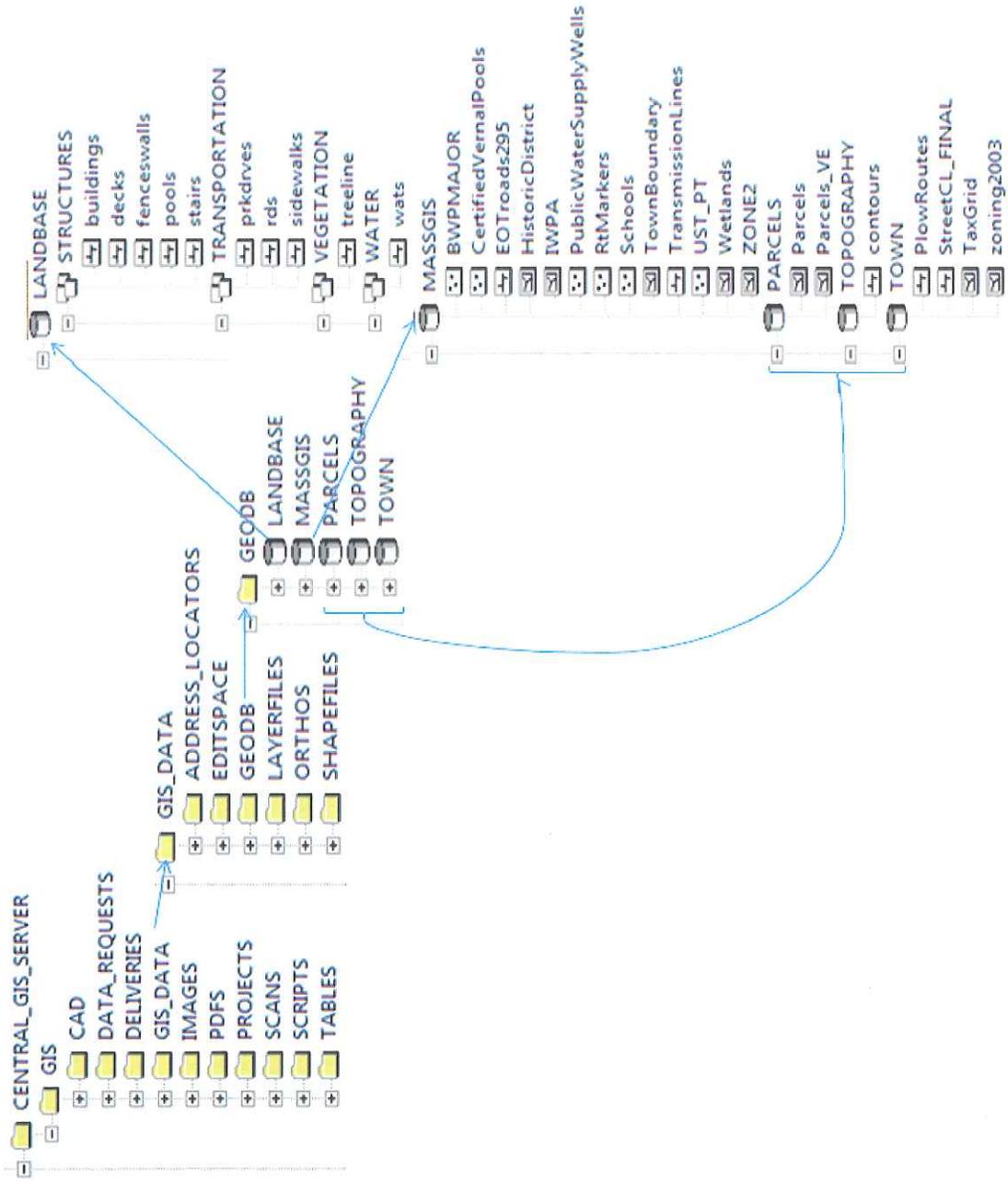
Zoom:

A capability for proportionately enlarging or reducing the scale of a figure or maps displayed on a CRT.

Estimated Hours Required to Update Data

| Datalayer | Last Update | Recommended | Est.Hours | Comment |
|-----------------------|--------------------|--------------------|------------------|--|
| Parcels | 2003 - CDM | NMCOG | 30- 50 | about 150 parcels to update - after this group is done they should be maintained by Engineering |
| Subdivisions | N/A | Planning/BLDG Dept | 10 | you can use a list of streets with subdivision info and then build from there |
| Zoning | 2003 - NMCOG | NMCOG | 12 | |
| town owned land | N/A | Planning/BLDG Dept | 6 | use parcels and classify by ownership, send to town officials to verify acreage, and ownership status. |
| Streets | NMCOG | Engineering | 15 | Start with NMCOG data and modify to add new streets |
| sewered streets | 2003 - CDM | Engineering | 8 | update the existing and future layer and merge with streets |
| sewer system | N/A | contractor | 100 | would need to use record drawings to digitize entire sewer network |
| Outfalls | on paper | Engineering | 60-120 | use a geocode operation to put the outfalls near their location and then review each and snap to location using an orthophoto. |
| Hydrants | 2004 - Fire Dept | Engineering | 40 | use the orthophoto to snap the hydrants to the correct location. |
| Buildings | 1998 | Engineering | 80 | You could probably update about 10 -20 buildings per day depending on the info available. |
| fences_walls | 1998 | contractor | ? | would require planimetric development from new flyover |
| Hydrology | 1998 | contractor | ? | would require planimetric development from new flyover |
| parkinglots_driveways | 1998 | contractor | ? | would require planimetric development from new flyover |
| Vegetation | 1998 | contractor | ? | would require planimetric development from new flyover |
| Topography | 1998 | contractor | ? | would require planimetric development from new flyover |

New File Structure for Central GIS Server



January, 23, 2008

To: John Mangiaratti
From: John Matley, NMCOG

Re: Tewksbury – Imagery options

My initial discussion with the communities of the region dealt with:

1. USGS is conducting an orthophoto acquisition of the eastern portion of the state. Their current plan is to capture imagery at 1 foot resolution from the middle of Dunstable to the coast. Communities in the coverage area can contract with USGS and obtain 6" resolution photography.
2. MassHighway has chosen to replace Pictometry as its provider of oblique imagery. This spring Greenman Pedersen, Inc., will be taking the photos and providing a new software package to view the product, (Multivision). The imagery will be 9" resolution, full state coverage. "GPI will also be flying any 4-inch imagery that the municipalities fund in the Spring as well."
3. Pictometry Inc will be flying the Lower Merrimack Valley at the request of the Merrimack Valley Planning Commission. They are providing 4" and 9" resolution, ortho and oblique, at a reduced cost from 2003. The communities there have been using the imagery since 2002 and wish to maintain the continuity of their programs.

The options at this point are pretty much down to one. Pictometry. Three of the larger communities in the region have selected this option for the following reasons:

1. Cost
2. Quality of imagery
3. Timeliness

The Council will be supplying a digital elevation model to Pictometry in order to rectify the orthophoto's. This will make the new orthophotos a more accurate product than those supplied by the state. This will allow users to update their GIS information on an as needed basis with existing software.

I am particularly interested in Tewksbury obtaining the imagery because their planimetric layer is extremely out of date. This would allow them to update their present information and avoid a full planimetric flyover in the future. Their cost for the imagery should be \$5500 vs. a flyover and planimetric development in the area of \$175,000.

I am beginning negotiation tomorrow with Pictometry on behalf of Billerica, Dracut and Lowell. I would like to know about Tewksbury as soon as possible. I will not set anything in stone with Pictometry, but time is of the essence.

Town of Westford

Plan Procedure

1. Plans are received from the Middlesex North Registry of Deeds each month via Mail paper and digitally.
2. The Assessor's Office Staff shall carefully review plans to determine it's purpose.
3. Label **Parcel ID** on plan and mark changes (i.e. boundaries, easements, acreage, new parcel ID, etc ...)
4. Neatly fold plan so it's as close to 8.5" x 11" as you can get it. In the *upper right hand corner*, with the "fold side" *up*, record in LARGE letters:
 - Plan Number
 - Plan Location
 - Parcel(s) affected
 - Document Number
5. High-light affected parcel(s) boundaries and note changes in *colored ink* on Assessor's (11 x 17) Map
6. **ASSESSOR'S REQUEST FOR MAP CHANGE FORM (ARMCF):**
 - Complete all applicable information
 - Instructions to Mapper must be precisely detailed and comprehensive
7. Affix plan, deed, Assessors Map and/or any other supporting documentation to ARMCF.
8. Record information from ARMCF onto MAP CHANGE LOG.
9. Record corresponding Log Number on ARMCF
10. Plans and Map Changes will be kept in a designated box located in the Principal Assessors office, in numeric order.
11. The Principal Assessor shall review box contents each April.
12. Upon review of each form, the Assessor shall make appropriate changes to the database, sign & date the bottom of the ARMCF and "✓" the *Patriot Updated* column on the MAP CHANGE LOG.
13. Plans and changes will then be returned to the designated box to await Mapper.
14. Record the **ACTUAL DATE** box and contents leave the Assessor's Office in *Date to Mapper* column on MAP CHANGE LOG.
15. Photo copy MAP CHANGE LOG:
 - Original shall be filed in *Plans* Draw
 - Copy stays with the box to Mapper

16. The Mapper shall make revisions as directed and sign/date the bottom of the ARMCF to indicate work completed.
17. Once all revisions are complete, the Mapper shall return the box and its contents to the Assessor's Office in the manner in which it was received.
18. Plans/changes received from Mapper shall be reviewed for accountability and accuracy by the Assessor's Office Staff.
19. The *Date Received from Mapper* shall be recorded on MAP CHANGE LOG for each plan/change accounted for. Return log to file.
20. Completed plans shall be filed accordingly.
21. ARMCF shall be filed in the Property Record Folder, once complete.
22. Follow same procedure for *Map Corrections*.
Note: Supporting documentation must accompany ALL Assessors Request for Map Change Forms

APPENDIX D
2008

Town of Westford, MA - PARCEL UPDATE FORM

Log # _____

Fiscal Year: _____

Date: _____

Plan Book & Page: _____

Plan Date: _____

Deed Book & Page: _____

Deed Date: _____

Map(s) Affected: _____

Location of Change: _____

| <u>Changes Required</u> | <u>Parcel #</u> |
|---|-----------------|
| <input type="checkbox"/> Subdivide parcel | _____ |
| <input type="checkbox"/> Change/Add parcel boundary | _____ |
| <input type="checkbox"/> Change Acreage | _____ |
| <input type="checkbox"/> Map Correction | _____ |
| <input type="checkbox"/> Change / Add Easement | _____ |
| <input type="checkbox"/> Delete Parcel | _____ |
| <input type="checkbox"/> Other: _____ | _____ |

Instructions to Mapper: _____

Work Completed By (Mapper): _____ Date: _____

Work Completed By (Assessors): _____ Date: _____

The Official Website of the Office of Geographic and Environmental Information (MassGIS)

GIS and Public Records

The following is the text of a letter from Mary E. Schwind, Acting Supervisor of Public Records, Commonwealth of Massachusetts, to Daniel M. Funk, City Solicitor of the City of Newton, dated February 22, 1996.

The five questions and answers in this letter raise many relevant points about GIS data and the Public Records Law.

Start of letter:

"Pursuant to 950 C.M.R. 39.07, I am in receipt of your request for an advisory opinion. Specifically, you ask a number of questions regarding the obligations of the City of Newton (City) under the Public Records Law relative to data maintained in a Geographic Information System (GIS). Please accept my apology for the delay in responding to your request. Your questions will be addressed in turn.

1. When a request is made for a disk containing GIS information, may the City satisfy such request by providing a hard copy print of a map?

Your first question focuses on whether a custodian of public records must provide access to records on disk when that medium is specified by a requester. The definition of "public records" is very broad and includes all documentary materials made or received by a public employee, regardless of form or characteristics. G. L. c. 4, 5, 7 (26) (1994 ed.) Where a custodian of public records has the ability to provide public records in the requested format, he must do so.

2. If not, may the City satisfy such a request by providing native format data?

You explain in your letter that in its native format, the GIS software contains graphic and non-graphic information in separate files, with pointers which establish the links between the files. Copies of GIS information in native format can be made on magnetic tape, and would be useful only to someone with a specific kind of computer capability. It is my understanding that in order to use such copies, a requester would need specific software and significant available memory. You further explain that, by typing one command, the GIS software can be operated to create an export format. The export format is a single file, containing both graphic and non-graphic data. You state that, in this format, files can be copied to a magnetic tape or disk which can be used by other computers with various software.

A record custodian has no obligation to create a new record or to rearrange an existing record in order to comply with a public records request. See G. L. c. 4, 5, 7 (26) (1994 ed.) defining "public records" as these non-exempt materials made or received by any public employee). This principle is equally applicable to electronic records. However, where a custodian is able to

provide records in a requested format without creating a new program, he must do so. Consequently, it is my opinion that, where a requester asks for GIS data in the export format, the data must be provided in that format. It should be noted, however, that where a requester is looking for data not included in the export program, and where complying with the request would require programming such as a merger of databases, the City is not obligated under the Public Records Law to perform such programming.

3. May the City charge a fee for data which is commensurate with the City's GIS development costs?

Government's ability to collect, compile, maintain and disseminate public information is growing exponentially because of the computer and development of complex information systems such as GIS. The temptation for public officials to increase revenue by sale of valuable information, such as that contained in a GIS database, is understandable. However, the premise behind the Public Records Law, and other open government laws on the federal and state level, is that the public has an absolute right to access public information held by the government. The public should not be required to pay a premium for access to information which it has already paid to create and maintain through taxes.

I recognize that, through the Public Records Law, a commercial enterprise can obtain GIS data at a nominal cost and can then sell that information at a considerable markup. However, that fact does not justify assessing a fee for those records in excess of those permitted under the Public Records Law.

The Public Records Access Regulations (Regulations) allow a record custodian to assess a fee for a search of electronic records based on the actual cost in using the computer. 950 C. M. R. 32.06 (1) (e). It has consistently been the position of this office that the only such "actual costs" which may be recovered are the cost of the energy consumed during use, the materials used, and the prorated salary of the computer operator. There is no basis in the Public Records Law or Regulations for recovering the cost of depreciation or purchasing equipment. Nor is there any provision for recovering the cost of developing a database. These costs are incurred by a custodian in the daily operations of the office, and are not the direct result of complying with a request for public records.

It should be noted that City officials may under certain circumstances provide GIS data at a cost higher than that permitted under the Regulations. One example is to sell subscriptions to the GIS database. The Public Records Law, and hence the Regulations, apply only to records which exist. G. L. c. 4, 5, 7 (26) (1994 ed.). A subscriptions service may be considered a request for records not yet in existence. A custodian is not required to comply with a prospective request; if he chooses to do so, the fees he may charge are not restricted by the Regulations. However, be aware that a custodian may not require a requester to purchase a subscription rather than a disk or other medium with existing information.

Additionally, if complying with a request required additional programming, such as adding fields or identifiers or merging with other databases, the custodian is actually creating a record to

respond to the request. The fee provisions of the Regulations do not apply to the creation of a record, only to existing records. Accordingly, the City may assess a fee in excess of those permitted under the Regulations if it chooses to comply with such a request.

4. Do the unique qualities of the GIS require special considerations or observance of special rules in responding to public records requests?

While the GIS implements new technology to provide data in forms not contemplated at the time the Public Records Law was enacted, the broad mandates of the Public Records Law apply to all documentary materials in the custody of the City. Accordingly, disclosure of GIS data upon request is governed by the same principles which apply to all public information.

5. In light of the interdepartmental character of the GIS and its ability to access databases on other city computers, if such data constitutes a public record, who would be considered the custodian thereof for purposes of responding to public records requests?

You indicate that the GIS central processing unit is located in the City's Assessing Department, and that workstations are located in several departments. You also indicate that an employee of the Management Information Systems (MIS) Department operates and administers the GIS.

A "custodian" of public records is defined as any person with routine access to or control of public records. 950 C.M.R. 33.03. This is not an exclusive definition; often, more than one person may be the custodian of a record. In my opinion, the office which maintains a record is a custodian thereof; that is the custodians of a record are the employees who use the data contained therein in their usual course of business and who have the ability to alter their record system.

Those employees who do not ordinarily use a record and who do not have the ability to manipulate the database containing it are users of the information, rather than custodians.

In many cases, MIS departments provide computer storage and support to city offices without themselves having routine access to or control of the records created or maintained by those offices. Accordingly, the status of the City's MIS Department as a custodian of GIS data depends on the extent of its access to or control of that data, as discussed above.

It should be noted that, in cases where the public record status of GIS information is in question, the Public Records Law provides a reasonable period of time for a custodian to confer with other City employees or the City Solicitor as to whether information must be disclosed. See G. L. c. 66, 10 (b) (1994 ed.) (providing that custodian shall comply with a public records request within ten (10) days). In addition, this office provides informal advice orally as well as formal written advisory opinions concerning public records issues."

This info can be found at: <http://www.mass.gov/mgis/municustod.htm>

More info at: <http://www.mass.gov/mgis/munipubrec.htm>



Town of Reading 16 Lowell Street, Reading, MA 01867

Storm Water Fees

What is storm water?

Storm water is rain water that runs off impervious surfaces such as streets, driveways, parking lots, rooftops, or other tightly packed surfaces. Impervious surfaces reduce the ability of storm water to be absorbed or infiltrate into the ground.

Why did Town Meeting and the Board of Selectmen vote to establish a storm water enterprise fund (SWEF)?

The Town of Reading is required by the United States Environmental Protection Agency (EPA) to develop a storm water management plan that reduces the discharge of pollutants to our storm water drain system and water ways. The Town is required to be in full compliance with the terms of our National Pollutant Discharge Elimination System (NPDES) Phase II permit by 2008 to meet federal and state mandates. The Town established a SWEF to provide a dedicated and adequate source of funding for our storm water management program.

Why is storm water management necessary?

Storm water often contains surface pollutants including petroleum products, soaps, detergents, and lawn fertilizer which eventually empty into the Aberjona, Ipswich, and Saugus rivers. Effective storm water management also helps reduce flooding and the erosion of river banks.

How is the SWEF fee calculated?

Single and Two-Family properties will be billed at a flat rate. All other properties will be assessed an annual storm water fee based on the total amount of impervious surface area on the lot, which will be billed quarterly. Condominium properties will be billed based on the total amount of impervious surface, at a maximum of the single and two-family rate, for each condominium unit. The amount will appear as a separate charge on your quarterly water and sewer bill. The fee will be calculated as follows for the following different types of property:

| Property Type | Storm Water Fee |
|--------------------------------------|---|
| Undeveloped | No fee |
| Single & Two-Family Residences | Flat fee of \$9.96/ quarter or (\$39.84 annually) |
| Multi-Family, Commercial/ Industrial | Fee is based on total impervious surface area |

How is total impervious surface area determined?

Impervious surface areas were measured using the Town's mapping system (GIS). Buildings, driveways, and parking areas, were delineated from aerial photos. The surface area of these features was calculated and will be assessed at a rate of \$39.84/ 2,552 sq. ft. (annually) for multi-family, commercial, and industrial properties.

For what purposes will SWEF fee revenue be used?

Storm water fee revenue will be used to hire two laborers that will perform stream and detention basin maintenance activities. The SWEF will allow the Department of Public Works to address a backlog of stream and drainage maintenance issues that have not been completed due to staffing and funding limitations. Storm water fees will also

fund capital expenditures for drainage system mapping (GIS layer), illicit discharge detection, and general drainage system infrastructure improvements.

Will residents be assessed a SWEF fee if their property is located on a private way or on a town accepted street that does not have catch basins or storm drains?

Yes, although a property may be located on a private way or on a town accepted street that does not have catch basins or storm drains, the owner will be assessed a storm water fee since the property still produces runoff into the Town's storm water system.

Are there certain types of properties that are exempt from the storm water fee?

The Board of Selectmen approved a rate structure as recommended by the Water, Sewer, and Storm Water Management Advisory Committee that does not provide any exemptions for municipal properties, schools, or properties owned by religious or registered non-profit organizations. Undeveloped property (without impervious surfaces) is the only category of property that will not be assessed a storm water fee.

Has the Town made any provisions for storm water abatements?

Yes, to encourage property owners to minimize the amount of runoff from properties and to reduce the amount of pollutants entering Town waterways, the Town has instituted the following storm water abatement program:

Single and two-family residential

Single and two-family residential properties that install and maintain infiltration systems or other means to reduce runoff will be eligible for an abatement of up to 50% of their total assessment.

Commercial/ Industrial/ Multi-Family

Commercial/ Industrial/ Multi-Family properties that install and maintain state-of-the-art storm water treatment and infiltration systems will be eligible for an abatement up to 50% of their total assessment.

What are some typical storm water devices that qualify for storm water abatements?

Drywells, Infiltration Chambers, Detention Ponds

What are some typical devices that do NOT qualify for storm water abatements?

Drinking water filtration systems, Rain Barrels, Sump Pumps

Where can I obtain more information or file for an abatement?

Property owners or condominium associations (on behalf of condominium owners) seeking additional information or would like to file for an abatement should contact the Department of Public Works, Engineering Division at (781) 942-9082. The Abatement Application Form may be obtained through the Town of Reading website at www.ci.reading.ma.us, or may be picked up at the Engineering Office at Reading Town Hall, 16 Lowell St.

Is the storm water abatement permanent?

The storm water abatement percentage will only change if the impervious surface area changes.