

Data Integration with Geospatial Visualization Tools at the Hanford Site – 14369

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ABSTRACT

The GeoVis application developed by Mission Support Alliance's (MSA) Portfolio Management (PFM) organization provides an integrated, spatially represented, view of project information that encompasses the Hanford Site cleanup mission from the present through transition of the Hanford Site to long-term stewardship. GeoVis is a web-based tool focused on the Hanford Site ecological cleanup objects, combining the mapping resources of the Hanford Geographic Information System (HGIS) with project data from the Integrated Technical Data-mart (ITD), a consolidated database of site data.

INTRODUCTION

GeoVis combines drawing and measuring capabilities with data available in the ITD, including cost, schedule, and more detailed data collected elsewhere on cleanup objects, such as facilities, waste sites, and wells and barriers, allowing the user to visualize the project conditions at the Hanford Site in a geospatial context.

DESCRIPTION

GeoVis has an intuitive interface and its abilities are general enough to be a useful tool to a wide audience on the Hanford Site. The application provides helpful links to user manual pages for each feature, which helps to lessen the learning curve for new users. There is also a feedback feature, which allows users to suggest improvements and further enhancements for the application. Developed by MSA PFM on behalf of the DOE Richland Operations Office, GeoVis is completely customizable.

GeoVis allows users multiple ways to select data (e.g. mapping polygons, keywords/lists of keywords, cleanup object IDs, and user-defined polygons); it also allows export of selection to other file formats such as Microsoft Excel® or as a URL address for additional analysis. Users can analyze and synthesize data from a variety of perspectives, running queries through the GeoVis interface and have the results rendered on screen.

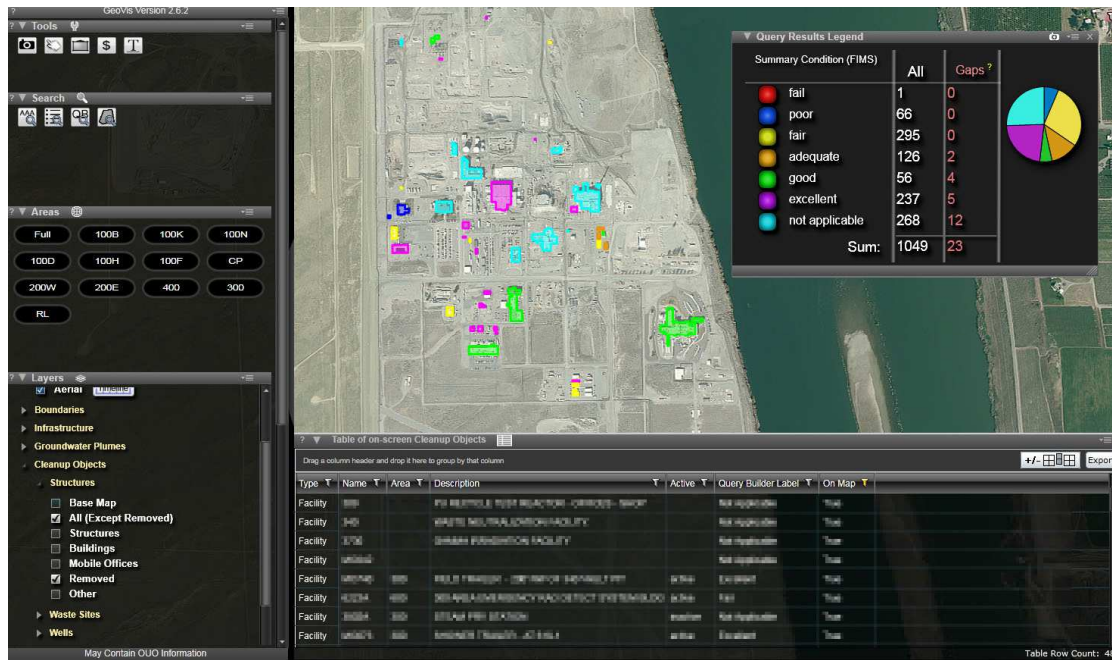


Fig.1. Query on Facility Information Management System (FIMS) Facility Condition

One of the most powerful tools in the GeoVis application is the Query Builder. Queries can be constructed and shared to examine the condition of cleanup objects, lifecycle status, ownership, and proximity of potential work to cultural resources, without the user needing sophisticated knowledge of Structured Query Language (SQL), a special-purpose programming language designed for managing data in a relational database system. Query Builder allows users to color-code various cleanup objects based on available criteria within the ITD. The number of items returned from these queries can range from a small handful sharing some specific characteristics, to thousands of items with a series of complex attributes that require sorting, spanning the scope of the site.

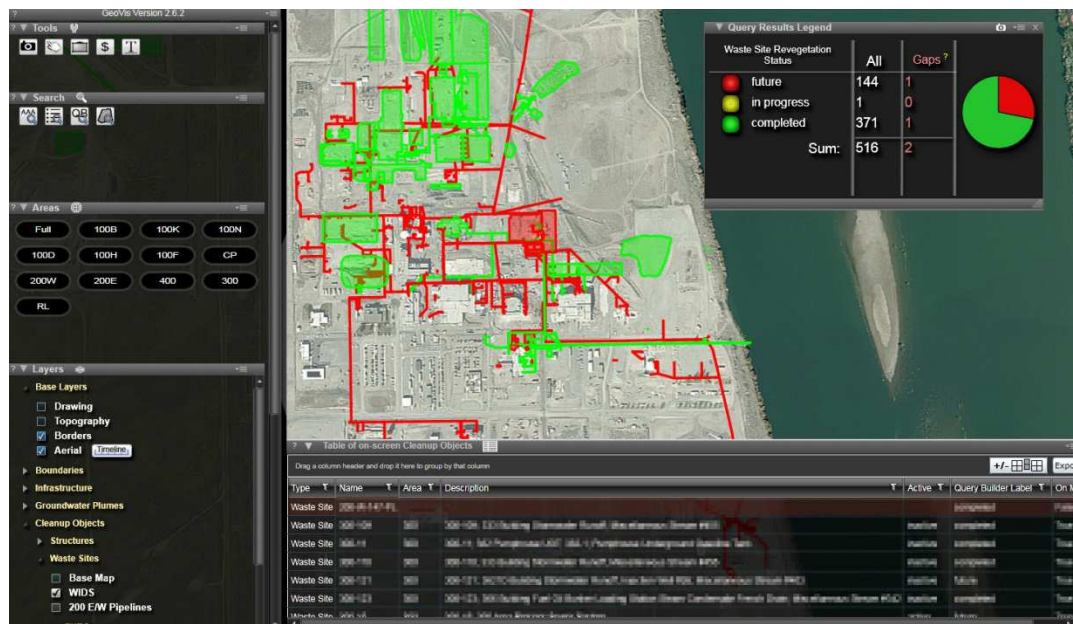


Fig. 2. Query on Waste Site Re-vegetation Status Based on Contractor Schedules

There are a number of common pre-defined views that have been saved as a menu selection so users do not have to re-run routine queries when the database has been updated. Additionally, users can load data from a Microsoft Excel® file on their local workstation and can render it onscreen within the application. Drawing tools can be used to define regions of interest, measure distances, and annotate the map.

These annotations can include flags. Flags can be added to the map by users to point out areas of interest. These flags are considered a type of cleanup object by GeoVis which allows these items to be listed on the table. In addition to flagging areas of the map, data about these points (which may include the coordinates of the points) can be loaded in from a Microsoft Excel® spreadsheet.

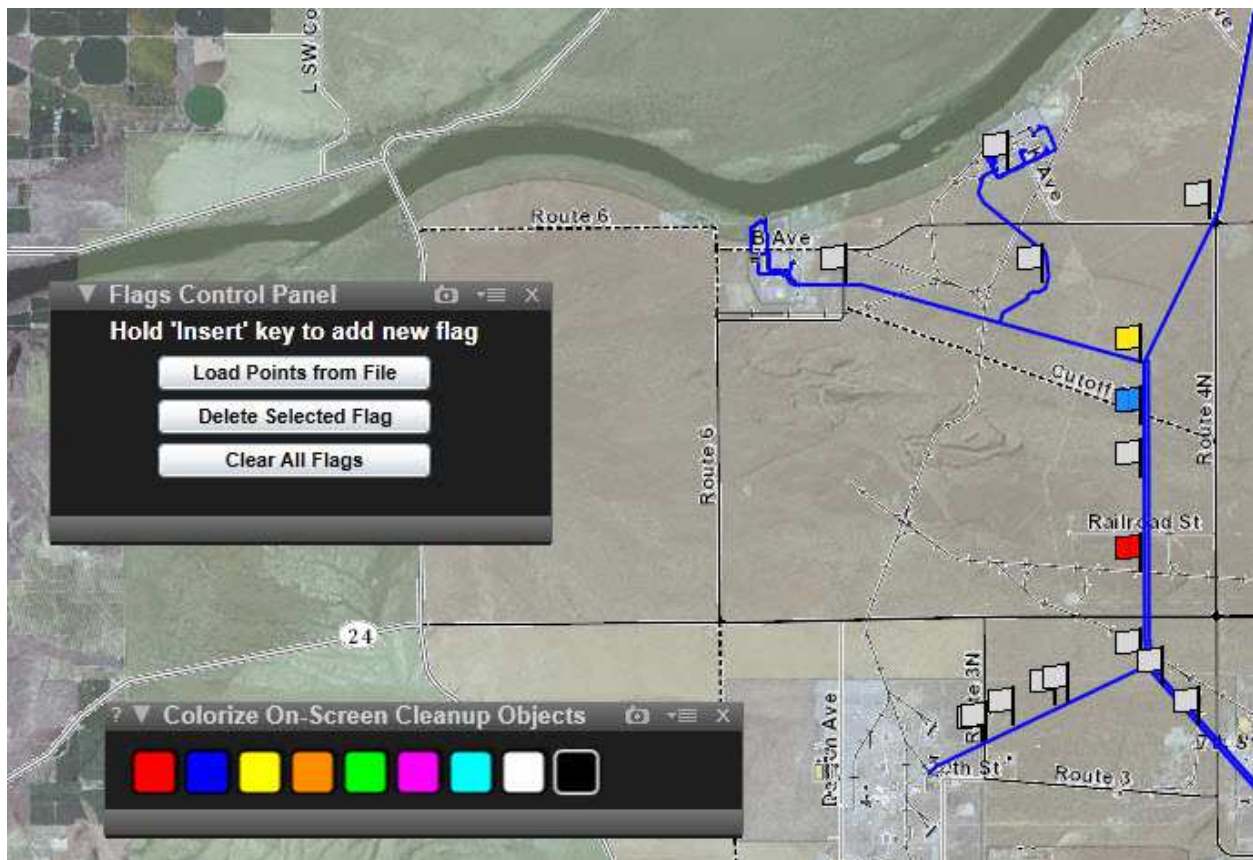


Fig. 3. Example of user-loaded flags

Information on budget and schedule can be viewed in context to determine possible conflicts in priority or schedule logic. With the access to these data attached to the mapping objects, the GeoVis is especially helpful to project planning, portfolio management, and improving the efficiency of subject matter experts doing project work. The following image and list explain various components of the details window where detailed project and schedule data can be accessed:

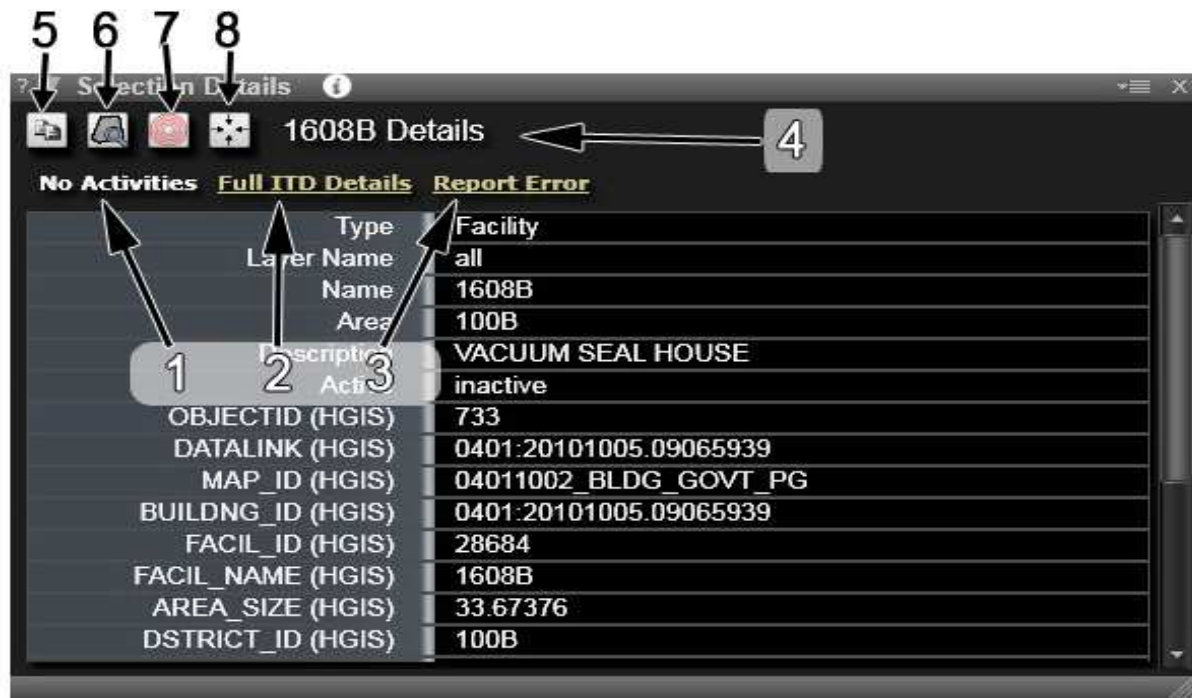


Fig. 4. Cleanup objects Selection Details window

1. Activities link - Available only while viewing cleanup objects and only if that cleanup object has activities in an active schedule. Clicking this link will launch a separate web browser window and navigate to a dashboard service where activity details about this cleanup object can be viewed. The login page to this service requires that the object name (1608B in this example) is entered; however for convenience, GeoVis will attempt to store the object ID into the clipboard so all that needs to be done is to paste this ID into the text box when it appears.
2. Full ITD Details link - Available only while viewing the details of a cleanup object and only if that cleanup object is present in the ITD. When the cleanup object is not present in the ITD this link becomes a "report data gap" link which will allow you to report the missing item. Clicking this link will launch a separate web browser window and navigate to a web page which will show all available details about the cleanup object in the ITD. Any of these details can be brought into the GeoVis directly and viewed on the table or used as part of query using the Query Builder.
3. Report Error link - If a user notices any inaccuracies in the data shown about the object, clicking this link will present a form which can be used to type in an explanation and submit a report to the ITD where it can be reviewed and corrected.
4. Object Name - Available only while viewing cleanup objects, otherwise the text "Object Details" is shown.

5. Copy - Clicking this icon will copy all of the details shown on the table to the user's clipboard. It is also possible to copy only a single row from the table by right-clicking on the desired row.
6. Use as selection - Clicking this icon will use the shape of this object as a selection, and select only cleanup objects which are partially or completely inside of the shape of this object. Note that while using this feature, the icon will be red. Clicking the icon while it is red will remove the selection.
7. Locate - Clicking this icon will animate rings on the map which will help identify the location of this item. This is helpful when an item has been selected (from the table), but cannot easily be seen on the map because of the zoom level. There is also a setting in the preferences window which may be enabled to automatically perform this action any time an object on the table is selected.
8. Zoom to - Clicking this icon will zoom the map into the object you have selected.

Furthermore, there are now different aerial images available for different years, providing a compelling perspective regarding progress and change over time. Users can select certain years to show side by side comparisons (in a multi-monitor display environment) of various areas. Users are then able to select various layers to view a variety of project or regulatory-based boundaries, infrastructure, or cleanup objects in context.



Fig. 5. Example of aerial imagery timeline

Locally loaded data, including data about flags, can be modified by the user within GeoVis on the table. After performing the selected queries, loading local data, and adding any annotations, the state of the GeoVis application in that instance can be preserved and the work recalled and shared with others. This 'Save State' system is a potent collaborative tool that allows numerous contributions by different users over time. It captures all attributes active within the application (including local data, flags, and the

backdrop image, if used) and will store the saved state into a database. This feature allows the work product to be loaded and shared with others, without having to copy and paste long, machine-generated URLs. Developers of the saved states can control access to them and users are able to browse and explore saved states that have been shared. States that have been shared can be modified or added to by others and updated.

CONCLUSIONS

Jon Peschong, Director of RL's Central Plateau Remediation, called GeoVis, "a first-of-a-kind, advanced, web based tool that 'turns data into information' by providing the ability to access information about location, condition and spatial relationships for these items with respect to scope, cost and schedule. This capability allows users to plan and analyze projects more effectively, saving time and increasing quality."