

**Evaluation of Story Maps to Enhance Public Engagement and
Communication at Legacy Management Sites –
17334**

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ABSTRACT

The US Department of Energy's Office of Legacy Management's (LM) mission is to fulfill the department's post-closure responsibilities and to ensure protection of human health and the environment. Accomplishing that mission currently requires managing 91 legacy sites across the country by performing efficient long-term surveillance and maintenance activities, preserving and making accessible historic site records, and identifying opportunities for beneficial reuse. Integral to the success of these activities is connecting and effectively communicating with the public, governments, and other interested parties. Relationships with such entities are so important that the Office of Legacy Management has elevated such engagement to one of its strategic goals for the next 10 years. Several public engagement efforts are currently supported, including stakeholder meetings, interpretive visitor centers, hard-copy documents, and Internet-based information sources.

The tools available to communicate with the public via the Internet are continually improving, and LM proactively evaluates these tools to enhance public engagement. The use of ESRI Story Maps to effectively and more succinctly communicate LM's long-term surveillance and maintenance practices is one tool currently being evaluated. Story Maps can utilize multiple types of content to engage users through site narratives, illustrations of change over time, photos, videos, and embedded links to external sources of information. The ability to illustrate site complexities via graphics and geospatial data is particularly useful for staff as well as communicating to stakeholders. Staff with a variety of expertise and functions in the organization can be empowered to respond to stakeholder questions using this tool. In addition, Story Maps can be easily initiated and managed in real time by LM site managers, an efficiency that would be invaluable to them as immediate site communication needs arise. A series of test Story Maps for several sites were developed to explore the capabilities of the tool. The test Story Maps included pages that described site description and overview, historical conditions and use, cleanup conditions, current monitoring data if applicable, and institutional controls. Links to existing communications tools were also incorporated in Story Maps, such as existing websites that currently store environmental reports and the Geospatial Environmental Mapping System (GEMS), where stakeholders can download monitoring data.

As with any tool, many things must be taken into consideration, such as: 1) Can the current IT infrastructure support the tool? 2) What data quality protocols need to be established? 2) What resources will be needed to maintain this tool? 3) What type of information should be shared? 4) Who will be responsible for information updates? This paper explores potential approaches for developing and deploying this tool for the public.

INTRODUCTION

The US Department of Energy (DOE) is responsible for the post-closure management of numerous sites remediated under various regulatory regimes. In 2003, DOE established the Office of Legacy Management (LM) to address the nation's uranium legacy and to conduct required long-term surveillance and maintenance (LTS&M) at remediated sites that have no continuing defense-related missions. LM's mission mandates the organization to protect human health and the environment at 91 sites across the United States [1]. A key function of that mandate involves performing efficient long-term surveillance and maintenance activities, preserving and making accessible historic site records, and identifying opportunities for beneficial reuse. In the future, LM will be applying these techniques to expanded missions such as increased number and types of sites, interpretive centers at existing sites, and the Manhattan Project National Park. Key to LM successfully accomplishing its mission is its ability to maintain partnerships and effective communication with the community, stakeholder organizations, and other governmental and tribal organizations.

In May 2016, LM issued its fourth strategic plan since its 2003 inception. This plan guides the organization's direction for the next 10 years and highlights communication not only as one of the organization's core values but also a strategic goal [2]. Goal Six of LM's strategic plan highlights engagement of the public, governments, and interested parties. In this effort, LM has enhanced its engagement efforts by hiring new public affairs staff, new outreach strategies such as town halls and open houses, and more effective access to data via the web and new media. As technology improves and the demands of both internal and external stakeholders for site information change, LM is seeking new ways of serving information via the web and new media in a timely and user-friendly manner. One such tool is the use of Story Maps.

Story Maps are being used in both public and private sectors to convey information to stakeholders, create enterprise platforms, and assist in decision making. Story Maps are web applications that combine maps, narrative text, images, and multimedia content to provide information. These applications provide a user-friendly platform to share the remarkable history of our sites, the complexity of their contamination and remediation, successes we achieve in our LTS&M activities, and even the challenges we face as we aim to fulfil our mission.

Many things must be taken into consideration for this proposal. Can the current information technology infrastructure support this project? What data-quality protocols need to be established? How much resources will be required to maintain

this tool? What type of information should be shared? Who will be responsible for information updates? We have begun to investigate these questions.

BUSINESS CASE FOR STORY MAPS AS A COMMUNICATIONS TOOL

LM manages a portfolio of diverse, unique, and challenging sites that were linked in some way to the legacy of the Cold War. Sites are managed by LM when DOE's mission and environmental cleanup is complete and some degree of long-term care is needed. At one extreme, the environmental conditions require long-term maintenance for generations to come, whereas other sites only need to be managed for the DOE records they generated. All sites generally require different levels of long-term care based on their characteristics such as public interest, residual contamination, and future land use. Some sites are surrounded by residential neighborhoods and business communities, which often contain community members that have worked at the former DOE sites.

Across the board, site ownership and enforcement authorities of the land controls are often mixed. LTS&M responsibilities at LM sites include managing different regulatory requirements from different cleanup programs such as the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the Resource Conservation and Recovery Act (RCRA), the Uranium Mill Tailings Radiation Control Act (UMTRCA), and the Nuclear Waste Policy Act (NWPA). These laws give enforcement authority to regulators and guide the cleanup (Figure 1). Some of the larger sites may be regulated by multiple agencies. As a result, it is imperative that LM work closely and collaboratively with regulatory representatives to share information and results on any situation that may impact the environment and public. LM utilizes a variety of tools to communicate with the staff and the public, including stakeholder meetings, interpretive visitor centers, hard-copy documents, and Internet-based information sources. More specifically, stakeholders are able to download key site documents on the LM website and current data from environmental monitoring on our Geospatial Environmental Mapping System (GEMS).

Proactively, LM conducts various forms of stakeholder surveys at various frequencies to ensure that timely feedback is received and used for internal decision making [3]. The survey results are published and incorporated into business decisions to ensure that we are in lockstep with the community of stakeholders that have a vested interest in our sites. LM has found that there is increasing interest in our mission and the well-being of the sites under our care. This is especially true for those sites that have been cleaned up but still have residential contamination requiring post-closure care. As a result, we need to expand our communication tool box and embrace modern and progressive options for stakeholder and regulatory engagement at all levels of government—local, state, federal, and tribal. As an organization, LM's success is linked to its ability to effectively partner with the public in a timely manner and communicate the health and well-being of our sites.



Figure 1. 2016 LM Site Map

As more sites are cleaned up and transitioned over to LM's care, the scope and diversity of its post-closure responsibilities including its interactions with the public will continue to increase over the time. Additionally, with an increased number of retirees from our organization, there is a need to efficiently and quickly orient new staff to the organization. New site managers will have ready access to key information about their sites. All of these conditions set the stage for the application and use of ESRI Story Maps for public engagement and for internal decision making.

Before substantial resources or expenditures were allocated to the project, LM decided to expand its knowledge base and implement several smaller projects on a limited scale. This approach provided the much-needed time to collect the necessary information, analyze the results, and formulate the recommendations to the project sponsor. Inputs for the recommendations were generated by members of the team and subject matter experts that would be responsible for its implementation.

The proceeding discussion includes specific examples of how ESRI Story Maps were successfully used in the LM organization.

DEMO OF STORY MAPS: TELLING THE STORY FOR FUSRAP SITES

To explore the utility of Story Maps as an enhanced communication tool for LM, an exploration of the technology was conducted for several Formerly Utilized Remedial Action Program (FUSRAP) sites that ranged in complexity and were at varying stages of remediation. In 1974, the Formerly Utilized Sites Remedial Action Program began to remediate sites where radioactive contamination remained from Manhattan Project and early US Atomic Energy Commission operations. In 1997, the US Congress directed the US Army Corps of Engineers to remediate the remaining designated FUSRAP sites. The Office of Legacy Management currently manages 30 remediated FUSRAP sites and expects to receive 9 more sites over the next 6 years.

Scope of FUSRAP Story Maps

FUSRAP sites that have been identified for transition to LM for post-closure care in the next 5–10 years were selected for Story Map Development. The Story Maps developed for several of the FUSRAP sites included the following information:

- Site Description/Background
- Selected Remedy and Remediation Goals
- Responsible Agencies
- Current Status of Remediation
- Site Soil and Groundwater Contaminants of Concern
- Pre-remediation Data
- Post-remediation Data
- Institutional Controls
- Site Documents

Key Activities, Features, and Functionality

An essential element in the development of these Story Maps was establishing a template for them so that the content of each Story Map developed is reflective of important site information: site managers, stakeholders, and other users can use this tool to comprehend the full story and nature and status of the remediation. That is, the story should include what, where, when, and how. By conforming to a template, one also gets an inkling of the site's complexity by virtue of the amount of data and tiers of information displayed.

Gathering information that is available for the sites and determining the best format for displaying the data proved to be key activities for arriving at a useful Story Map. Using photos and figures from publicly available reports was most effective in describing the site and depicting site status (before and after remediation).

The Story Maps developed made use of “out of the box” features that ESRI provided. However, customization of fonts, color, and other features was done to give each FUSRAP Story Map its own unique aesthetics (look and feel). Before and after site photos or images when available were presented side by side, and a “swipe” feature was embedded so the user can swipe left to right or vice versa on the same page to view before and after site conditions. Large data tables were

saved as images for incorporation into the Story Map pages. Important site documents were also included and linked to various text or figures elsewhere in the Story Maps. The three screen shots below (Figures 2–4) were extracted from the Story Maps developed and provide a few examples of the types of information that can be displayed.

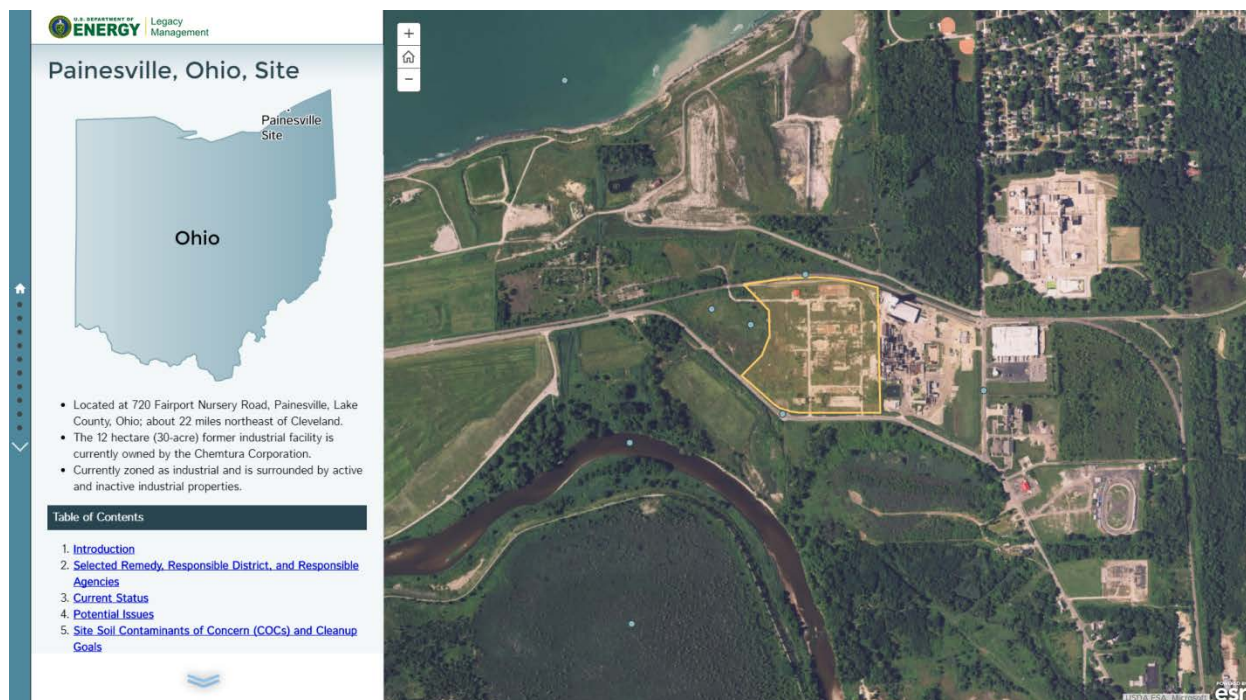


Figure 2. Home page of the Painesville, Ohio Site Story Map

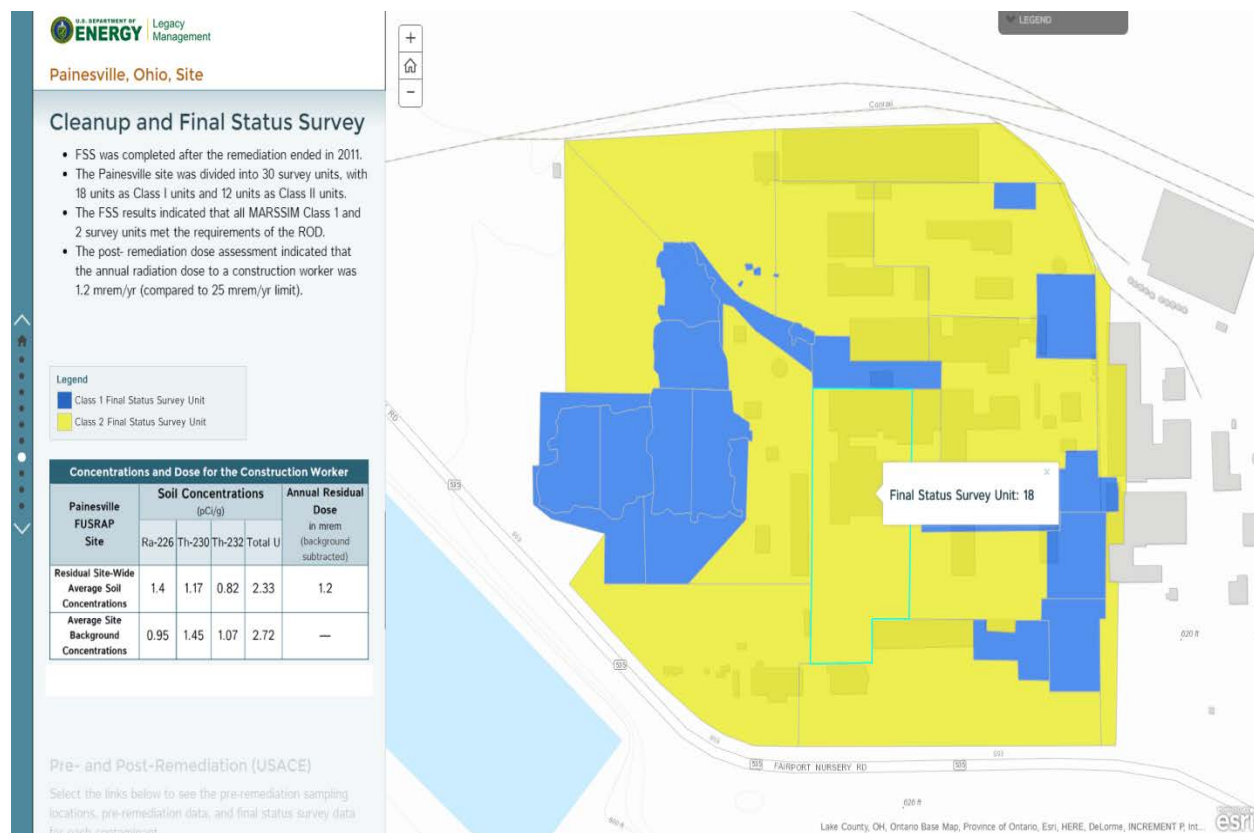


Figure 3. Final Status Survey Units for the Painesville Site



Figure 4. Pre and Post Remediation sampling locations, Painesville Ohio Site

IMPLEMENTATION OF STORY MAPS AT LM

Implementing a process for producing Story Maps at LM involved formal and informal communication and coordination with several different LM groups. The efforts began by garnering organizational buy-in from site managers and senior management through presentations of demonstration Story Maps. A Story Maps project was then initiated, and a production team was assembled. That team then identified an efficient information technology (IT) infrastructure and the detailed processes facilitating Story Map production.

To gain organizational buy-in, demonstration Story Maps were prepared. Site managers familiar with their site history and environmental data were consulted to identify information essential to understanding the site legacy. A geospatial analyst then created the site-specific Story Map that quickly provides relevant, concise, and authoritative information. For the FUSRAP site types, this information was conveyed to the staff at ANL to develop the Story Maps depicted in Figures 1-3. Informal and formal demonstrations of those Story Maps to FUSRAP site managers elicited positive responses. A formal business case for the Story Map project was successively drafted and required coordination with LM's Information Technology and Environmental and Spatial Data Management Groups to put in place the technical infrastructure to support the project. Following approval of the business case, a project charter and management plan were developed in accordance with DOE Order 415.1 [4].

An integrated, on-premises infrastructure is used to bring together the different content used in Story Maps. The content, potentially comprising videos, pictures, text, and interactive maps, are accessed by hyperlinks existing in the public domain. To facilitate content integration, it is necessary to develop a data schema that considers the larger scope of what information might contribute to content in Story Maps and information products. This schema should define the connectivity, optimize the efficiency of data access, and minimize the operation and maintenance costs of managing data. Much of the appeal of the Story Maps software is that it relies on hyperlinks that connect content to the Story Map, and the schema defines those connections. This functionality allows for quick development of Story Maps due to the ease of connecting to existing content and data. Efficient data access improves the user experience by minimizing the time required for content to display. A well-designed schema also facilitates future Story Map updates and is adaptable to eventual software changes.

Inclusive to the management plan and schema design documents were the definition of a robust technical infrastructure. Content developed for Story Maps is stored internally at LM during development and accessed through the LM instance of Portal for ArcGIS the on-premises implementation of ArcGIS Online (Figure 5). Use of Portal for ArcGIS allows for content to be securely maintained internally for long term stewardship work or before evaluation for public release. Once approved

for release a decision is made to release the content to ArcGIS Online and other LM specific platforms, where it will be publicly accessible.

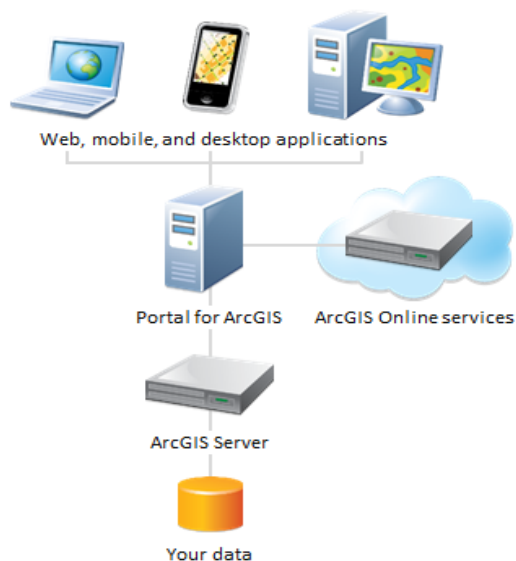


Figure 5. LM's Selected Infrastructure to Support Story Maps¹

With the infrastructure in place, Story Maps were prepared by a Story Maps Production team and subjected to a thorough content review process. The members of a team may vary depending on the content of the Story Map, but generally comprise a Story Map owner (eg. site manager), writer, cartographer, designer(s), publicist(s), subject matter expert(s), IT representative(s), and reviewers [5]. The approval process was documented using content groups, created and maintained using ESRI's ArcGIS for Server, that relate to different content of a Story Map. Technical editors, metadata reviewers, graphic artists, and public affairs specialists, for example, each belong to content groups and must approve content prior to public release. Using content groups allows LM to approve content at different stages of production.

Even within LM, the combined information conveyed through the Story Map demonstrations has encouraged staff to become familiar with site information outside the scope of their normal work. Personnel focused on LTS&M continually search for ways to more efficiently achieve the LTS&M goals at the sites for which they have responsibility. Different site types, and even different sites within a particular type, apply different methods to achieve their LTS&M goals. Story Maps

¹ Source: <http://server.arcgis.com/en/portal/latest/administer/linux/the-portal-s-role-in-arcgis.htm>

provide a simple means of communicating innovative LTS&M methodologies potentially applicable at other sites.

CONCLUSIONS

The use of ESRI Story Maps to effectively and more succinctly communicate results of LM's long-term surveillance and maintenance practices is currently under evaluation. This tool is intended to support our organizational goal of improving stakeholder communication both internally and externally to support the broad scope of LM's mission. Several key steps have been employed in the implementation of Story Maps including the development of demos to test the technology and ensuring that the technical infrastructure and the right team are in place. We continue the process of identifying the right content and data-quality protocols to ensure that this tool can effectively support effective communications.

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