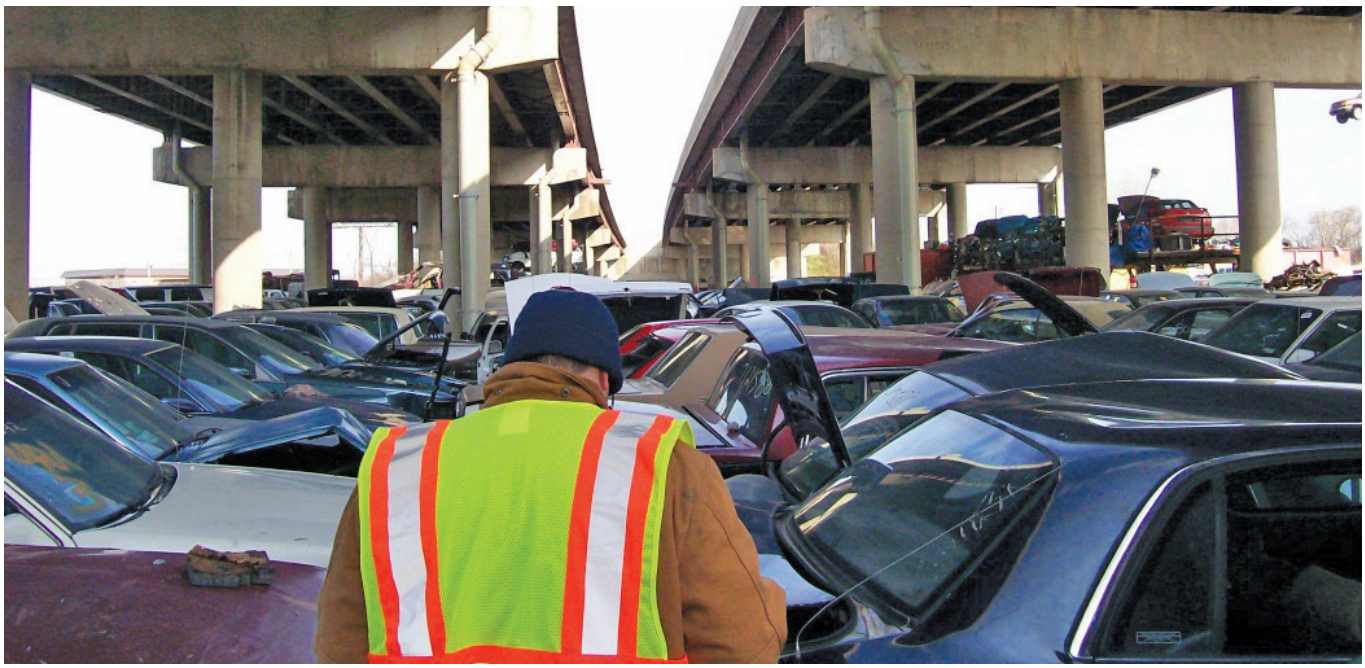
A Manual for Conducting Preliminary Environmental Site Assessments for Illinois Department of Transportation Infrastructure Projects

Anne L. Erdmann, Daniel J. Adomaitis, Phyllis L. Bannon-Nilles, Gregory A. Kientop, and Dale R. Schmidt



Circular 585 2014

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Front Cover: *Bradley Ettlie investigating site conditions beneath an interstate highway.*

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Prairie Research Institute
University of Illinois at Urbana-Champaign
615 E. Peabody Drive
Champaign, Illinois 61820-6918
http://www.isgs.illinois.edu

Under contract #IDOT-2011-05568 to:

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CONTENTS

List of Figures

GLOSSARY OF ACRONYMS

AAI	All Appropriate Inquiries
ACM	asbestos-containing materials
ASTM	American Society for Testing and Materials
AULs	activity and land use limitations
BOL	Bureau of Land (IEPA)
BTEX	benzene, toluene, ethylbenzene, and total xylenes
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
ERNS	Emergency Response Notification System
ESA	Environmental Site Assessment
FIRM	Flood Insurance Rate maps
FOIA	Freedom of Information Act
GIS	Geographic Information System
IDNR	Illinois Department of Natural Resources
IDOT	Illinois Department of Transportation
IEMA	Illinois Emergency Management Agency
IEPA	Illinois Environmental Protection Agency
IMD	Illinois Manufacturers' Directories
ISGS	Illinois State Geological Survey
ISWS	Illinois State Water Survey
IT	information technology
LUST	leaking underground storage tank
MTBE	methyl tertiary butyl ether
NFR	No Further Remediation
NPL	National Priority List
NRC	National Response Center
NRCS	Natural Resources Conservation Service
OBA	Office of Brownfields Assistance (USEPA)
OPS	Office of Pipeline Safety (USDOT)
OSFM	Office of the State Fire Marshal
OSHA	Occupational Safety and Health Administration
PAH/PNA	polynuclear aromatic hydrocarbons
PCB	polychlorinated biphenyls
PESA	Preliminary Environmental Site Assessment
PIN	property identification number
ppb	parts per billion (equivalent to µg/kg in solids, and µg/l in liquids)
ppm	parts per million (equivalent to mg/kg in solids, and mg/l in liquids)
RCRA	Resource Conservation and Recovery Act
REC	recognized environmental condition
ROW	right-of-way
SEMS	Superfund Enterprise Management System
SIC	Standard Industrial Classification
SWAP	Source Water Assessment Program (IEPA)
TRI	Toxics Release Inventory
UIUC	University of Illinois at Urbana-Champaign
USDOT	United States Department of Transportation
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
UST	underground storage tank
VOC	volatile organic compounds

Introduction

Environmental site assessments (ESAs) have become an important component of real estate transactions, especially for commercial and industrial property. Through the Illinois Department of Transportation's (IDOT) program of new highway construction and improvement to existing roadways and other transportation infrastructure, IDOT often must acquire properties that have the potential for environmental concerns. Various recognized environmental conditions (RECs), natural features, and natural hazards may be present on existing IDOT right-of-way (ROW) or on sites proposed for acquisition. The Illinois State Geological Survey (ISGS) has developed and tested for IDOT a site assessment program that provides information on environmental conditions associated with highway or other transportation projects. Site assessments conducted by ISGS for IDOT are referred to as Preliminary Environmental Site Assessments (PESAs), as they differ from industry-standard ESAs or All Appropriate Inquiry (AAI) reports as defined by the United States Environmental Protection Agency (USEPA; Federal Register 2005).

This manual describes the procedures used by the ISGS in evaluating environmental conditions associated with RECs and natural hazards that may impact IDOT infrastructure projects. The manual is a product of the PESA program developed by ISGS, and it reflects work completed on more than 3,500 highway projects since March 1989 (Figure 1). The manual also describes offshoots of the main PESA program, including a project to assess IDOT maintenance facilities, an example of a large project completed by ISGS for IDOT, and a description of educational components of the program. The AAI standard (Federal Register 2005) as it applies to the PESA program is also discussed. IDOT's environmental procedures are outlined in its Bureau of Design and Environment Manual (see the Information Sources Used for PESAs section below).

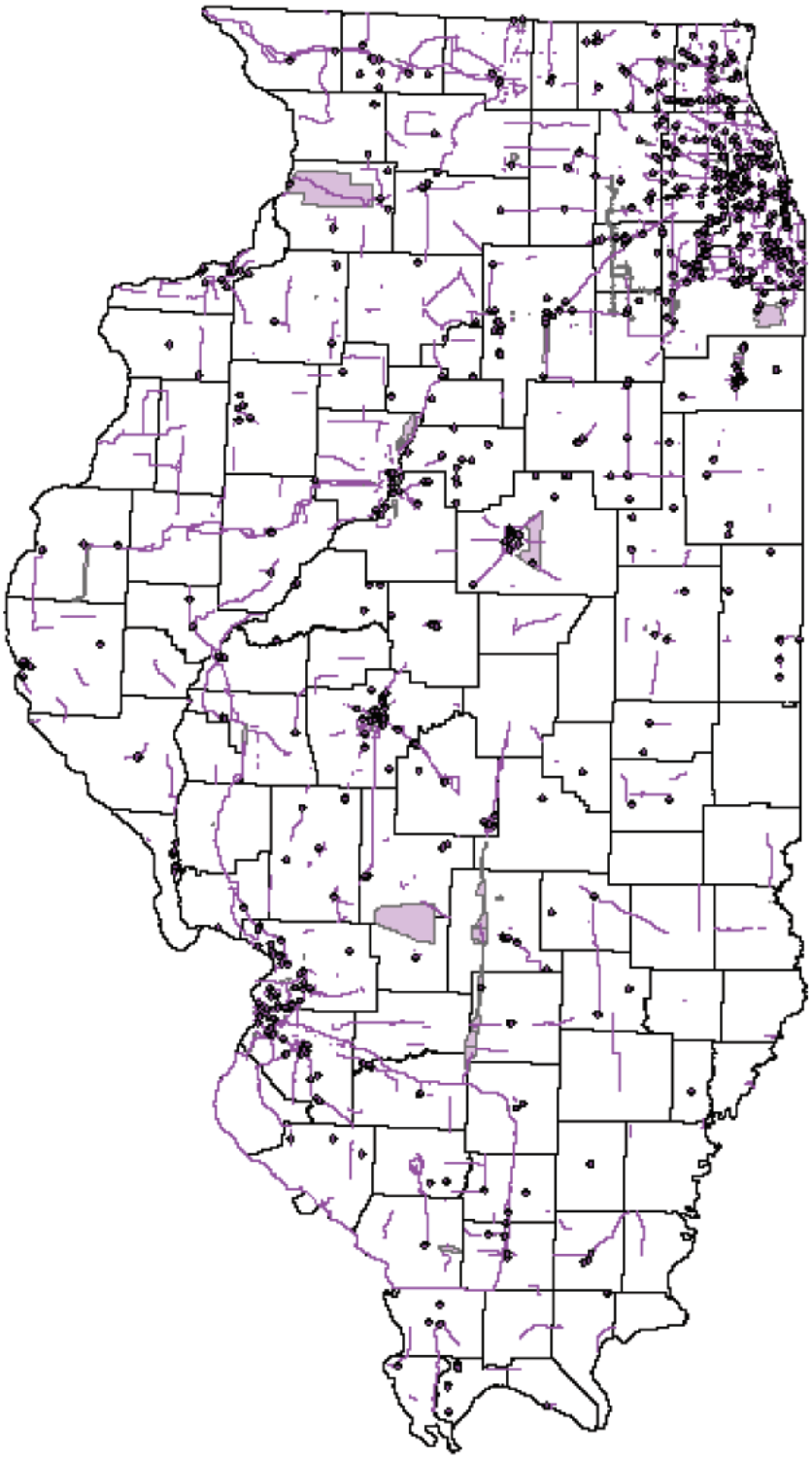

Figure 1 Locations of environmental site assessments completed by ISGS since the onset of the program in 1989.

This is the second edition of this manual, originally published by ISGS in 1996 as ISGS Open File Report 1996-5. The manual has been revised to reflect significant changes in the program since that time.

Program Rationale

State and federal laws (e.g., the Illinois Environmental Protection Act and the Comprehensive Environmental Response, Compensation, and Liability Act [CERCLA]) require landowners, including the state, to be aware of the environmental condition of the property they own or control. Already the largest landowner in Illinois, IDOT routinely acquires property for new road construction and improvements to existing alignments, as well as other infrastructure projects.

IDOT must be able to assess environmental risks and liabilities associated with such property for the following reasons:

- To protect worker and public safety. Workers who encounter an unknown hazard may be at risk, and may undertake activities that cause the hazard to spread beyond its original limits. The public may become exposed to the risk through worker activities.
- To reduce IDOT's liability. ESAs are conducted to determine the environmental condition of a site. One reason to undertake this process is to obtain protection from potential liability under CERCLA as an innocent landowner, a contiguous property owner, or a bona fide prospective purchaser. To qualify for this defense, IDOT must establish that an appropriate investigation into the environmental condition of the real estate in question was conducted prior to acquisition. However, not all properties to be acquired will necessarily require this defense.
- To minimize delays by operating in an efficient and cost-effective manner. An important difference exists between the end use of a standard ESA conducted for a commercial real estate transaction and the PESAs the ISGS conducts for IDOT. Although IDOT may need to establish that all appropriate inquiries were made for the purposes of CERCLA, the department also needs to have prior knowledge of environmental conditions that could impact its project. Such conditions may require mitigation and result in construction delays and cost overruns (Figure 2). A potential buyer of commercial real estate may elect not to purchase if environmental conditions are shown to be unfavorable, but IDOT may be required to proceed because of the public need. The site may need to be remediated prior to purchase or construction, and various remediation or monitoring alternatives may need to be evaluated. Alternatively, IDOT may be able to redesign the project to avoid an impacted area. Therefore, ISGS conducts two main types of site assessments for IDOT: the AAI assessment, which is required to protect IDOT from CERCLA liability, and the PESA, which provides environmental information that could impact the highway project, but is not necessarily designed to provide a legal defense for CERCLA purposes.

Potentially hazardous situations can be mitigated efficiently provided that IDOT has prior knowledge and is prepared for the situation. Unexpected conditions can create delays, expense, and liability, especially if contamination or other conditions are exacerbated by construction, and can jeopardize the health and safety of workers and the public. Also important is the nature of the project itself. A simple road resurfacing project that involves no excavation may not be significantly impacted by unfavorable environmental conditions, such as soil or water impact from a leaking underground storage tank. But if excavation will occur, such as for new traffic signal equipment, utility relocations, or road widening, then the planned excavation may intersect contamination and require disposal permits, special material handling techniques, remediation, monitoring, or avoidance.

The preliminary ESAs, or PESAs, performed by the ISGS for IDOT differ from industry-standard ESAs in two key ways. First, the majority of site assessments performed by environmental consulting firms are single-parcel assessments. The ISGS performs some single-parcel assessments, but most assessments are for strips of ROW or new highway construction with several potential alignments. For such projects, hundreds or thousands of parcels may be impacted by the proposed roadwork. The intensive methods that are standard for a single-parcel assessment are prohibitive in

Figure 2 Unanticipated issues, such as undocumented underground storage tanks in state right-of-way, may cause construction delays and cost overruns. Photograph courtesy of U.S. EPA (www.epa.gov/oust/graphics/trpics2.htm).

cost, resources, and time; therefore, the ISGS has developed alternative methods of assessing multiple-parcel projects.

Second, most of the assessments the ISGS conducts are neither the industry-standard Phase I assessments as delineated by the American Society for Testing and Materials (ASTM; background information and on-site inspection, but no subsurface testing; ASTM E1527-13, ASTM 2013), nor AAI assessments as defined in 40 CFR Part 312 (Federal Register 2005). Instead, PESAs involve using the RECs approach from AAI and ASTM E1527-13, but do not contain as much of the extensive offsite investigation and interviewing as required for the AAI standard and ASTM E1527-13; in addition, investigations of building interiors and inaccessible parts of properties are not performed. PESA reports identify RECs and de minimis conditions, and provide an explicit description of potential site hazards, which IDOT uses to further investigate, avoid, mitigate, or remediate the hazards. (De minimis conditions are environmental conditions that "generally do not present a threat to human health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate governmental agencies"; ASTM 2013.) If IDOT determines further information is needed, it may contract with an environmental consulting firm to perform source, site characterization, and plume delineation studies, or it may request that ISGS conduct an AAI investigation on a specific property of concern.

Although the PESAs conducted by ISGS for IDOT differ from the industry-standard ESA as discussed above, in this manual we use the terms "environmental site assessment," or ESA, and "preliminary environmental site assessment," or PESA, interchangeably, and always refer to the types of preliminary assessments conducted by ISGS for IDOT unless specifically noted otherwise. AAI assessments are covered separately below.

Program Development

The ISGS program to conduct PESAs for IDOT throughout the state began in 1989. To enable determination of environmental risk, IDOT contracted with ISGS to develop procedures to identify sites that contain natural and man-made hazards, prior to acquisition of ROW or improvements to existing state-owned property. Discovery of these hazards depends on a thorough investigation of targeted properties, including a review of the historical use of the property and adjoining properties, and an examination of current uses and conditions. The PESA program also includes the development of procedures and methods to determine the potential for regulated substance and natural hazard impacts on IDOT highway construction projects. Projects have ranged in size from small actions involving a single parcel to a corridor 112 km (70 mi) long, having several proposed alternate routes and hundreds of separate parcels.

When the ISGS began the PESA program, little published information was available pertaining to the performance of ESAs. Subsequently, journal articles and books have been written on the subject, and courses on site assessment procedures have been developed and presented by professional organizations. The ASTM has published standard practices for the performance of Phase I (ASTM 2013) and Phase II (ASTM 2002) ESAs, and the USEPA has issued standards and practices for conducting AAIs for the purposes of CERCLA defense (Federal Register 2005).

Initially, the ISGS PESA program involved PESAs for infrastructure improvement projects only, including roads, railroads, and airports (Figure 3). As the program expanded and capabilities grew, other components were added. These include the evaluation of IDOT maintenance facilities, the development of an Extranet for information storage and transfer, the development of Geographic Information Systems (GIS)-based resources, and, as time allows, educational projects regarding site assessment work.

Program Administration

The program is administered by two principal investigators, and is staffed by project managers, who carry out the technical components of the program: collection of historical, geologic, and basic environmental information about an area, analysis of this information, evaluation of current land use and conditions, and database development. Information technology (IT) specialists oversee the program's Extranet and GIS resources, as well as all IT required for the program. A data resources manager

Figure 3 ISGS, IDOT, and railroad staff conducting a site planning meeting for a railroad PESA. Photograph by Anne L. Erdmann.

oversees the program's other databases and resources, making sure that the most current available resources are utilized and seeking out new sources of information. Additionally, as the program continued to grow, a team leader position was created as a first-line supervisory role; each team leader oversees a group of up to five staff members. Teams are administrative rather than functional.

Principal investigators and team leaders. The principal investigators provide scientific direction to the program, manage the budget and resources connected with the program, and are the main liaisons with IDOT. Current and past program principal investigators have had backgrounds and experience in engineering geology, hydrogeology, surficial processes, environmental geology, and geophysics, as well as expertise in basic research, field and laboratory instrumentation, and field studies. The principal investigators are the final project reviewers, and provide signature approval on the majority of PESAs and other reports submitted to IDOT. The lead principal investigator holds certification as a licensed professional geologist in Illinois. Team leaders provide input to and consult with the principal investigators on matters relating to program management and administration, as well as the technical direction of the program. They also manage program resources, supervise staff teams, and, in the absence of the principal investigators, may provide final signature approval on site assessment reports. Team leaders and the principal investigators also maintain proficiency in conducting ESAs by periodically completing PESA projects and maintaining Occupational Safety and Health Administration (OSHA) Hazardous Waste Site Worker training.

Data resources manager. The data resources manager locates, collects, develops, and manages background and historical information from environmental resources used in the PESA program. The data resources manager is responsible for ensuring that the most recent versions of databases are being used, distributing these to all staff, searching out new databases, and instructing the rest of the program staff on resource use and limitations. This person also assists in the collection of basic resource information for projects, particularly for staff in remote offices with limited access to resources, and supervises office help as needed.

Project manager. The project manager is responsible for the project-specific collection and synthesis of all information gathered for the report, as well as documentation of the project assessment process. Geologic, hydrogeologic, and land-use data are assembled from maps, aerial photographs, directories, inventories, and published and unpublished databases. The project manager also conducts field studies and analyzes all project data. After a review of all data, the project manager identifies RECs and de minimis conditions for the project on the basis of the findings of the investigation (Figure 4). The project manager writes a standardized report for each project, which is designed to clearly outline the land use and regulatory histories, RECs, de minimis conditions, and data gaps for each project.

The project manager is trained to make observations related to the project and its environmental setting. This individual must understand the geologic framework of the project and the effects of the geologic setting on environmental elements that may impact the highway project. Project managers are also required to complete the 40-hour Hazardous Waste Site Worker safety training course certified by OSHA and the 8-hour annual refresher training (Figure 5).

Figure 4 Daniel J. Adomaitis using a GPS unit to identify locations of environmental features. Photograph by Mark A. Hart.

Figure 5 ISGS staff members undergoing 40-hour Hazardous Waste Site Worker training, as required by the Occupational Safety and Health Administration. Photograph by Daniel J. Adomaitis.

Project managers are required to have a minimum of a bachelor's degree in one of the earth sciences or a related field. Strong verbal and written communication skills as well as multi-project organizational skills are also essential.

IT specialists. Two IT specialists handle the increasing data, connectivity, GIS, and hardware and software needs associated with the site assessment program. The IT specialists oversee the IDOT-ISGS Extranet, and not only respond to the needs of the site assessment program, but also liaise with and respond to the needs of IDOT Central Office and districts, IDOT legal staff, and consultants to IDOT. (See the section on Recent and Future Developments for further information on the Extranet.) In addition, the IT specialists maintain and develop hardware and software for the program's computing needs, liaise with IT staff elsewhere at the ISGS and at the University of Illinois at Urbana-Champaign (UIUC), and make recommendations for IT upgrades and new technology.

Cooperative Approach: Why a Geological Survey?

The relationship between IDOT and a state geological survey is unique in terms of the PESA process; most state departments of transportation conduct this work in-house or contract it out to a consulting firm. Both IDOT and ISGS are frequently asked why IDOT chose to develop this relationship with ISGS rather than utilize one of these other options. The main reasons are as follows:

- Program staff. ISGS employs a large staff of multidisciplinary geoscientists and environmental scientists. Several of these staff members joined the PESA program from other programs elsewhere in the ISGS. IDOT was able to tap into this reservoir of existing talent without having to staff up specifically for the PESA program.
- Documentation and record keeping. ISGS has the resources and expertise necessary to track and retain reports, data, and other documents relating to the PESA program. Because of the large volume of work conducted by IDOT and space limitations, IDOT is unable to store records for long periods of time. ISGS, which has been in existence for more than 100 years, has a long tradition of record keeping and documentation, and maintains extensive records of well logs, borings, and other geological records of use in the site assessment process.
- Cost-effectiveness. As part of the UIUC, ISGS is cost-effective.
- Data quality and data access. The ISGS PESA program has efficient access to data sources such as historical maps, aerial photographs, and directories through the University of Illinois libraries, through IDOT and other agencies, and throughout the state in local collections. This information is shared in a networked database of local and regional resources and contacts utilizing the IDOT-ISGS Extranet. This database continually improves the data quality and efficiency of the ISGS PESA program as new sources of information are encountered. Very often private consultants must rely on environmental data research services that may have varying access to resources.
- Interagency relationships. Because of its status as part of the UIUC, ISGS has been able to arrange access to data at federal, state, and local agencies, and form long-term relationships with these agencies. ISGS, subject to approval by IDOT and internal ISGS review, also provides these agencies with data that have been collected as part of the PESA research process.
- Institutional memory. Most important, ISGS provides continuity and institutional memory for the PESA program. State law requires IDOT to re-bid private-sector contracts on a frequent schedule. Because ISGS is part of the UIUC, it is exempt from this bid requirement; thus, a long-term relationship could be established. As a result, continuity in procedures can be maintained, and when projects need to be put on hold or revisited years later, all of the previously gathered information is already in-house. In addition, ISGS can perform long-term, multi-year studies and projects related to the PESA work, such as development of large-scale environmental databases.

From the onset of the PESA program, the approach to program development and operation has been highly collaborative. IDOT and ISGS staff are in regular contact regarding program developments and improvements, and ISGS regularly gives presentations on PESA program status and innovations at IDOT planning meetings. Many of the program innovations and cooperative adaptations have been developed through joint efforts between ISGS and IDOT. The ISGS contract with IDOT is managed by the IDOT Bureau of Design and Environment, Environment Section.

Historical Research Methodology

A PESA is initiated when IDOT submits an Environmental Survey Request to ISGS. Upon receipt of this request, project managers begin their site investigation by collecting information regarding the historical background and the geological and hydrogeological character of the project site. The purpose of this records search is to review information that may help identify the likelihood of RECs associated with the property or ROW in question. ISGS standard procedures for historical research meet or exceed those required by the industry-standard ASTM publication on Phase I ESAs (ASTM 2013), with the exception of the more extensive offsite investigations and interviewing, as noted earlier. A variety of resources and databases are consulted in the records review process, and they are updated and modified as new information becomes available. Standardized research checklists and procedures, including the addition of a relational database system, and specialized reference documents all help to streamline the efficiency of an otherwise complicated research and documentation process while preserving the quality of the data.

Many program resources have been converted to digital layers for use in a GIS, which allows for spatial representation of environmental and geological information. The use of GIS databases has increased the speed, accuracy, versatility, and efficiency of the historical research process. Additional layers continue to be developed and spatial

databases continue to be produced. In addition, a web-based Extranet and GIS for IDOT environmental assessment projects has been developed as a joint venture among ISGS, IDOT, and a consultant for IDOT. The Extranet provides a statewide web-based GIS system that integrates a wide range of environmental information into an easy-to-use format that is shared among ISGS, IDOT, and IDOT's environmental consultants, thereby facilitating the information transfer process (Figure 6). The Extranet also provides a central location for file upload and download.

ISGS chose to handle all data resource management and resource review in-house instead of contracting with a commercial company for this information. After evaluating the information collected by commercial companies for sample IDOT projects, ISGS determined it was not sufficiently detailed or location-specific to meet program needs. Consultants performing PESAs for IDOT will not have access to certain in-house ISGS resources. Instead, they will need to conduct individual agency database searches, purchase this information from a third-party vendor, or both.

A detailed checklist of the various sources of information used to prepare a PESA is included in the Appendix to this report (Appendix—PESA Report Format). The following are descriptions of some of the more critical resources consulted as part of a routine site assessment.

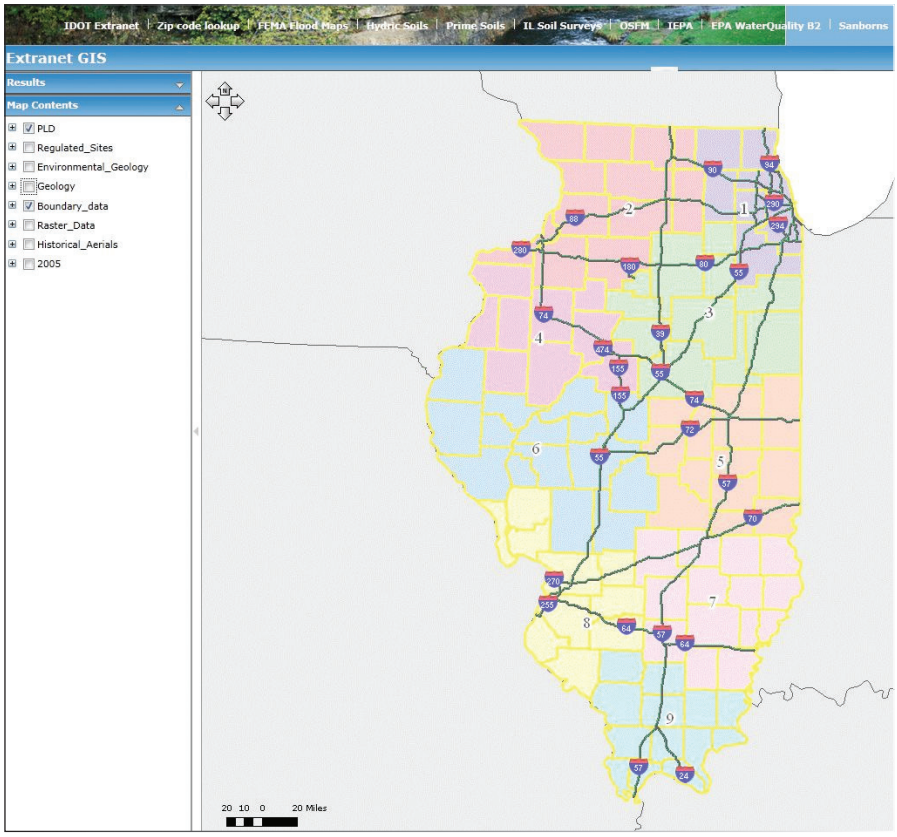

Figure 6 Screen capture of the GIS part of the Extranet, which allows rapid access to geographically integrated geologic and environmental data.

Physical Setting Resources

According to the ASTM (2013) standards, the only mandatory source to be checked regarding the physical setting of a property is the current U.S. Geological Survey (USGS) 7.5-minute topographic map. The ISGS checks this resource as one of the first steps in the research process. The ASTM standard also lists a number of discretionary and non-standard sources that could be checked to obtain more detailed physical setting information. These resources are especially valuable in situations where knowledge of the subsurface conditions and possible contaminant migration pathways may influence subsequent investigations. The ISGS routinely checks all of these "optional" sources, and many more, as part of the historical research procedure.

Current USGS topographic maps are available in 7.5-minute (1:24,000-scale) quadrangles for the entire state of Illinois in digital versions (see topomaps.usgs.gov). Topographic maps are used to delineate the project site, determine elevations in the project area, assess the local and regional direction of surficial drainage, and identify some natural and man-made features in the project area. Names and locations of natural features near the project area, such as rivers, lakes, and wetland areas, can be noted. Man-made features depicted on topographic maps include political boundaries, buildings, forest preserves, railroads (active and abandoned), roads and highways, gravel and clay pits, quarries, mine dumps, large aboveground storage tanks, pipelines, sewage disposal facilities, water towers, refineries, schools, hospitals, trailer parks, cemeteries, airports, drive-in theaters, fairgrounds, churches, and electrical substations. The USGS describes the standard sets of symbols used on their topographic quadrangle maps at pubs.er.usgs.gov/publication/70039164. Although topographic maps are commonly too general for the determination of site-specific information, the maps are useful for a generalized depiction of the principal natural and man-made features in the project area. USGS topographic maps are periodically updated and may indicate some land-use development by use of color coding and patterning superimposed over earlier editions.

Street or city maps are used for a more detailed description of the project area. Such maps are now typically online from a variety of sources (for example, Google Earth: www.google.com/earth/index.html). Address information (block numbers) can also be obtained from many of these sources.

The ISGS has also developed a **project location database** using commercial mapping software as base maps. This database allows the project manager to determine if any of the more than 3,000 former PESAs overlap or are near the current project. Additionally, other IDOT sites are included in this database, including preliminary site investigation reports or environmental impact statements prepared by consultants, permit-access agreements, IDOT maintenance facilities, highway authority agreements, and miscellaneous sites for which IDOT has information. This database has been converted to a GIS coverage by ISGS, allowing more flexibility in the use and accessibility of these data.

Geologic and Hydrogeologic Information Resources

Geologic maps and publications are used to determine the composition and approximate thickness of the surficial materials in the project area, as well as the type of bedrock. Information on site geology is used to evaluate the likelihood, migration potential, and potential risks of pollutants in the subsurface. The resources commonly used to obtain geologic information are listed below; many of these are available from the ISGS. Most of these resources are currently available as GIS data sets (see www.isgs.uiuc.edu/?q=data); in the descriptions below, the scales of and citations for the original source maps are given.

The *Bedrock Geologic of Illinois* map (1:500,000; Kolata 2005) is used to determine the type and approximate age of bedrock in the project area (Figure 7). *Glacial Drift in Illinois* (1:500,000; Piskin and Bergstrom 1967) depicts the thickness of surficial deposits.

Stack-Unit Mapping of Geologic Materials in Illinois to a Depth of 15 Meters (1:250,000; Berg and Kempton 1988) depicts the horizontal and vertical distribution of surficial deposits.

In addition, more detailed geologic maps produced by ISGS exist for parts of the state, and may be used in addition to or instead of the statewide-scale maps.

Soil survey maps and manuals, published by the United States Department of Agriculture, Natural Resources Conservation Service (formerly Soil Conservation Service), are used to identify the soil types found in the project area. These soil surveys include soil distributions and information on soil parameters, including slope, drainage, and permeability. These characteristics can help predict the behavior of pollutants in the subsurface. These maps are available online at websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx.

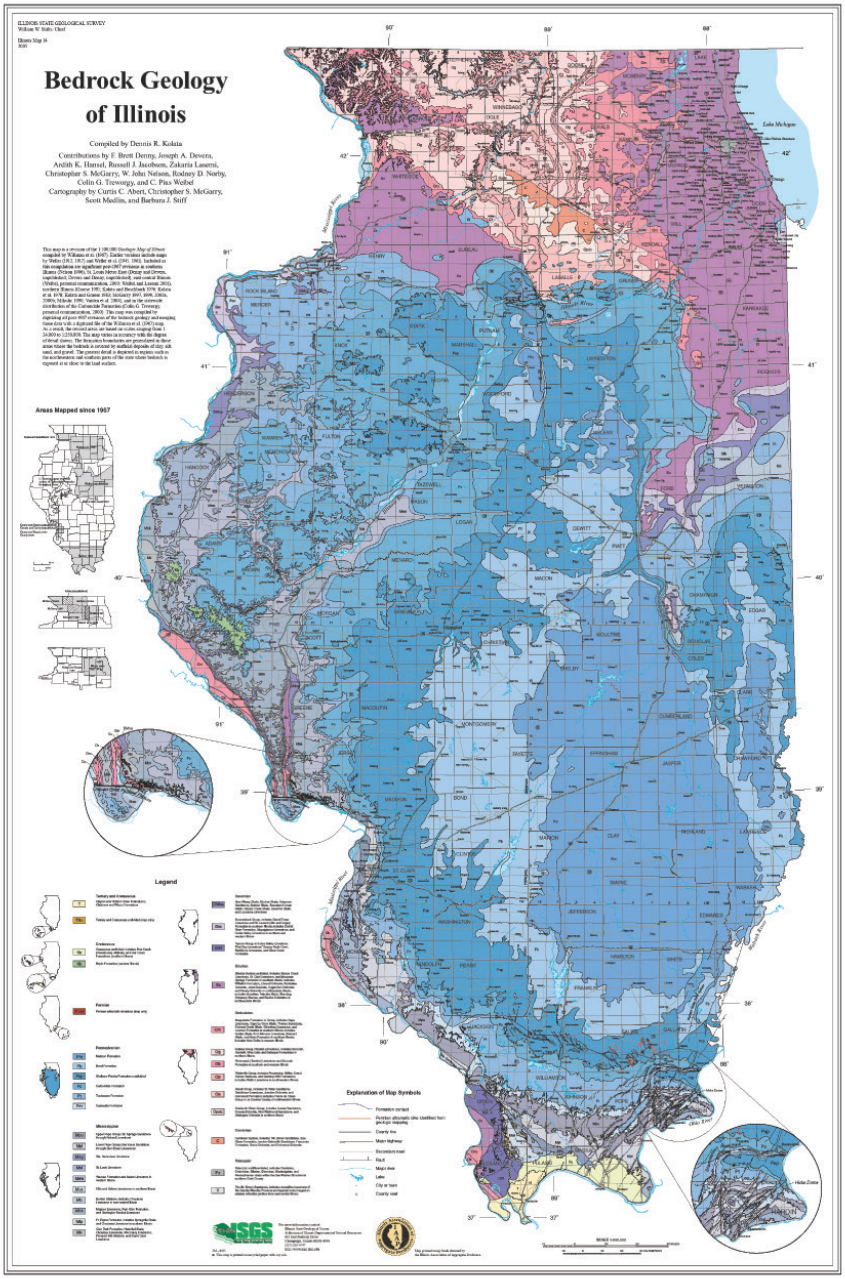

Figure 7 *Bedrock Geology of Illinois* map: one of the many resources used in preparing PESAs. Map by Kolata (2005).

In addition, the presence or absence of hydric and non-prime farmland soils is discussed in PESAs. *Hydric soils* can indicate the past or current presence of wetlands, which may have to be avoided or mitigated. *Non-prime farmland soils* are preferentially used by IDOT for

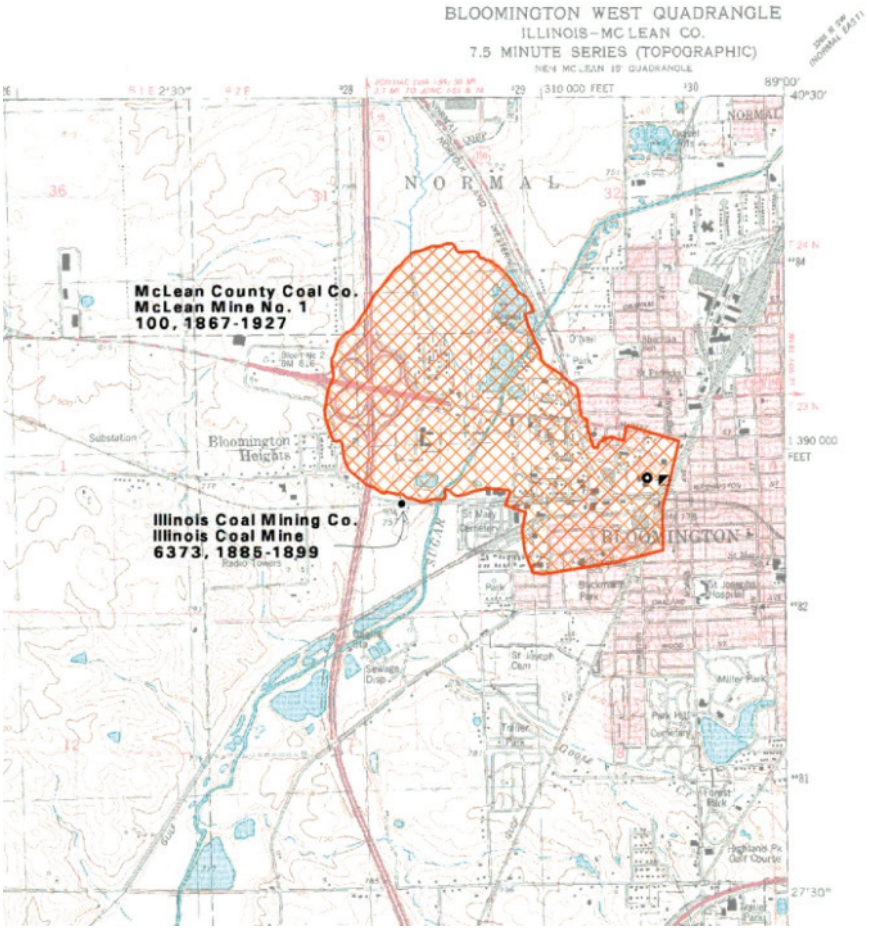

Figure 8 Portion of the Bloomington West quadrangle showing mined-out areas. Map by Andrew G. Louchios.

borrow during road construction. Information on hydric and prime or non-prime farmland soils is available at the website listed above.

Mining information. Mining for coal, clay, silica sands, limestone, sand and gravel, ganister and tripoli, fluorite, lead, and zinc has occurred in various locations throughout the state of Illinois. Potential impacts on road projects from mining activities include undermining, the potential for subsidence, or the presence of a mine shaft on or near the project ROW. The presence of other mine-associated hazards, such as railroad spur tracks and spoil piles, may have an impact as well.

To determine the locations of active and abandoned coal mines in Illinois, ISGS staff first consult the online quadrangle-scale mine maps, found at www.isgs.illinois.edu/maps-data-pub/coal-maps.shtml. These maps include the names and dates of operation of the mines, boundaries of mined-out areas, mining method used, and locations of mine shafts (Figure 8). When a quadrangle-scale map is not available, the online county-scale coal mine maps can be used with their associated directories to determine much of the same information. The directories also include information on mine ownership and type of coal seam mined. For non-coal mining, such as for clay, lead, tripoli, and sand and gravel, the publication *Directory of Illinois Mineral Producers and Maps of Extraction Sites* (Circular 584; Miao et al. 2014) is consulted.

Hydrogeologic information. Depending on the type of IDOT project, PESAs may include a shorter or a more detailed version of hydrological information. The resources listed below are used to obtain hydrogeologic information for projects that require ISGS to prepare the longer version of the hydrogeology section of the PESA.

The ISGS maintains a database that includes information on both public and private water wells, oil and gas wells, and engineering borings. If a well is found within 305 m (1,000 ft) of the project area, the corresponding *well log or boring log* is reviewed to gather site-specific information on geologic materials in the area and the depth to bedrock. These logs can also be used to determine the depth, composition, and location of major producing aquifers of the region. This information is helpful in assessing the danger of contaminant migration to a drinking water supply. Well logs and other records are filed by township, range, and section in the Geological Records Unit of ISGS, and are available for public use. Online well information is also available through ISGS at www.isgs.uiuc.edu/?q=ilwater (Figure 9).

To define whether the project ROW is within a designated groundwater protection area, a project manager identifies the presence of public wells in or near the project area and their corresponding setback zones, and determines whether the project lies within a wellhead protection recharge area or a public water supply watershed area. Various GIS data sets compiled by the Illinois Environmental Protection Agency (IEPA) are used to gather this information. Information on IEPA's Source Water Assessment Program is available at www.epa.state.il.us/water/groundwater/source-water-assessment.

Potential for Contamination of Shallow Aquifers from Land Burial of Municipal Waste (1:500,000; Berg et al. 1984) depicts the potential for shallow groundwater contamination, based on the capacities of earth materials to accept, transmit, restrict, or remove contamination from waste effluents. Because of the scale at which it was produced, this map is intended primarily as a tool for

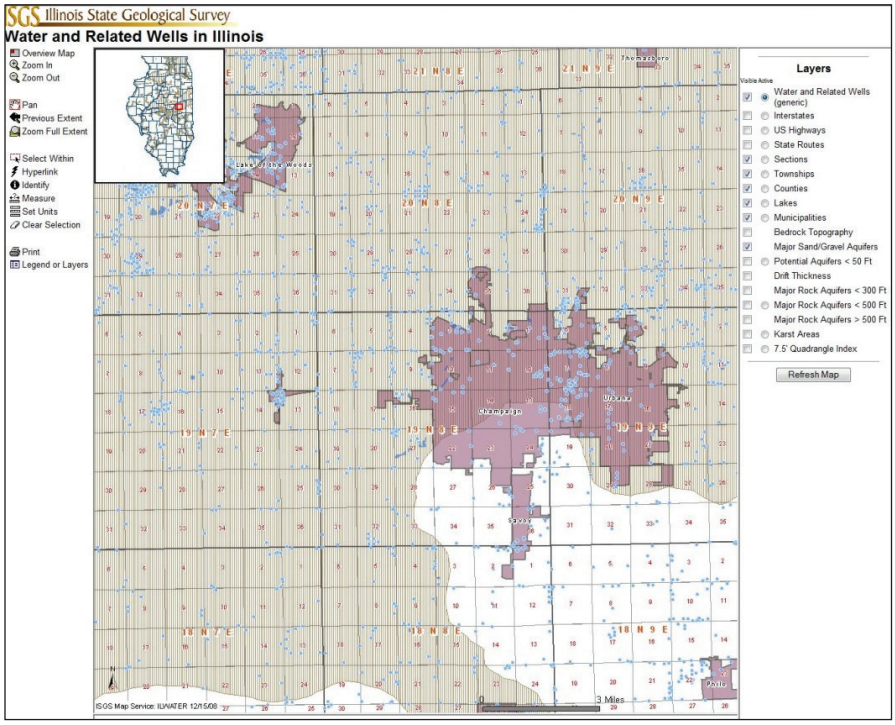

Figure 9 Screen capture of the ISGS ILWATER database, showing wells around Champaign-Urbana.

regional evaluations and not for site-specific determinations.

IEPA maintains maps regarding public water supply surface water intakes, which provide information regarding surficial sources of public drinking water, including reservoirs, lakes, rivers, and creeks. IDOT uses this information to evaluate the potential impact of proposed construction projects on the public water supply. This information is available at www.epa.state.il.us/water/groundwater/source-water-assessment/.

If IDOT is considering in-stream work in association with a bridge replacement, the IEPA's *Illinois Integrated Water Quality Report* is consulted to determine the assessed quality of water in the project area. Information regarding water quality is available from IEPA at www.epa.state.il.us/water/water-quality/.

Natural Features and Hazards Resources

Flooding potential and the presence of wetlands, as described below, are investigated by ISGS in the PESA process primarily as an initial identification prior to more detailed surveys performed by other agencies. Information is also provided on whether a project has the potential for being located in karst terrain, areas prone to landslides, or areas with high seismic risk. Although wetlands identification and natural hazard assessment are not part of ASTM- or AAI-defined site assessments, at IDOT's request this information is provided to IDOT for use in preliminary planning.

Wetlands are of potential concern to IDOT because they are susceptible to environmental impact from upgradient source areas, and because a project that impacts wetlands will have additional permit and mitigation requirements. Avoidance of wetlands is generally preferred. Digital wetlands information for Illinois is available from the U.S. Fish and Wildlife Service at www.fws.gov/wetlands/Data/Mapper.html.

Flood maps depict areas at potential risk from flooding, as shown on *Flood Insurance Rate Maps* prepared by the Federal Emergency Management Agency (www.fema.gov). These maps, available for most of Illinois, cover both incorporated and unincorporated areas. They are available at www.illinoisfloodmaps.org.

Karst terrains develop because of the dissolution of carbonate bedrock. Karst features and resulting karst hazards are the most common in areas where carbonate rocks outcrop at the surface, or where they are shallow and buried with unconsolidated materials generally less than 50 ft (15 m) thick. Hazards common to karst regions include sinkholes, springs, erratic surface water drainage and groundwater flow, and rapid movement of materials into and through the subsurface. Sinkholes and springs can also back up and cause local flooding during high-volume rain or snowmelt events. A map assembled by Weibel and Panno (1997) provides a general indication of the locations of karst terrains, features such as sinkholes, and carbonate rocks in Illinois.

Landslide inventory. ISGS has mapped locations of landslides and landslide-prone areas. This map is available from www.isgs.illinois.edu/?q=publications/miscmapland-slide. ISGS staff determine whether any of these features are near the project area, and often attempt to field-verify the event if it is located on or near a project. Landslide activity has obvious implications for construction and engineering practices.

Seismic risk. A 2008 USGS map that incorporates earthquake magnitudes and rates of return from historical events and expected maximum magnitudes from all known fault zones and background events is used to determine the general potential for seismic risk in the project area. This information is relevant to IDOT when designing roads or structures in areas of seismic risk potential. The map is available at earthquake.usgs.gov/hazards/products/conterminous/2008/.

Standard Environmental Record Resources

The AAI and ASTM Phase I site assessment standards (ASTM 2013) include a list of *federal and state databases* required to be consulted as part of an ESA. These standards also identify

additional state and local resources that may enhance and supplement the information from the required sources. These database searches are crucial in determining whether former or current land use of a property in the project area has involved the use or storage of substances that may pose an environmental hazard to IDOT construction workers or the public. All of the data resources listed in the ASTM standard or their Illinois equivalents are consulted for PESA work.

Various lists and databases prepared and updated periodically by federal and state agencies are consulted for each project site. For every site along and adjoining the project, these databases are reviewed to determine whether each site is listed on any of the databases. If so, a Freedom of Information Act request for site information is submitted to the agency that maintains that database. The file for each site is reviewed to aid in identifying recognized environmental conditions.

ISGS conducts searches of federal, state, and other environmental databases for reported environmental concerns for sites on and adjoining the proposed project. For certain resources, search distances may be expanded when deemed applicable in the judgment of the environmental professional.

The lists and databases consulted for each IDOT project include the following.

Figure 10 Gateway to USEPA environmental databases, including CERCLIS, RCRA, TRI, and others.

Federal databases

SEMS database. This U.S. Environmental Protection Agency (USEPA) database is a component of the Superfund Enterprise Management System (SEMS; formerly known as the Comprehensive Environmental Response, Compensation and Liability Information System, or CERCLIS), and contains names, addresses, and status of evaluation and remediation for federal CERCLA sites within the state of Illinois (Figure 10). The database includes current, archived, and National Priority List sites, and is available online from USEPA at cumulis.epa.gov/supercpad/cursites/srchsites.cfm. A project to produce a polygon-based GIS SEMS database is in progress at the ISGS, which will provide more detailed locational information for these sites.

Resource Conservation and Recovery Act (RCRA) sites database. RCRA sites are sites that deal with RCRA hazardous waste as generators; treatment, storage, or disposal facilities; or handlers and/or transporters. USEPA maintains this information as part of its Resource Conservation and Recovery Information System (RCRIS) database. RCRA sites are identified as sites that are subject to corrective action (CORRACTS); sites that are treatment, storage, or disposal facilities (non-CORRACTS TSD); and sites in all other RCRA categories. This database can be accessed at www.epa.gov/enviro/facts/rcrainfo/search.html.

Emergency Response Notification System database. This database contains records of reports concerning releases submitted to the National Response Center (NRC). The NRC is usually notified when any one of a number of different types of spills or releases of potentially hazardous substances occurs. Records are available back to 1982. Information on events from 1990 to the present can be obtained at www.nrc.uscg.mil/default.asp, and information for events from 1982 to 1989 and later can be obtained at www.rtk.net/db/erns. Spill reports are quite comprehensive in some cases, and can include spill date, location, responsible party, substance spilled, amount spilled, media discharged into, cause of the incident, and event descriptions.

Brownfields pilot sites database. The USEPA defines brownfields sites as sites for which the potential for expansion, redevelopment, or reuse may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant. For Illinois, this database is available at www.epa.gov/swerosps/bf/plocat.htm#region5 and includes a list of brownfields pilot sites and associated fact sheets.

Toxics Release Inventory (TRI) database. The USEPA TRI database lists companies that have had reported releases of hazardous materials to the environment along with businesses that receive waste from the reporting companies. As of the date of this publication, it is available from USEPA for the years 1987 through 2012. Records are typically made available by USEPA approximately 2 years after the calendar year in which the events occurred. The TRI includes the address of the company, the chemical released, the medium into which the chemical was released (air, water, land), the route by which the chemical entered the environment (such as an air stack or public sewage treatment plant), the amount of the release (if known), what chemicals are stored at the facility, and what chemicals are shipped off-site. The information can be accessed at www.epa.gov/enviro/facts/tri/search.html.

Transformer databases. The USEPA maintains two databases on transformer registration and quarterly activities regarding polychlorinated biphenyl (PCB)-containing transformers. These databases can both be accessed at www.epa.gov/osw/hazard/tsd/pcbs/pubs/data.htm.

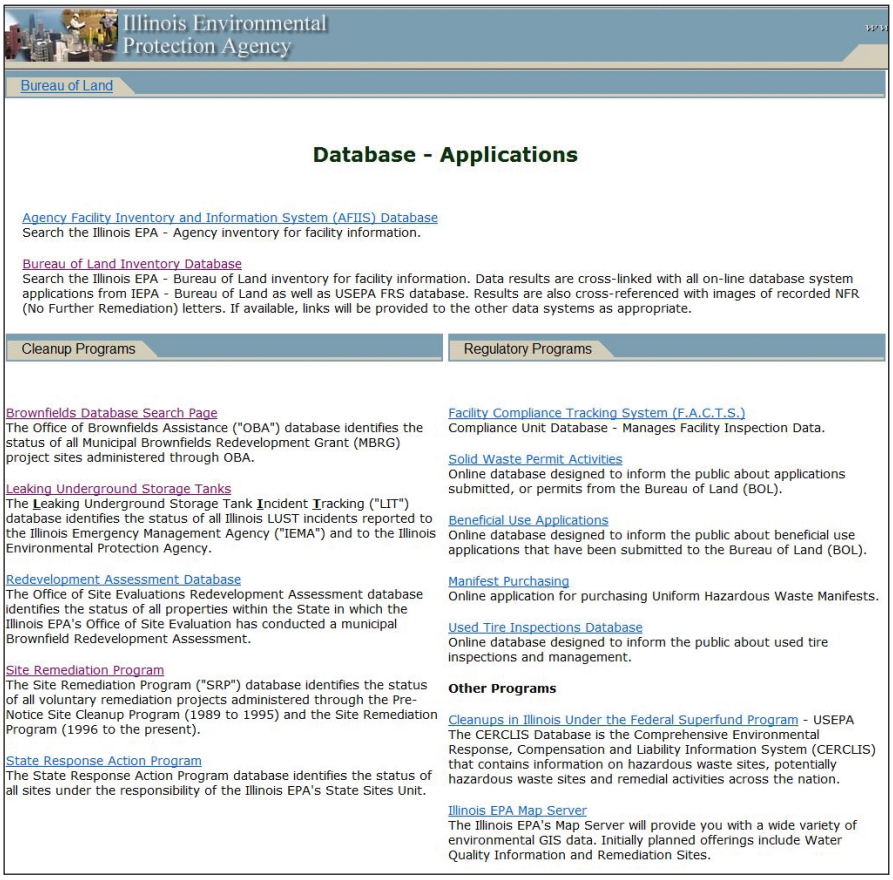

Figure 11 Gateway to IEPA databases.

State databases

Leaking underground storage tank (LUST) database. The IEPA LUST database identifies all sites at which a release associated with an UST has been reported. Information in this database includes owner, location, Illinois Emergency Management Agency (IEMA) incident number, and IEPA file number, as well as selected information about the incident status, including whether the site has received a No Further Remediation (NFR) letter. If a site has received an NFR letter, this database may also indicate whether any activity and use limitations (AULs) such as institutional controls or engineered barriers are associated with the site. The LUST database can be accessed online at epadata.epa.state.il.us/land/ust/Search.asp and is updated about once a week (Figure 11). A project to produce a GIS-based LUST database is in progress at the ISGS, and will provide more detailed locational information for these sites.

Bureau of Land (BOL) inventory. This database contains an inventory of all sites within the state of Illinois that have a file at the IEPA Bureau of Land. It includes sites that have involvement with regulated substances (in a generation, treatment, storage, or transportation capacity), spill sites, landfill or dump sites, and sites that have had an environmentally related citation or citizen complaint. If a site has received an NFR letter, this database may provide access to this letter, which may also indicate whether any institutional controls or engineered barriers are associated with the site. The inventory can be accessed at epadata.epa.state.il.us/land/inventory and is updated regularly.

Site Remediation Program database. This resource lists all voluntary remediation projects administered through the IEPA Pre-Notice Site Cleanup Program (1989 to 1995) and the Site Remediation Program (1996 to the present). The database indicates whether an NFR letter is present, gives a contact for the site or the name of the IEPA project manager, and provides both IEPA and USEPA identification numbers where applicable. If a site has received an NFR letter, this database may also indicate whether any AULs such as institutional controls or engineered barriers are associated with the site. This database can be accessed at epadata.epa.state.il.us/land/srp and is updated regularly.

Brownfields database. The IEPA's Office of Brownfields Assistance (OBA) database identifies the status of all Municipal Brownfields Redevelopment Grant project sites administered through OBA. This database can be accessed at epadata.epa.state.il.us/land/brownfields.

UST database. The Illinois Office of the State Fire Marshal's (OSFM) UST database contains all reported or known sites that have (or once had) one or more

registered USTs on the property. Information typically provided on this list includes owner, location, contact name and phone number, status, number of tanks on the property, and size and contents of the tanks. This database is available at webapps.sfm.illinois.gov/ustsearch/ and is updated regularly.

Regulated substance releases. IEMA releases a database containing records on regulated substance releases from 1987 to the present. Information typically present in IEMA records includes the date, type of material, amount released, whether the IEPA was contacted, and any available information regarding remediation that may have taken place. IEMA records are available at www.state.il.us/iema/FOIA.asp.

Landfills and disposal sites. Landfills, disposal sites, and dump sites present one of the more dangerous concerns for ISGS and IDOT workers because historically, records regarding the materials that landfills have accepted generally are incomplete or non-existent. This scenario of an unknown hazard can be costly in terms of time and money for IDOT; being well-informed as to the locations of landfills and other disposal sites, and the boundaries of the landfilling activity, is important in dealing effectively with this type of site. There is currently no centralized complete database of landfills or disposal sites in Illinois; general IEPA BOL regulatory files must be consulted for this information.

Injection well inventory. In conjunction with the Safe Drinking Water Act of 1974, an inventory of injection wells in Illinois was performed by IEPA and USEPA. The purpose of this inventory was to provide information regarding the type, depth, construction, and other aspects of these wells, with the ultimate goal of protecting underground sources of drinking water from this source of potential contamination.

Class I and Class V wells were identified in this inventory. Class I wells are used to inject regulated substances beneath the lowermost formation containing an underground source of drinking water. Only a few Class I wells were identified in the inventory. Class V wells are defined as shallow wells used to inject non-hazardous fluids. Class V wells are classified into geothermal reinjection wells; domestic wastewater disposal wells; drainage wells; recharge wells; mineral and fossil fuel recovery-related wells; industrial, commercial, or utility disposal wells; oil field waste disposal wells; and miscellaneous wells. The injection well database includes the facility name and address, identification number, legal contact and phone number, status of operation, and type of fluid injected into the well. This database is updated annually. Information on IEPA's injection well program can be found at www.epa.state.il.us/land/regulatory-programs/underground-injection-control.html.

In-house databases

Oil and gas information. This resource consists of several in-house GIS data sets, which provide locational information on oil and gas facilities, fields, pipelines, and wells throughout the state. Facilities noted include those involving crude oil, natural gas, refined products (gasoline, kerosene, liquefied natural gas and ammonia), refineries, propane storage, gas storage, liquefied natural gas plants, and supplemental natural gas plants. Public GIS-based information on oil wells is also available through www.isgs.illinois.edu/?q=iloil. In addition, pipeline information is available from the U.S. Department of Transportation (USDOT) at www.npms.phmsa.dot.gov.

Coal gasification sites database. Historically, gas for lighting and heating was produced from coal by numerous power companies and municipalities. By-products of gas manufacturing included coal tar (containing polynuclear aromatic hydrocarbons, or PAHs) and benzene. Commonly these and other wastes associated with gas manufacturing were left on-site, both aboveground and underground, which may pose a significant threat to public health and the environment.

ISGS is in the process of compiling a GIS-based database of these sites for Illinois, with data derived from a variety of sources, including IEPA records and Sanborn Fire Insurance maps. This draft database is currently available only to in-house users.

Standard Historical Sources

Although the above-mentioned databases are good tools for identifying problems that may currently exist in a project area, other resources are needed to address the issue of historical land use and development of a community over time. The ASTM (2013) standard does not specify exactly how many of these "standard historical sources" need to be consulted for a property, but instead calls for using as many sources *as needed* to identify past land uses. The standard specifies that the history of the property must be traced back to before the property was first developed. To do this, ISGS uses a combination of many of the sources listed in the standard.

Plat maps that provide information on current and past ownership of land parcels in the project area are available for each county in Illinois. Because these maps were first published as early as the mid-1800s for some parts of Illinois, and have been updated periodically throughout the years, a sequence of plat maps can provide information on changes in property ownership. Plat maps may also identify land ownership of facilities that may be involved with regulated substances and provide information regarding the location of commercial and industrial development. Both historical and current plat maps are housed in the Geological Records Unit of ISGS and at the UIUC library, and are available for public use. Additionally, current and some historical plat maps can be purchased from the Rockford Publishing Company at www.rockfordmap.com. Plat maps from the 19th century for Illinois are available through the UIUC library (see www.library.illinois.edu for holdings) and through the Illinois State Library (see www.cyberdriveillinois.com/departments/library/home.html for holdings).

Sanborn Fire Insurance maps, which provide information on the locations and uses of buildings, are available for many towns and cities in Illinois. These maps are one of the most valuable

resources for determining early land use in urban areas. First published in the late 1800s for Illinois, these maps have been periodically updated and include detailed illustrations of urban streets and structures. Because building occupancy is typically indicated, these maps can be used to identify a property that was once occupied by a gasoline station, auto repair shop, railroad roundhouse, industry, coal gas manufacturing plant, or other facility that could be a concern. Specific information, such as the number and location of gasoline or fuel tanks on a parcel, the size of the tanks, and the materials used in building construction, is often given. A sequence of Sanborn Fire Insurance maps provides a valuable record of developmental changes in urban areas.

Two collections combine to provide fairly complete historical coverage. The Chadwyck-Healey collection includes dates between the late 1800s and the 1950s. These are available at sanborn.umi.com. University Publications of America distributes a collection of more recent Sanborn maps, generally from the 1950s to the 1980s. These are available on microfilm reels at the Illinois State Library. Color paper copies of Sanborn maps can be found in a variety of places; local or regional libraries often have copies of the Sanborn maps for their scope of coverage. The UIUC Map and Geography Library also has color paper copies of Sanborn maps for Illinois, which can be accessed by the public. Sanborn maps from the 1990s and later may also be available through local libraries or data research companies.

City directories, also known as crisscross directories, are another valuable source of historical land-use information. These volumes have been published by many companies over the years. They list property owners by address in urban areas, provide specific information on types of businesses present at a certain address, and are a good record of year-to-year land-use change in a community. Local libraries generally carry city directories specific to their city or town; these directories are typically checked by the project manager during visits to the site. County or regional archival libraries may house more complete historical collections of directories for surrounding towns. City directories are instrumental in filling in the research gaps in an urban area. Some local library holdings of city directories in Illinois are given in the ISGS Open File Series Report titled *A Directory of Illinois Libraries: Historical Resources for Environmental Site Assessments* (Bannon-Nilles et al. 1999).

Historical topographic maps are available in hard copy only and a file is maintained by the ISGS. Maps dating back to the early 1900s are available for some areas of Illinois; however, some quadrangles were not mapped at a scale of 1:24,000 until the 1980s. Many quadrangles have been periodically updated, typically about every 10 to 20 years. Historical topographic maps provide a reference for temporal changes in development in the project area (Figure 12). Examples of common changes depicted by a sequence of topographic maps include expansion of municipal boundaries; the appearance and removal of structures; name changes; construction of new roads and highways; the appearance or abandonment of railroad lines; and the size and appearance of quarries, wetlands, surface impoundments, and surface water. Revised editions of topographic maps often indicate land-use development by use of color coding and patterning superimposed over an earlier version of the map.

Aerial photographs and imagery are used to determine historical land use and developmental change through time. They are available by county, typically for each decade starting in the late 1930s and extending into the mid-1990s, at the UIUC Map and Geography Library and at other libraries in the state. More recent aerial photographs and imagery can be viewed digitally on websites such as historicaerials.com and www.google.com/maps. In addition, some counties and municipalities in Illinois maintain their own detailed sets of aerial photographs.

Unlike topographic maps, which are somewhat generalized, aerial photographs depict all existing features in an area at the time the photograph was taken. Land disturbances, such as stressed vegetation, landfill activity, and flooding, can be examined, as well as excavation and construction in progress when the photographs were taken. The distinctions among agricultural, residential, or urban land use also can be easily determined. As with the historical topographic maps, a sequence of aerial photographs provides an estimate of the timing of construction or land disturbance. In addition, the viewer can often determine the nature of a structure by its shape or configuration. For example, the typical configuration of a gasoline station with circular drive, dispenser island, and small main structure can often be identified.

Illinois manufacturers' directories (IMDs) provide information on manufacturers, which commonly use regulated substances in their industrial processes. The information in the directories is supplied by participating manufacturers; not all manufacturers are included. The UIUC library holds copies of these directories for selected years from 1941 to the present. Entries include the street address of an industry, year of establishment, product manufactured, and industrial code. The type of product and the code provide information that can be used to determine the types of regulated substances and wastes that may be used or generated by the facility. IMDs are also available from www.manufacturersnews.com.

Local information sources. Information on incidents of regulated substance releases near a project can in some cases be obtained from the local governmental offices in whose jurisdictions a project route is located. City fire departments are the most likely source of information about incidents occurring within city limits, but in some towns, this information is handled by other municipal departments. For rural areas, information can often be obtained from the township clerk, volunteer fire protection district, county sheriff, building inspector, county highway department, county health department, or county IEMA office.

Alternative Historical Information Resources

In addition to the above-mentioned materials, other resources may be used to obtain more detailed information

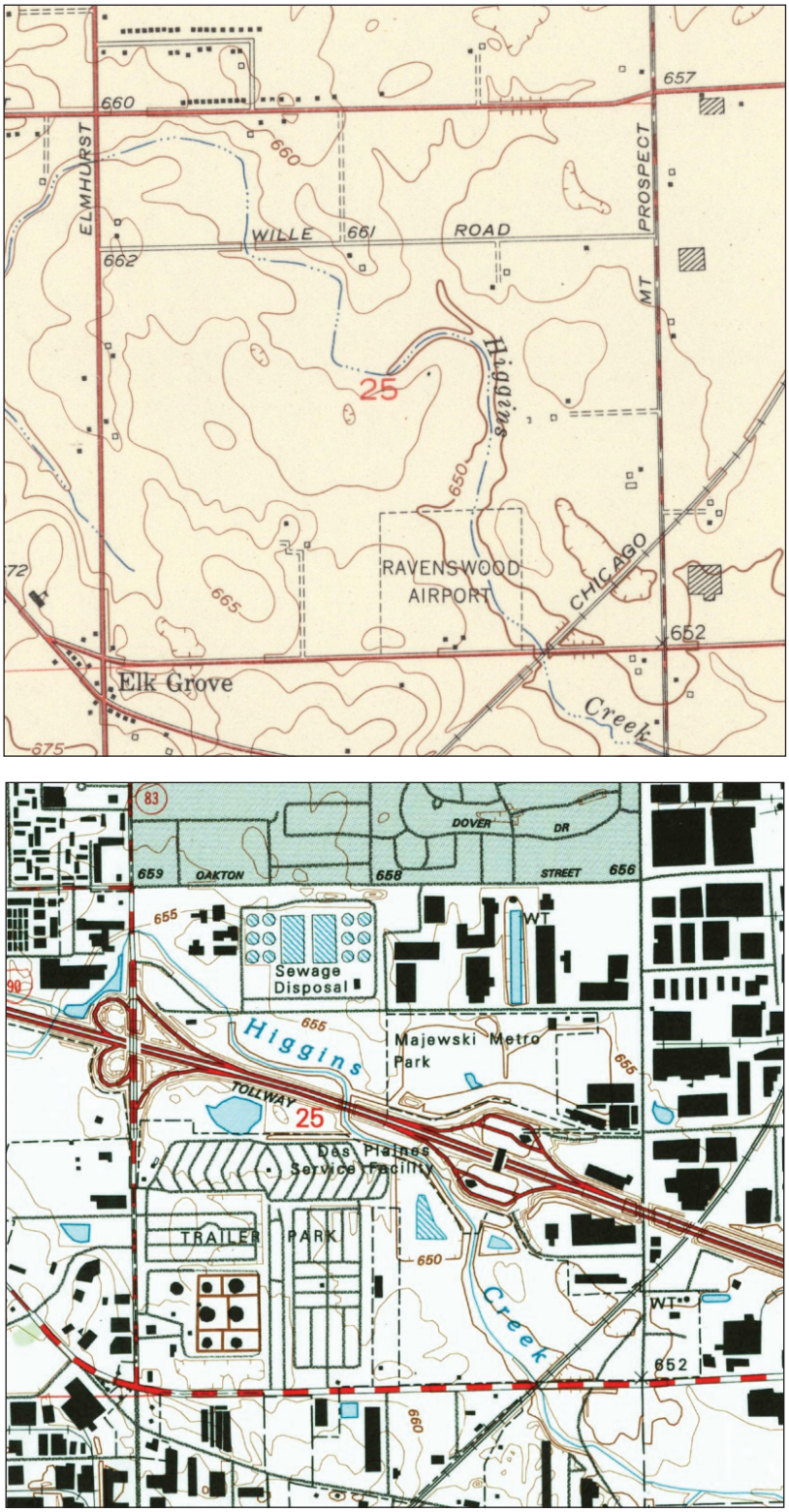

Figure 12 T41N, R11E, Section 25, Arlington Heights quadrangle. Top figure is from the 1953 topographic map, and bottom figure is from the 1993 topographic map. Note the presence of the airport in 1953, and the presence of aboveground storage tanks (black circles in lower left corner) and a sewage disposal facility in 1993.

concerning a specific parcel. Many of these sources are local and require an increasingly intensive effort to locate and acquire. These resources are not used as part of a routine site assessment by ISGS, but they may be consulted as needed for a particular project. It should also be noted that in large metropolitan areas, such as Chicago, additional information may be available because of the specialized nature of the urban setting. The ISGS has numerous publications relating to resource extraction topics as well as other useful historical sources relating to general land-use development topics dating back to 1866, many of which are available online. Following is a list of some of the alternative resources that may provide additional historical data.

Local libraries may contain publications pertaining to the early historical development of a town, especially commercial and industrial development. They also may house historical collections of local newspapers and city directories. One resource containing a partial listing of these collections in Illinois is the ISGS Open File Series Report titled *A Directory of Illinois Libraries: Historical Resources for Environmental Site Assessments* (OFS 1999-8; Bannon-Nilles et al. 1999).

Local and county historical societies may have information on the historical development of a town and its neighborhoods. Employees at these organizations often have extensive personal knowledge of the area as well.

Local planning agencies may have information on local land use and past waste disposal practices.

Property tax files and assessor's records often include records of building age, past ownership, appraisals, maps, and photos of a property. For several counties in Illinois, these records are now available online, although there may be a charge associated with accessing the records.

Title searches provide information on ownership, leases, and easements. They are often kept on file at the municipal or county clerk's office. This source is limited because it often provides only the names of past owners or lessees and

no information about the corresponding uses of the property.

Building permits can provide records of building construction, demolition, alteration, or modification. They are usually kept by the building department of a municipality or county.

Zoning records indicate land uses permitted by local government and changes in land use over time. They are usually kept by the planning department of a municipality or county.

Public health or sanitation departments may have file information on historical landfills, uncontrolled dumps, and other waste disposal and sewage treatment issues, as well as records on contaminated drinking water wells that indicate a potential environmental problem in the area.

Field Investigation Techniques

The purpose of field inspections is to verify the physical and geomorphological character of the area, to confirm present and adjoining land use, to collect addresses for address-based database searches as well as for subsequent research into past land uses, to conduct local on-site research, and to conduct site interviews. Other investigations are conducted as required.

Field inspections consist of one or more trips to the site, depending on the size and complexity of the project. Typically, the basic elements of the historical research are substantially completed prior to the first site inspection, so that the project manager can investigate beyond present land use for potential environmental problems and direct subsequent research into past land use using local resources. Depending on the length and complexity of the project, site inspections may consist of a complete "walk-over" of the site or a slow drive along the project area with stops to investigate sites of interest. Items such as local feature names, address ranges along the project route and cross streets, and political boundaries are noted in addition to site-specific descriptions.

One important part of the field investigation is the determination of where site boundaries will be drawn. PESA sites are identified through both field inspection and regulatory file review, and are largely "common sense" sites. Sites as they appear in PESAs may or may not reflect actual parcel boundaries as reflected in assessors' records and property identification numbers (PINs). What appears to be a single site in the field, such as a gas station, may be divided into multiple parcels with different PINs for tax assessment purposes. REC identification is most useful to IDOT if it reflects activities at the entire site, not on arbitrary divisions of the site.

Sites may also be combined based on common use, if they are contiguous and if no RECs are present. For example, if a residential subdivision is present along the project, and no RECs are identified at any individual residence, all of the residences may be combined and listed as a single site in the PESA. However, to preserve the information regarding which residences the PESA has investigated, each residence is listed individually in the Address Listings section of the report (see Appendix). In addition, for largely rural projects, agricultural land may be combined to form a single site even if it is not contiguous.

The following elements are included in field inspections.

Preparation. The first step in preparing for the site inspection is a review of the IDOT environmental survey request. The specific determinations of the limits of the project area and the style of PESA report requested are crucial. Uncertainties in these issues are resolved with the IDOT district environmental coordinator prior to conducting the site inspection. The minimum information required from IDOT consists of a description of the project, the project limits, and a map delineating the project.

Historical materials are then reviewed to identify items that require field checking for location and accuracy. Local sources of information such as public libraries or historical societies are identified for investigation while in the field.

The following investigations are performed at the site. Site-specific information is recorded in field notebooks or on-site maps or aerial photographs. A field checklist is used to ensure that all items are investigated.

Topography. The direction of surface water flow is noted. Closed depressions are identified, as well as drainage pathways that are not indicated on a topographic map. Irregularities in the topography, such as mounds or unnatural depressions, are also noted. Areas with active dumping or filling are described.

Water quality. Surface water is checked for discoloration, foam, bubbles, slicks, or sheens. The presence or absence of plant and animal life in or near the water is noted (Figure 13).

Biota. The area is checked for the general health of vegetation. Obvious areas of stressed vegetation are noted.

Site-specific characteristics. Addresses, business names, and present uses of buildings along the project route are recorded. Any indications that past use may have been different from the present one are noted. Items checked include stains or discolorations on or around buildings and lots; tanks, debris, drums, and dumped materials; and unusual odors. Particular care is taken to identify former gasoline stations. Evidence of past use as a gasoline station may include dispenser islands, outlines of islands (new asphalt or concrete in the shape of an island), new asphalt or concrete along former piping areas, fill caps, vent pipes that are freestanding or along the building, large overhead garage doors, service bays, pillar and canopy-type architecture, pipes protruding from the ground, tank-sized gravel areas on the lot (these may have subsided as the gravel has settled), and lighting characteristic of gasoline stations, among other features (Figure 14).

Asbestos-containing materials (ACM) and lead paint. In any building, ACM may be present. These materials may be a component of floor tiles, wall and pipe insulation, roof materials, patching or painting compounds, ceiling materials, or stove and furnace insulation. ACM

Figure 13 Oil sheen on surface water. Photograph by Daniel J. Adomaitis.

Figure 14 Vent pipe along building wall, indicating possible presence of an underground storage tank. Photograph by Daniel J. Adomaitis.

is therefore a de minimis condition for any site containing a building. Lead paint was banned in residential use in the United States in 1978, so residences constructed in and before that year may contain lead paint. Lead paint has not been banned in industrial and commercial use, so any such building has the potential of containing lead paint, and lead paint is a de minimis condition for all such buildings. ACM and lead paint may also be present in areas where construction or demolition debris is noted. During the site inspections, areas where demolition debris is observed are delineated and described with regard to observable contents and estimated extent. Lead paint may also be present on other structures such as water towers and bridges.

Structures containing ACM, lead paint, or both may require more costly methods of demolition and removal of demolition debris. Estimates of approximate ages for buildings are made from historical background information such as Sanborn Fire Insurance maps, historical topographic maps, and aerial photographs. Dates of construction may also be inscribed on buildings or cornerstones, which can be noted during site inspections. If buildings are determined to be at risk for lead paint because of their estimated ages, this information is made part of the final report. All buildings are flagged as having the potential to contain ACM.

Other features. The locations of natural gas or petroleum pipelines in the project area are noted. Transformers, both on and above the ground, are identified. Former and current railroad right-of-way and dead-end roads are noted, and these areas are checked for spills and dumping. Any other features of potential environmental concern are noted as well (Figure 15).

Personal interviews. Interviews with local government officials, employees and owners of businesses, and long-time residents near the site may be particularly valuable sources of information. The nature of the interview depends on the project and the amount of information available for an area. Inquiries may include questions regarding current use practices, site histories, USTs, spills, disposal practices, and any other factors based on site conditions and information already gathered. Personal interviews are conducted at the discretion of the project manager and are typically not conducted for every site on a project. The absence of a personal interview is listed as a data gap only when the proj-

ect manager deemed it desirable to conduct such an interview because of missing site information, but could not locate anyone to interview or obtain responses to questions.

Local research and information verification. Background and historical information is checked for its accuracy and relevance to the project. Locations and addresses are verified, and distances from the proposed project are noted. Special attention is paid to changed addresses and community boundary lines. Local libraries are checked for additional information sources, such as city directories, special edition fire insurance maps, historical photographs, and local historical summaries. Building, fire, environmental, planning, assessor, and health departments or other local, township, and county government offices may be contacted. This information helps reduce the amount of questioning needed during an interview, and helps direct the course of interviews.

Photography. Photography takes place at the discretion of the project manager. Areas that may be photographed include material dumped into depressions that could easily be covered or burned, sporadic seeps that suggest subsurface impact, architectural and parking lot features actively being razed or renovated, and unregulated dumping or remedial events (Figure 16).

Safety Equipment

During field inspections, several aspects of personal safety must be considered. First, hazards associated with working on highway projects include those posed by the necessity to work in and around traffic areas, some of which are high-volume or high-speed-zone areas, or are highly congested. Staff may need to travel in the vehicle at speeds slower than the surrounding traffic or park along the shoulder of a highway. Equipment necessary for these activities includes the vehicle's warning flasher system, strobe lights integrated into the vehicle's headlight and taillight systems, signs on vehicles indicating frequent stops, safety vests, and cell phones (Figure 17).

Figure 15 Aboveground storage tanks with discolored soil and water. Photograph by Matt Villicana.

Figure 16 Unregulated dumping. Photograph by Environmental Site Assessment staff.

Two additional concerns that impact safety include working in high-crime areas and potential on-site medical emergencies. Field work in high-crime areas may require additional staff (including security staff) and the use of cell phones. A properly sized and fully equipped first-aid kit is available at all

Figure 17 Mark Collier and Dale Schmidt working on a PESA in downtown Chicago, where dense traffic makes it particularly important to wear personal protective equipment such as these safety vests. Photograph by Mark A. Hart.

times. A copy of the program's health and safety standard operating procedures is carried in each vehicle.

Report Development

Final Reports

Three main factors are essential in completing written reports. First, the report should communicate clearly and effectively the results of the assessment. Therefore, the report must be comprehensible to readers not necessarily conversant with geological and environmental terminology.

Second, the report format must be structured such that individual writing styles are not discernible, because many staff members contribute to reports. A standard report format was designed to provide continuity across time and changing staff assignments. Regardless of the number of staff members contributing to each report, only one staff member is responsible for completing the final draft and ensuring that all of the components are smoothly integrated.

Third, although the data and their interpretations are assembled over time, the report should contain all the information that has been gathered at any stage of the assessment process. This ongoing accumulation of information allows for the production of an interim report at any stage of the assessment process and gives ISGS or IDOT staff the ability to evaluate the potential impact to the project on the basis of information gathered up to that point. Basic environmental information gathered during historical research may provide sufficient reason to discontinue, reschedule, or redesign the project because of inherent high risk due, for example, to the potential acquisition of a site listed on the National Priority List (federally funded cleanup sites) of the USEPA.

The report form has evolved significantly since the initial report was written, as the result of interaction between ISGS and IDOT. The reports are prepared for IDOT's use; therefore, IDOT's needs drive the report format. The Appendix outlines the present report structure. This basic framework shows some, but not all, of the standardized items that are key to maintaining the continuity of style. This document is dynamic and will continue to change through time to better reflect changes in the program and IDOT's needs.

The rest of this section describes the components of the typical PESA report.

The cover of the report presents key identification information, including the ISGS project number, the IDOT job number, the IDOT sequence number, the date the request for the report was received by ISGS, and the due dates supplied by IDOT ("Design Approval Date" and "Survey Target Date"). Geographical information about the project site is presented both as text and as a figure showing the general project location within an outline of the state.

Major report elements include the following:

- The EXECUTIVE SUMMARY presents the "bottom line" of the report. It summarizes in tabular form sites that have RECs (Table 1); sites that have de minimis conditions only (Table 2); sites that have neither RECs nor de minimis conditions (Table 3); and sites that are adjoining the project that also appear on regulatory lists (Table 4).
- The INTRODUCTION describes the project location, scope of work, and project features. Any special instructions from the IDOT districts or Central Office are noted in this section, as well as any variations in the scope of work.
- The GEOLOGY and HYDROGEOLOGY sections provide basic information on the geologic setting of the project. Geologic and hydrogeologic characteristics may influence the movement of regulated substances through the subsurface. The level of hydrogeologic information presented depends on the type of project as determined by IDOT. For certain projects, more detailed hydrogeologic information is supplied. Information on soils and mining is also contained in this section.
- The NATURAL FEATURES AND HAZARDS section describes natural features and potential hazards that are or may be present in the project area. These include wetlands, landslides, floods, seismic risk, and karst terrain.
- The PROJECT SITES section includes descriptions of all sites that touch the proposed project, a history of each site back to first reported use or oldest reasonably ascertainable resources, information regarding potential sources of regulated substances, and information from regulatory file reviews, interviews, and any other resource. Data gaps, if any, are noted. RECs and de minimis conditions, if any, are identified for all sites that touch the project. "Sites" are primarily defined by on-site inspection, and may or may not coincide with actual parcel boundaries as defined by PINs. Sites may be combined with other adjoining sites if land use is similar and if no RECs exist for any site within the group; for example, all houses in a residential development along the project may be combined into a single site in the PESA report. Project sites should be numbered sequentially, beginning with 1, and proceed in a logical geographic order through the project.

- The ADJOINING SITES section lists all sites that are adjoining the project that also appear on regulatory lists. Regulatory files for these sites are reviewed; if events on adjoining sites are determined to have impacted or to potentially impact sites on the project, this information is discussed in the Project Sites section. Adjoining sites should be given alphabetic designations, beginning with A.
- The ORPHAN SITES section lists sites potentially on or near the project area with ambiguous or vague addresses whose locations could not be resolved. Regulatory information is reviewed for these sites to attempt to establish their locations.
- The CONCLUSIONS summarize the RECs, de minimis conditions, and adjoining sites of potential concern. The same categories are used as in the Executive Summary; in addition, any identified potential natural hazards are listed.
- The ENDORSEMENTS identify the author of the report and the senior staff who reviewed and approved the report.
- The ADDRESS LISTINGS section contains a list of individual addresses observed on buildings that are part of the sites discussed in the Project Sites section; because sites in the report may contain multiple buildings with different addresses, this section provides a list of all addresses that were individually examined, even if they are combined earlier in the report.
- The INFORMATION SOURCES section lists the documents, databases, websites, and other resources used in compiling the geology, hydrogeology, and other background and historical information.
- The APPENDIX shows the items investigated during the assessment process.
- The LIST OF ATTACHMENTS describes figures, tables, and other supporting information associated with the report.
- ATTACHMENTS that are required include a project location map, maps of all sites and adjoining sites discussed in the report, figures from regulatory files depicting soil and groundwater impacts (where these exist) for sites on the project, and complete copies of NFR letters, if present, for sites on the project. Optional attachments include soil and groundwater impact maps for sites adjoining or otherwise not on the project that have the potential to impact the project.

Resource Review Reports

Some projects, determined by IDOT, require only a listing of sites within the area of the proposed project that appear on regulatory lists. Site inspections are conducted for these projects, and results of the site inspections and review of regulatory files are summarized in letter reports.

All Appropriate Inquiries

In November 2005, the USEPA published its final rule setting federal standards for conducting AAIs into the previous ownership, uses, and environmental condition of a property for the purposes of qualifying for certain landowner protections under CERCLA. This rule became effective on November 1, 2006. Since that date, parties must comply with the requirements of the AAI Final Rule (Federal Register 2005), or follow the standards set forth in the ASTM E1527-13 Phase I Environmental Site Assessment Process (ASTM 2013), to satisfy the statutory requirements for conducting all appropriate inquiries. AAI investigations must be conducted in compliance with either of these standards to obtain protection from potential liability under CERCLA as an innocent landowner, a contiguous property owner, or a bona fide prospective purchaser (www.epa.gov/brownfields/aai/index.htm).

IDOT does not necessarily require that it obtain such protection for all properties under investigation for an infrastructure project. ISGS conducts AAI investigations only for properties for which IDOT desires such protection. These investigations typically occur after a PESA has been completed for a project, and only for the specific parcels for which IDOT desires protection, upon notification of ISGS by IDOT.

AAI inquiries conducted by ISGS differ from PESAs in several ways:

- PESAs typically do not provide recommendations to IDOT, whereas AAI reports provide recommendations, in particular for future subsurface or surficial sampling.
- Interviewing is more extensive.
- Radius searches for sites with regulatory files follow standard AAI protocol.
- Property inspection is more extensive. For PESAs, interior building inspections are not routinely conducted. If an AAI inquiry is to affect the part of a parcel that contains buildings, interior inspections are conducted.
- The report format is different, concentrating on items specifically required by the AAI standard.

Other Program Features

In addition to the PESA work that is the primary function of the program, ISGS, in cooperation with IDOT, has continued to develop additional program features. A program to evaluate IDOT maintenance facilities is ongoing, which focuses on potential releases from these sites. Several high-profile, large, or otherwise unusual projects, which required ISGS to devise alternative methods to address difficult assessment issues, have been completed for the site assessments program. Data archiving concerns have become increasingly prominent as the program has grown, and ISGS is continuing to develop improved methods of archiving and accessing PESA information. Finally, ISGS's work in education and outreach has increased over the past few years, involving collaborations with universities that are used to bring practical environmental applications into the classroom.

Maintenance Facilities

IDOT owns and operates about 200 maintenance facilities, located throughout the state (Figure 18). In 1995, as part of the PESA program, ISGS was requested by IDOT to evaluate its maintenance facilities to determine the potential severity of environmental

Figure 18 IDOT maintenance facility. Photograph by Greg A. Kientop.

impacts to off-site receptors in the event of a release of regulated substances at the facility as a precursor to a possible future facility audit. The maintenance facility evaluation program was modeled after a similar program developed by the Pennsylvania Department of Transportation, and involves ranking each facility as having low, moderate, or high potential for adverse environmental impacts in the event of incidents at the facility.

Factors evaluated include known or potential on-site regulated substance issues, potential contaminant transport pathways, and potential on-site and off-site receptors. Factors are assigned a weight depending on the relative importance of each. Information presented in maintenance facility reports is derived from a questionnaire filled out by IDOT maintenance facility personnel, from examination of the area surrounding the maintenance facility by ISGS personnel, and from database resources similar to those consulted for PESA work. At IDOT's request, most potential on-site sources are evaluated based on the questionnaire completed by IDOT staff and are not verified by ISGS personnel. Potential off-site sources of regulated substances are not investigated for these reports.

High-Profile Projects

Occasionally, IDOT will submit a project to ISGS that not only underscores the planning value of the environmental screening process, but also helps promote the relationship between IDOT and ISGS because of the extremely high media attention that the transportation project generates. Following is an example of this type of project.

The "Hillside Strangler," a confluence of three interstate highways (I-290, I-88, and I-294), a US highway (US 12/20/45 – Mannheim Road) and an Illinois highway (IL 38 – Roosevelt Road) created traffic snarls that stretched over six suburban Chicago communities, including the village of Hillside. The system of interchanges gained a national reputation as one of the worst expressway situations in the country, ultimately resulting in a political promise from an incoming governor to alleviate the problem as his first act. ISGS made the project a top priority, fostered interagency cooperation, and was able to complete the PESA in less than half the time usually allotted to projects of this size. IDOT used information provided by ISGS's PESA process in the acquisition of 77 properties in this $140 million renovation of the highway interchanges, which was completed on schedule.

Project Archiving

Processing of PESA project data. The ultimate intentions of project archiving are to process, condense, and preserve the information from a PESA investigation as well as to make it readily accessible for future reference needs. Upon completion of a PESA project, the information is sorted into two category types: (1) information that can be readily re-created from regulatory databases or published maps, and (2) information that is unique to a project, such as field notes, photographs, or a transcript of an interview with a property owner. Because the major regulatory list databases are online and maintained by the regulatory agencies, and historical map libraries are maintained separately, this sort of information is discarded once a PESA is completed in order to streamline project files. The general philosophy behind the archiving is to have the information either easily accessible in digital form, or streamlined and filed as original documents.

Digitizing PESA project data. The conversion of PESA project information, such as photographs documenting site conditions and testing locations, as well as historical aerial photographs referenced in a PESA project report, into digital forms is an important way of preserving the information. This digital information is often made more accessible via numerous types of computer software, such as GIS applications, and is easier to store. Care and planning need to be applied in choosing the digital resolutions and file format options to ensure efficient storage as well as usable data resolutions. Non-proprietary formats, such as PDF, JPEG, or TIFF files (300 dpi or higher resolution), are preferred for graphics files. Conversion of the working graphics files from proprietary into standard file formats is best completed at the conclusion of the project, because software incompatibilities can arise over time as software is upgraded. Print-testing of the converted files is recommended to ensure accurate preservation. Back-ups of digital archives are a basic element of this preservation effort.

PESA report archiving. PESA reports have typically been completed as WordPerfect files. Conversion of these proprietary files into PDF format has now been completed, and all PESA reports are available on the Extranet to IDOT and its consultants. (See Recent and Future Developments section for a discussion of the Extranet.)

Education and Outreach

Students today need to gain practical experience that will help them develop skills that are desirable to potential employers. Nowhere is this more evident than in the field of environmental geology, where graduating students often find that environmental consulting firms or government agencies value practical experience more than the primarily theoretical studies that are common to university curricula. Some staff members in the ISGS-IDOT PESA program have branched out to teach the principles of ESA presented in this manual to students at institutions of higher learning across the state of Illinois. Following are two examples of such courses.

Landscape Architecture (LA) 550 at UIUC

This offshoot of the program commenced in 1999–2000, when a partnership was developed between ISGS scientist Phyllis Bannon-Nilles and Dr. David Kovacic, associate professor at UIUC. Bannon-Nilles and Kovacic together identified the need for a class in which students would learn practical ESA methods and techniques. They paired up to re-design a course that Kovacic was already teaching on environmental impact assessments and the National Environmental Protection Act process; the new class spent half a semester on ESA techniques. This course (LA 550; originally LA 450) was offered for the first time in 2000.

Certain key elements were identified as being essential to a course of this nature. The first element involved writing a test plan for a project area; this assignment required students to become familiar with the use of Sanborn maps, aerial photographs, and city directories as they researched the history of an area in their own community. Students visited the project area to search for clues to former land uses. They also learned how to use a variety of geologic maps to define the subsurface materials in their project area. This information allowed them to make some assumptions about the expected behavior of potential subsurface contaminants at the project site, thereby leading to more informed sampling decisions and results interpretation. Another key element of this course was choosing a class ESA project that was small enough in scale to complete in about a month. While working on this project, students became familiar with hazard recognition, soil gas analysis, sampling of soil and groundwater for contaminants of concern, and using risk-based clean-up objectives. The site assessment culminated in the preparation of a technical ESA report.

Two factors were critical to the LA 550 course: (1) the amount of teamwork and coordination involved in its teaching, and (2) its practical application to the outside world. For example, during one typical semester, a team of real-world specialists provided state-of-the-art information on ESA methods and techniques. Students benefited from the contributions of six ISGS scientists, one IDOT engineer, and staff at the UIUC Map and Geography Library.

Environmental Science: Sci 202/204 at DeVry University–Tinley Park, Biol 106 at Lewis University–Romeoville

In the fall of 2002, ISGS scientist Gregory Kientop began an adjunct teaching position at the DeVry University campus in Tinley Park, a southern suburb of Chicago. The course has offered the opportunity to share information on ESA methods and techniques with students who are pursuing degrees in IT, computer sciences, telecommunications, business, and management. The multidisciplinary class consists of 3 hours of lecture and a 2-hour laboratory class each week, and fulfills a general education requirement for DeVry University degree programs. An accelerated version, taught in a 4-hour class, has also been offered.

This environmental science course addresses many of the same planning needs that are reflected in the ESA process and techniques. Numerous examples of ESA methods are detailed, including historical aerial photograph interpretations, geologic materials descriptions, environmental planning tools, map reading, and Internet-based GIS research. Lecture topics on ecosystem management, environmental pollution, and regulatory and urban development issues are covered, with many examples that use the ESA process as a practical application of these concepts in environmental planning. Field trips, case studies, computer-based projects, and guest speakers are used to provide practical applications. Also, since 2008, a non-laboratory version of this class, as well as an occasional class in GIS, has been taught at Lewis University–Romeoville.

The Environmental Science programs at the DeVry University–Tinley Park and Lewis University–Romeoville campuses provide an opportunity to raise the critical environmental planning awareness of a diverse group of technically educated students using state-of-the-art equipment and methods. The use and advocacy of numerous sources of federal, state, and local program data and methods, including those of the Illinois Department of Natural Resources, ISGS, IDOT, IEPA, USGS, and USEPA, provide a valuable educational opportunity for the students as well as a useful way to disseminate governmental planning information and awareness to a potentially influential group of young technical professionals.

Recent and Future Developments

In this section, some of the current work in progress and plans for future development of the PESA program are outlined. Work is focusing primarily on improved data management, access, and display, both internally and externally. Current federal transportation mandates call for developments in environmental streamlining; the collaborative efforts between IDOT and ISGS to make data more rapidly and easily available are designed in part to address these mandates.

Database Management

As discussed above, many of the databases used for PESA work consist of hundreds or thousands of tabular records kept by many state, federal, and local agencies. Because these databases have been developed over a number of years by a number of different agencies, they exist in a variety of formats. The maintenance of and quality control on these databases is highly variable as well. It is important to PESA work to be sure that all records relevant to a given project are located and investigated, but this can be difficult when records have been entered over a period of years and are not necessarily in consistent formats. For example, St. Clair County may appear in different databases, or even within the same database, as "St. Clair," "St Clair," or "Saint Clair," and all such records must be located. The same problem applies to site names and address formats. ISGS has converted some databases into a common format (Microsoft Access or Excel), which allows for rapid querying and sorting, and simplifies issues of inconsistency in names and addresses.

GIS Applications

Most environmental records kept by state, local, and federal agencies are in address-based tabular format, as mentioned above, or, occasionally, as address-matched map information that has not been field-verified. Because site assessment work is focused on specific locations, it is far more useful to have information tied to geographic locations rather than presented in tabular format. When the locations of sites of potential concern are presented on a map, the project manager is able to locate sites relevant to the proposed road project far more quickly than having to scan through pages and pages of tabular addresses. In addition, many of the addresses in these databases are in hard-to-use formats, such as post office box numbers or rural routes. To address these issues, ISGS is in the process of converting some of the most commonly used tabular databases into locational formats.

In cooperation with USEPA and IEPA, projects are underway to map locations of SEMS, landfill, coal gasification, and LUST sites. A GIS is being used to map and manage the data. For all of these projects, site locations are determined from site maps present in regulatory files, from field investigations, or from records checks at county courthouses or other local sources. Locations of sites are then mapped as either polygons or points (depending on the database), using USGS digital topographic maps and digital orthophoto quadrangles as base maps. Attributes are assigned to allow on-screen querying.

Extranet

As databases get larger and more numerous, and as interest in on-screen, real-time querying of environmental information increases, there is also a greater need for efficient means of data sharing. Because IDOT districts typically do not have the time and resources to acquire GIS-based software and train staff in its use, interest has also arisen in web-based map information that allows data display and querying without the user needing specialized software or training.

To address these issues, IDOT proposed the development of an Extranet, a system that allows IDOT's Central Office, IDOT's regional districts, ISGS, and IDOT's consultants to upload data, download data, and share data. The Extranet is now online, and current ISGS efforts involve making more PESA data available via both GIS and PDF files. In addition, a GIS-based system is in place for use by ISGS, IDOT, and IDOT's consultants via the Extranet, and much of the PESA data is now searchable as map-based information. Modifications to the Extranet occur frequently, based on input from users, additional sources of information, and changes in program needs.

Summary

ESAs for highway projects differ considerably from the types of assessments or audits commonly completed for a single-parcel land purchaser. Often, IDOT must proceed with the acquisition of environmentally impacted property and may bear the major cost of remediation. Delays and added construction costs that result when impacted soil and water are encountered affect limited transportation budgets. Conducting preliminary environmental screening at an early stage in road improvement projects saves time and money, and allows IDOT to choose from a number of options regarding how to proceed. Identification of RECs assists in defining the level of hazard that may be encountered during construction activities and provides guidance for further investigation of RECs or for proceeding with the project.

This manual outlines a process for preparing PESAs for highway projects. A standard operating procedure has been developed to ensure consistent collection and presentation of the data. Employment of individuals specifically educated and trained to collect and evaluate historical and physical evidence used for environmental risk evaluation is critical to a successful program. The procedures to be followed for data gathering and interpretation must be clearly stated and uniformly applied so that all assessments have the same relative value and can be correlated from project to project. Knowledge of problematic environmental conditions prior to starting construction allows for proper planning and mitigation of conditions that might otherwise create significant impacts during construction.

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Disclaimer

Software, equipment, educational institutions, and vendor names are specified in this document for informational purposes only; their mention does not constitute an endorsement by ISGS, IDOT, the University of Illinois, or the state of Illinois. Website addresses listed in this document were accurate and active at the time the document was published; however, websites change frequently and web addresses may be different in the future or may cease to exist entirely. Not all of the sources listed below are referred to directly in the text. Many of the ISGS publications listed below are available for download or purchase at the ISGS website, www.isgs.illinois.edu. Where no publication dates are given, sources are dynamically updated.

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APPENDIX—PESA REPORT FORMAT

The Appendix gives the outline of the Preliminary Environmental Site Assessment (PESA) report format. Not all language used in the reports is present.

IDOT Sequence #: **ISGS:**
IDOT Job #: **IDOT District #:**

PRELIMINARY ENVIRONMENTAL SITE ASSESSMENT

FINAL REPORT

DATE:	Date report is submitted to IDOT
IDOT DESIGN DATE:	IDOT design date; provided by IDOT.
SURVEY TARGET DATE:	IDOT survey target date; provided by IDOT. Not all projects will have this date; delete this line if date does not exist.
DATE REQUEST RECEIVED:	Date request for PESA received by ISGS.
LOCATION:	The project is described briefly here and indicated with a star on the map below.

TABLE OF CONTENTS

Create and insert a table of contents on this page.

GLOSSARY OF ACRONYMS

AAI	-	All Appropriate Inquiries
ACM	-	asbestos-containing material
AST	-	aboveground storage tank
ASTM	-	American Society for Testing and Materials
AULs	-	activity and use limitations (includes institutional controls, engineered barriers, and HAAs)
bgs	-	below ground surface
BOL	-	Bureau of Land (IEPA)
BTEX	-	benzene, toluene, ethylbenzene, and total xylenes
CERCLIS	-	Comprehensive Environmental Response, Compensation, and Liability Information System
ERNS	-	Emergency Response Notification System
FEMA	-	Federal Emergency Management Agency
FIRM	-	Flood Insurance Rate map
FOIA	-	Freedom of Information Act
GIS	-	Geographic Information System
GRO	-	Groundwater Remediation Objective
HAA	-	Highway Authority Agreement
IDNR	-	Illinois Department of Natural Resources
IDOT	-	Illinois Department of Transportation
IEMA	-	Illinois Emergency Management Agency
IEPA	-	Illinois Environmental Protection Agency
IMD	-	Illinois Manufacturers Directory
ISGS	-	Illinois State Geological Survey
ISTC	-	Illinois Sustainable Technology Center (formerly Waste Management and Research Center)
ISWS	-	Illinois State Water Survey
LUST	-	leaking underground storage tank
µg/kg	-	micrograms per kilogram (ppb)
µg/l	-	micrograms per liter (ppb)
mg/kg	-	milligrams per kilogram (ppm)
mg/l	-	milligrams per liter (ppm)
M.M.	-	mile marker
M.P.	-	mile post
MSDS	-	material safety data sheet
MTBE	-	methyl tertiary butyl ether
NFR	-	No Further Remediation
NPL	-	National Priorities List
NRCS	-	Natural Resources Conservation Service
OSFM	-	Office of the State Fire Marshal
PAA	-	Permit Access Agreement
PAH/PNA	-	polynuclear aromatic hydrocarbons
PCB	-	polychlorinated biphenyls
PESA	-	Preliminary Environmental Site Assessment
P.G.	-	Professional Geologist
ppb	-	parts per billion (equivalent to µg/kg for solids, and µg/l in liquids)
ppm	-	parts per million (equivalent to mg/kg in solids, and mg/l in liquids)
PRP	-	Potentially Responsible Party
RCRA	-	Resource Conservation and Recovery Act
REC	-	recognized environmental condition
ROW	-	right-of-way
SEMS	-	Superfund Enterprise Management System
SIC	-	Standard Industrial Classification
SRO	-	Soil Remediation Objective
SRP	-	Site Remediation Program
TACO	-	Tiered Approach to Cleanup Objectives (IEPA)
TCLP	-	Toxicity Characteristic Leaching Procedure
TPH	-	total petroleum hydrocarbons
TRI	-	Toxics Release Inventory
TVOC	-	Total volatile organic compounds
USDA	-	United States Department of Agriculture
USEPA	-	United States Environmental Protection Agency
USGS	-	United States Geological Survey
UST	-	underground storage tank
VOC	-	volatile organic compounds

EXECUTIVE SUMMARY

This report presents the results of an environmental site assessment for brief project description, city, county. This report was prepared on behalf of the Illinois Department of Transportation (IDOT) by the Illinois State Geological Survey (ISGS).

The following sites were examined for this project. The tables below list sites along the project for which recognized environmental conditions (RECs)* were identified for each address or address range (Table 1); sites along the project for which only de minimis conditions were identified (Table 2); sites along the project for which no RECs or de minimis conditions were identified (Table 3); and sites adjoining but not on the project that were identified on environmental databases (Table 4). Further investigation of sites with RECs may be desired.

Table 1. The following sites along the project were determined to contain RECs:

Property name IDOT parcel #	ISGS site #	REC(s), including de minimis conditions	Regulatory database(s)	Land use
Sites with RECs are entered in this table				

Table 2. The following sites along the project were determined to contain de minimis conditions only:

Property name IDOT parcel #	ISGS site #	De minimis condition(s)	Land use
Sites with de minimis conditions only are entered in this table			

Table 3. The following sites along the project were determined not to contain RECs or de minimis conditions:

Property name IDOT parcel #	ISGS site #	Land use
Sites with neither RECs nor de minimis conditions are entered in this table		

Table 4. The following additional sites, adjoining but not on the project, were identified on environmental databases:

Property name	ISGS site #	Regulatory database(s)	Land use
Any adjoining sites that appear on regulatory databases are entered in this table			

* For all sites:

Where REC(s) are indicated as present, a condition was noted that may be indicative of releases or potential releases of hazardous substances on, at, in, or to the site, as discussed in the text. Potential hazards were not verified by ISGS testing. Radon, biological hazards (such as mold, medical waste, or septic waste), and non-agricultural pesticides and/or herbicides may also be of concern. No further investigation concerning the presence or use of these factors was conducted for this PESA.

Where RECs are not indicated as present, radon, biological hazards (such as mold, medical waste, or septic waste), and non-agricultural pesticides and/or herbicides may still be of concern. No further investigation concerning the presence or use of these factors was conducted for this PESA.

For the purposes of this report, the following are considered to be de minimis conditions:

- Normal use of lead-based paint on exteriors and interiors of buildings and structures.
- Use of asbestos-containing materials in building construction.
- Transformers in normal use, unless the transformers were observed to be leaking, appear on an environmental regulatory list, or were otherwise determined to pose a hazard not related to normal use.
- Agricultural use of pesticides and herbicides. In addition, most land in Illinois was under agricultural use prior to its conversion to residential, industrial, or commercial development. Pesticides, both regulated and otherwise, may have been used throughout the project area at any time. Unless specifically discussed elsewhere in this report, no information regarding past pesticide use that would be subject to enforcement action was located for this project, and such use is considered a de minimis condition.

Radon and biological hazards are not considered in this PESA unless specifically noted.

NA = no parcel number was supplied by IDOT for this site.

Although potential natural hazards and undermining, if present, are described in this report, they are not considered as RECs or de minimis conditions for the purposes of this report, and are therefore not listed in the tables above.

INTRODUCTION

This is the **Final Report** of a preliminary environmental assessment by the ISGS of natural and man-made hazards that may be encountered for the proposed project. This report identifies and evaluates recognized environmental conditions (RECs) that may be indicative of releases or potential releases of hazardous substances on, at, in, or to the proposed project.

This assessment has been prepared using historical and geological information, including aerial photographs, U.S. Geological Survey topographic maps, plat maps, file information of the ISGS regulatory file information from federal, state, and other agencies, and various other sources of information. An on-site investigation has been completed. The specific methods used to conduct the assessment are contained in "A Manual for Conducting Preliminary Environmental Site Assessments for Illinois Department of Transportation Highway Projects" (Erdmann et al. 1996, and revisions in preparation). If new information is received concerning this project that is considered to have a significant impact on the findings of this report, the report will be revised and resubmitted to IDOT Bureau of Design and Environment.

This Preliminary Environmental Site Assessment (PESA) was performed in compliance with the IDOT-ISGS PESA Manual (Erdmann et al., 1996, and revisions in preparation) and not with the All Appropriate Inquiries environmental assessment standard (40 CFR Part 312) that took effect on November 1, 2006.

GEOLOGY

Bedrock geology.

Surficial geology.

Soils.

Non-coal mineral resources.

Coal mining.

HYDROGEOLOGY

Drainage direction.

Wellhead protection areas.

Surficial public water supplies.

Groundwater recharge.

Groundwater protection areas.

Potential for contamination of shallow aquifers.

Well information.

NATURAL FEATURES AND HAZARDS

Wetlands.

Floodplains.

Seismic risk.

Landslides.

Karst region.

PROJECT SITES

ADJOINING SITES

Federal records

SEMS: NPL, active, and archived

RCRA sites subject to corrective action (CORRACTS)

RCRA sites—non-CORRACTS TSD

RCRA sites—other

Brownfields pilot sites

Non-LUST releases

State records

Leaking underground storage tanks (LUST)

Registered underground storage tanks (UST)

Landfills, disposal sites, and solid waste management facilities

Activity and Use Limitations (including institutional controls, engineered barriers, and Highway Authority Agreements)

Brownfields

IEPA Bureau of Land Inventory

IEPA Site Remediation Program

Non-LUST releases

Municipal records

Tribal records

There are no tribally owned lands in the state of Illinois; therefore, the checking of tribal records is not applicable for this report.

ORPHAN SITES

Insert any information on orphan sites here.

CONCLUSIONS

(X) List sites with RECs and include the RECs.

(X) List sites with de minimis conditions and include the de minimis conditions.

(X) List sites that had neither RECs nor de minimis conditions.

(X) List adjoining sites and the regulatory lists they appear on.

(X) Describe any potential natural hazards.

(X) For the purposes of this report, the following are considered to be de minimis conditions:

- Normal use of lead-based paint on exteriors and interiors of buildings and structures.
- Use of asbestos-containing materials in building construction.
- Transformers in normal use, unless the transformers were observed to be leaking, appear on an environmental regulatory list, or were otherwise determined to pose a hazard not related to normal use.
- Agricultural use of pesticides and herbicides. In addition, most land in Illinois was under agricultural use prior to its conversion to residential, industrial, or commercial development. Pesticides, both regulated and otherwise, may have been used throughout the project area at any time. Unless specifically discussed elsewhere in this report, no information regarding past pesticide use that would be subject to enforcement action was located for this project, and such use is considered a de minimis condition.

ENDORSEMENTS

Project Manager: _____ **Date:** _____
Name

Approved: _____ **Date:** _____
Name

ADDRESS LISTINGS

The following addresses along the project were evaluated for this project. Addresses of sites, if any, adjoining but not along the project are not listed here; see text for discussion of these sites.

Property name and address	ISGS site #	Parcel #
All sites in the Project Sites section are entered here		

INFORMATION SOURCES

APPENDIX

LIST OF ATTACHMENTS