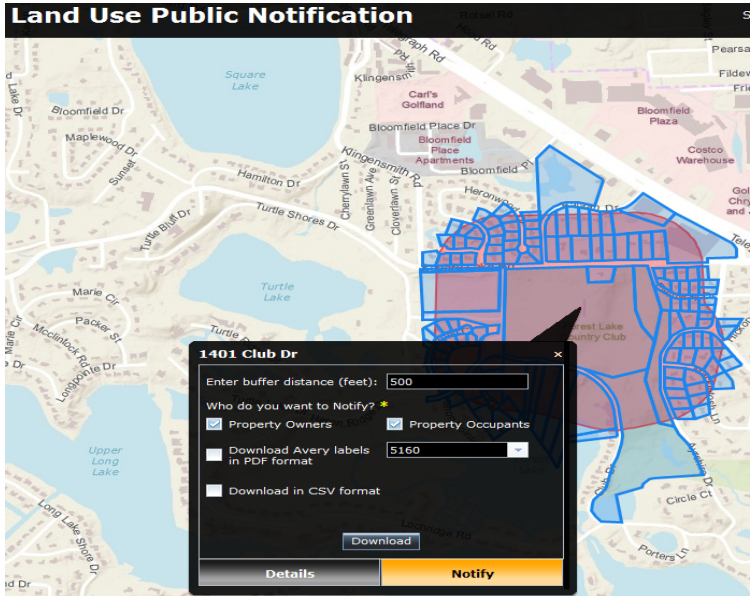
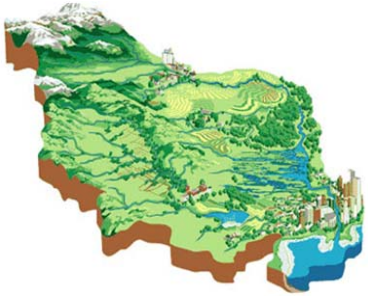
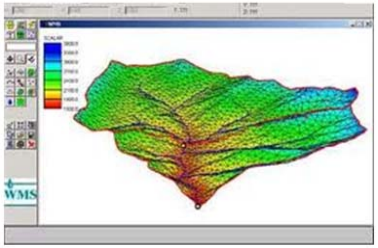
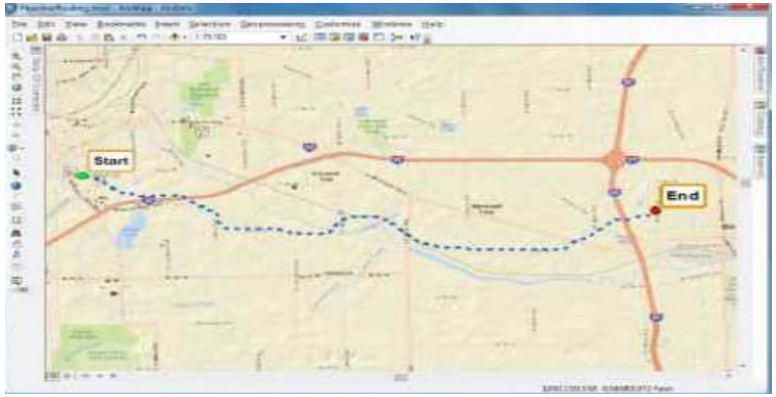
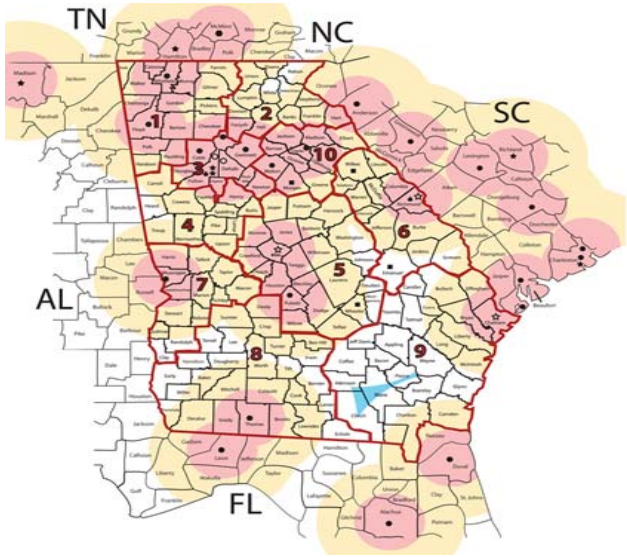
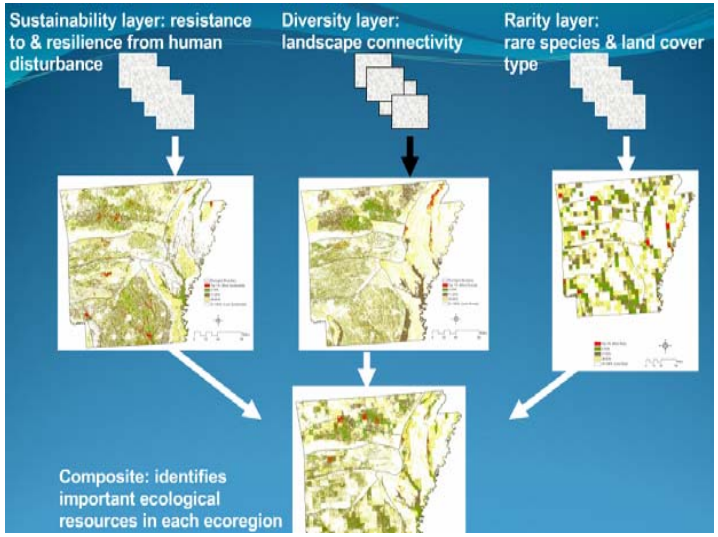
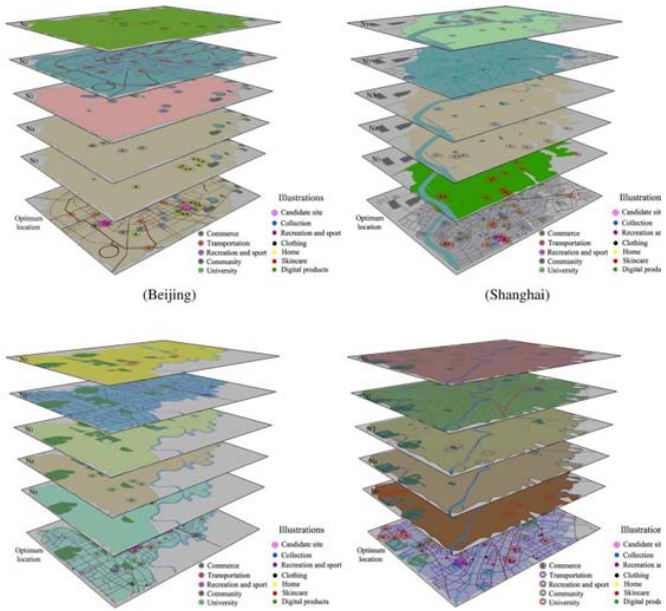
Applying GIS in the NEPA process

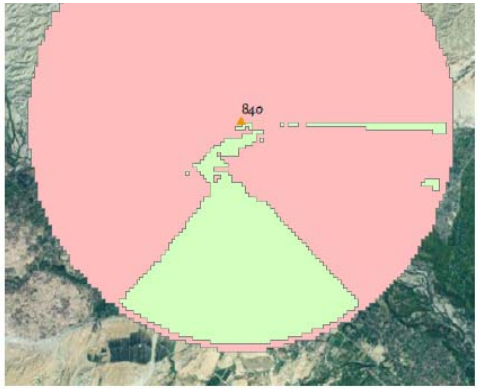
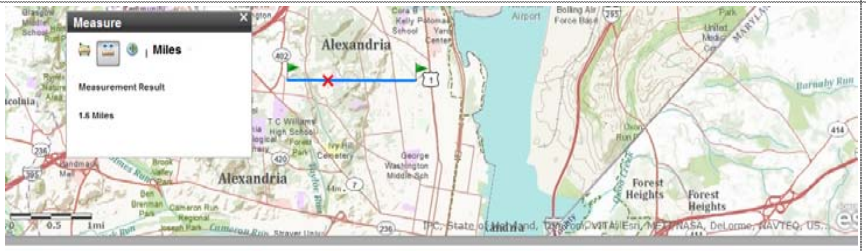
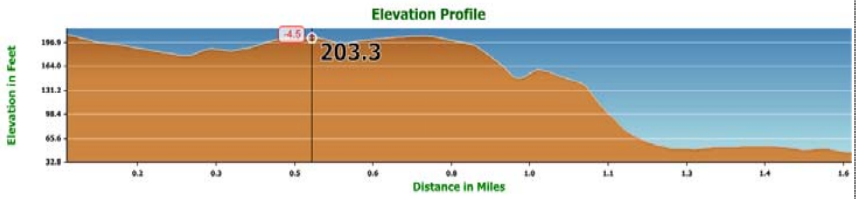
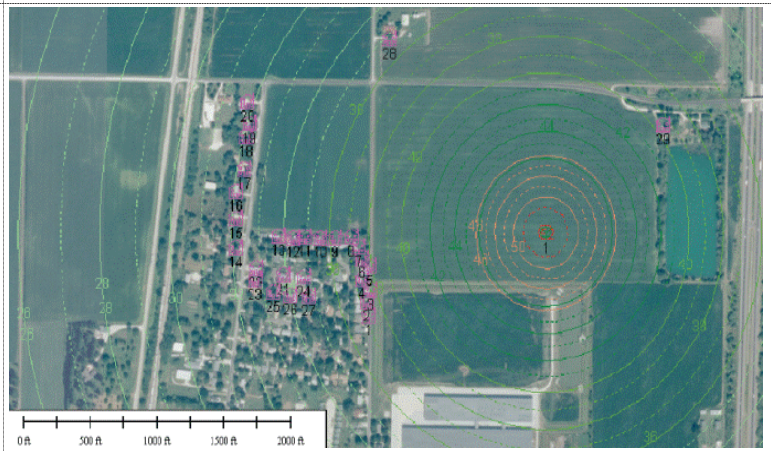
GIS Functionality	Currently Available?	Description	Examples	Notes and Resources
Map of State/Local Permitting and Review Programs.	**NO** No centralized map contains links for all of the Agencies (Federal/State/Tribal) responsible for administering various permits/reviews	**This tool:** Would allow a user to click on any state and it could return (*but not limited to): • 401 Water Quality Program, • 404 Permitting Program, • NPDES Programs, • RCRA Program, • CAA (Conformity Plans, Non-Attainment Areas, etc.), Threatened/Endangered/Candidate Species Programs, • Floodplain Authority, • Etc. The results could include links to: • Application Forms • Current Plans or Guidance • Agency/Program Contacts • Websites for more information.		This would be a centralized location where agencies/public/proponents to get the most up to date information on where, who, and how to navigate the permitting and/or review process. Close Example: State and Territorial Environment Agencies http://www.epa.gov/epahome/state.htm#IN
Map of Federal Regional Offices: Permitting and Review Coverage	**NO** No centralized map contains the regional/jurisdictional coverage of a Federal agencies offices responsible for administering various permits/reviews	**This tool:** Would allow a user define an area anywhere in the US and it could return the Federal Agencies, specifically which office has Jurisdiction in that area. This allows users to quickly determine what regional agency office has jurisdiction over a project. This also can assist in interagency coordination		I.e. Putting these examples into one map: USFWS: http://www.fws.gov/where/ USACE: http://www.usace.army.mil/Locations.aspx EPA: http://www.epa.gov/tp/wherey oulive/regions.htm NOAA: http://www.legislative.noaa.gov/NIYS/ ACHP: http://www.achp.gov/programs.html NPS: http://www.nps.gov/gis/documents/nps_regions_11x8-5-new.pdf BLM: http://www.unr.edu/geothermal/BLMlease.htm
Street View	**YES** This functionality is available for free through: Google Maps, Google Earth, and through a free extension of Google's Street Maps for ArcGIS Desktop Explorer.	**This is a functionality:** That allows a user any where in the world to pick a location, and view a 360 degree panoramic view of the area as if they were standing there themselves. This functionality could assist in aesthesis analysis and consultation under Section 106 of the NHPA.		Note that this may not be available for every proposed action area: Particularly for those located in rural areas or a fair distance away from major roads.

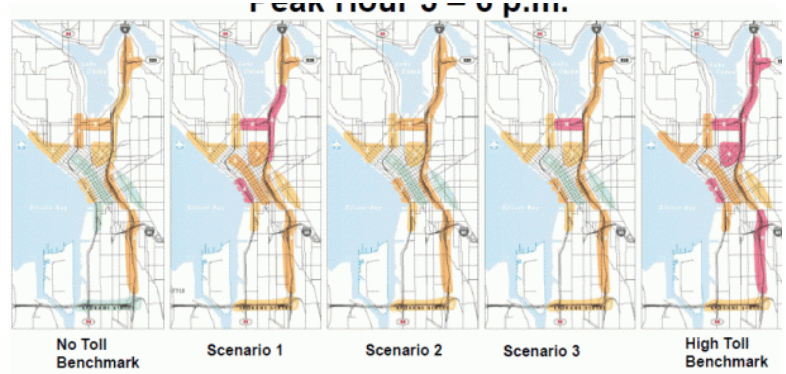
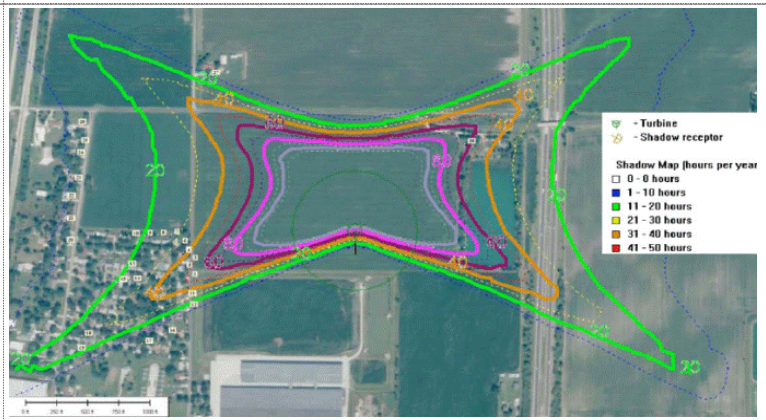
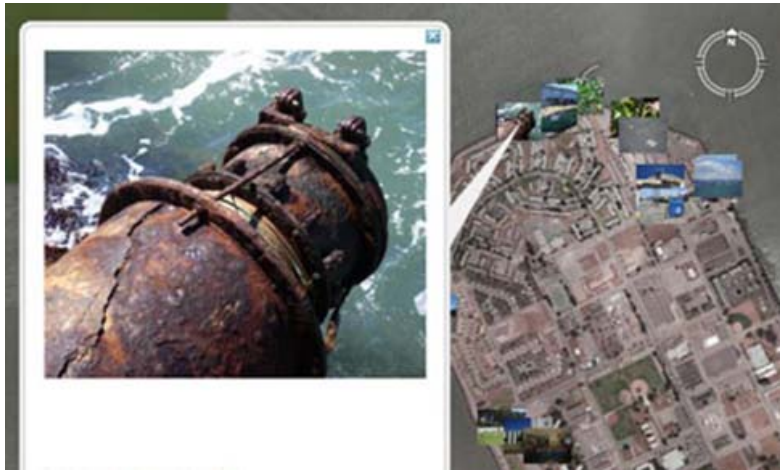
		As you can view and document the Point-Of-View from particular location or building. This can also assist with consideration of aesthetic impacts when building a new structure.		
3D Visualization	**YES** This functionality is available for free through Google Sketch-up: http://sketchup.google.com/	**This is a functionality:** That allows a user to place 3D models of structures to produce interactive maps and video presentations for public engagement and outreach. This helps to situate the project through modeling and shows the audience visuals of what the end project will look like.		You can create your own 3D structure or choose from the free library of models (http://sketchup.google.com/3dwarehouse/). You can than place your structure on Google Earth and record a shareable video or the map itself. All for free. **Example Video using Google Sketch-up:** https://www.youtube.com/watch?feature=player_embedded&v=QKR574LatQQ

Mailing Distribution Lists	**YES** Garmin, TomTom, and Yahoo all allow free use of their North American Address Directories. Most GIS applications can access and use this information.	**This is a functionality:** That allows a user to draw a polygon or select an area and input a buffer zone. The tool returns all of the mailing addresses for the residents/businesses in the area. With this function, users can quickly determine where to send public notices regarding a proposed action in their area.		
Water Quality Modeling	**YES** EPA BASIN: Developed and used by EPA for watershed management the software has since been publically released as free/open-source software for advanced watershed and hydraulic mapping http://water.epa.gov/scitech/datait/models/basins/index.cfm GRASS: Developed and used by USACE and EPA for navigable water delineation the software has since been publically released as free/open-source software for General mapping. http://www.osgeo.org/grass	**This is a functionality:** That allows a user to map a predefined area (action area). The user can model erosion potential and other parameters/variables for the proposed action. The tool can than model the locations and degree of potential impact. This can be beneficial in demonstrating the potential impact to water resources in the action area. A tool like this can be used to determine the sediment loading potential, buffer areas, identify appropriate mitigation measures and areas, identify and avoid impacts to impaired waters and other water resources.	 	
Routing Optimization	**YES** Though most systems and tools created for this purpose are priority and expensive. However you can access and use Geoprocessing tools in ArcGIS Explorer by customizing the template example provided to perform the same task for free. However your agency would need a GIS server to perform the processing.	**This is a functionality:** Allows users to define two points (start/end) on a map and assign "values or weights" to various layers (i.e. users define the spectrum of avoidance). The application than returns the lowest value/impact route and other alternative routes. (Users would be able to identify and characterize wetlands, floodplains, local zoning, local infrastructure (roads/pipes/lines), sensitive areas, prohibitive areas, public areas, etc.)		Pipeline Routing Example: http://www.arcgis.com/home/item.html?id=9bdbafe0b52b44c5add6f82ef08cc13f

Inventory of Past Environmental Documents	**NO** No centralized map (to our knowledge) contains an inventory of Past NEPA and/or other Environmental/Health/or Social Analyzes.	**This tool:** Geographic index to past NEPA documents and environmental reports/studies by federal and state agencies. When starting an environmental review related to an unfamiliar area, environmental data relevant to the area is helpful, but having another NEPA document that discusses the baseline conditions/affected environment is priceless, thus providing a greater degree of context and situational awareness. This type of map and information has tremendous potential to save time and resources and could serve as a starting point or template for the discussion on the existing environment.		**<u>Potential Documents could include *but not limited to:</u>** • Biological Opinions/Assessments • Habitat Conservation Plans • State Water Quality Plans • State Air Quality Plans • Watershed Plans • Phase 1/2 Environmental Site Assessments • NEPA EAs and EISs • Health Assessments. • Etc.
Public Comment through Maps (crowdsourcing)	**YES** However your agency would need to have a GIS Server to make the map editable through the web. There are many free tools and templates available. But setting this up would take a dedicated GIS and/or Software Programmer to write the code for the application.	**This is a functionality:** That allows users to input alternative routes or locations and allows the public to place comments on the map. GIS is not just for review and mapmaking, but is now becoming a means for public engagement and comment through crowdsourcing. Imagine using a map to not only convey information on a proposed action to the public, but to communicate with them and solicit input. Using Maps for public comment and scoping periods can greatly enhance an agency's ability to identify and assess the areas and resources your interested parties and concerns citizens have identified by receiving geo-tagged comments.	**Hypothetical Case Study:** Your NEPA analysis evaluates 3 potential alternative routes for a new road/rail/waterway/etc. You create a map with your proposed alternatives on a map and publish the map online. The public, stakeholders, and resources agencies equipped with their own local knowledge and special expertise can collectively identify sensitive areas/communities, noise concerns, historical or cultural concerns, competing land uses, existing infrastructure and utilities, past analysis/data/information or any other number of potential concerns/areas, they could also upload geotaged attachments. You as the Project Lead can than watch these comments roll in over the course of the public scoping/comment period, allowing you to assess and address concerns and issues efficiently and effectively. Furthermore, now you know where to focus your review and inform potential mitigation and monitoring requirements.	**Citizen Request Example:** http://localgovtemplates.esri.com/ServiceRequest/SubmitRequest.html **Community Planning Example:** http://localgovtemplates2.esri.com/publicinfocenter/default.htm

Mitigation Optimization	**YES** EPA Region 6 working with FHWA Eco-logical has developed the REAT model. Furthermore FHWA Ecological has issued a solicitation for GIS applications that do just this.	**This is a functionality:** That allows users to utilize GIS data to identify and rank those areas with the greatest need for and cost-benefit ratio to compensatory/offsite/in-lieu mitigation. Changing the dynamic of mitigation from a project-by-project onsite approach to a planning and mitigation program based on socioeconomic, land use, biological, and ecological factors. To yield a comprehensive and "Targeted Mitigation" plan.		**GIS APPLICATIONS IN ECO-LOGICAL GRANT PROJECTS** http://gis.fhwa.dot.gov/documents/PeerEx_report_72209.asp **Recorded Webinar - EPA Ecological - Regional Environmental Assessment Protocol:** (Recording) **Transportation Innovations: Linking Transportation and Natural Resource Planning through Environmental GIS Tools** (Recording) **Eco-logical GIS Geoprocessing Model:** http://www.arcgis.com/home/item.html?id=912c49bb51bf482faf94acb832ba7d83
Siting Optimization	**YES** Though most systems and tools created for this purpose are priority and expensive. However you can access and use Geoprocessing tools in ArcGIS Explorer by customizing the template example provided to perform the same task for free. However your agency would need a GIS server to perform the processing.	**This is a functionality:** That allows users to define a general location (property boundary) on a map and assign "values or weights" to various layers (i.e. spectrum of avoidance). Inputs could include wetlands, floodplains, local zoning, local infrastructure like buildings/roads/pipes/lines, sensitive areas, prohibitive areas, etc. The tool then returns the lowest value/impact sites. This may also include engineering parameters (roads for access/entry to site, transmission tie-ins, engineering thresholds (ex. Slope greater than 10%) , etc.)		**Siting Optimization Template:** http://www.arcgis.com/home/item.html?id=9a16da4754bb4830b35cc72167812b44
Aesthetics & Viewshed Modeling	**YES** Many of these Geoprocessing tools and templates are freely available.	**This is a functionality:** That allows users to enter the dimensions of an object (H,W,L) to determine how far and from where that object is visible. The GIS application can factor in the height of the tree-lines, thickness of the canopy, topography, existing buildings, etc. The tool will return the area from where the object is visible. This could potentially be used to show the impact	The tool will run and add a feature to the map representing visible areas from the input point. The polygons are colored green and red to correspond to the areas that are visible (green) and not visible (red) from the observer location. 	

		of adding a building or other feature and how that project might affect the viewshed. This functionality can be used to determine the "Area of Potential Effect" for consultations under Section 106 as well as the Aesthesis or Visual Resources section of a NEPA Document, and Public Engagement		
Elevation Profile	**YES**	**This is a functionality:** That allows users to select and measure a distance the results of which are displayed as an elevation profile. An elevation profile can be used to help determine engineering constraints for slope/gradient, erosion/sedimentation potential, and flooding potential.	 	ArcGIS Terrain Example: http://www.arcgis.com/apps/OnePane/basicviewer/profile.html
Noise Attenuation	**YES**	**This is a functionality:** That allows users to enter the dimensions of an object (H,W,L) and its noise generation (dB) and returns a map of the noise attenuation over a variety of distances. Would produce (dB, L90-40 averages) map. Ideal application would allow a user to factor in ambient noise monitoring and existing noise sources in the affected area.		
Traffic &	**YES**	**This is a functionality:**	Peak Hour 5 – 6 p.m	

Congestion Modeling		That allows users to model the impacts of induced growth and impacts to local transportation networks. This tool is useful in modeling alternatives and can generate images useful for public engagement and outreach.		
Shadow Casting Model	**YES**	**This is a functionality:** That allows users to model the frequency, amount, and timing associated with tall structures. For visual modeling and shadow flicker analysis for wind turbines and other moving structures. This can be used to demonstrate the effects of a project and also model alternatives.		
1. Site Visits and Surveys 2. Asset Management & Environmental Management Systems 3. Mitigation & Monitoring Verification	**YES** Most all GIS Application allow users to geotag photos to their maps. Additionally many smart phones have apps that can be used for recognizes work.	**This is a functionality:** That allows users to document the geo-location of their photos, reports, and findings to assist in verification and monitoring requirements required under these activities.