National Levee Database

Presentation to the NCLS

January 12, 2010

Bryan Baker P.E.
Objectives

- Background/Mission/Authorities
- Status of NLD Efforts
- Path Forward
- Questions
Authorities

- 2006 Supplemental Appropriations to the USACE for Levee Inventory
The development of an SDSFIE-compliant geospatial National Levee Database including all necessary attributes of levees/floodwalls relevant to design, construction, operations, maintenance, repair, inspections, and potential for failure. This database model shall consist of mandatory attributes that must be populated as well as optional attributes that are specific to the management practices of specific communities of practice. The database structure shall be the same at every District to assure commonality of levee data with other agencies (Federal, state and local). The databases shall be maintained at District level and be accessible as a regional/national database by Division and HQUSACE users. In this Pilot effort, the reporting requirements of the Flood Control and Coastal Emergencies (FCCE) program, as described in EP-500-1-1, will be the used as the test metric for success.
SDSFIE Levee Data Model Features

- floodwall_line
- flood_fight_point
- closure_structure_line
- levee_failure_point
- rehabilitation_line
- levee_crossing_point
- levee_centerline
- protected_area
- pump_station_point
- toe_drain_line
- sand_boil_point
- borehole_point
- cross_section_line
- piezometer_point
- levee_station_point
- gravity_drain_line
- encroachment_point
- levee_relief_well_point
Entities Associated with Levee Inspections

SEGMENT_INSPECTION
- PK: Segment_Insp_ID
- FK3: FC_Segment_ID, Project_Code, Inspection_Date, Inspection_Result, Inspection_Rating, Comments

rehabilitation_line
- PK: Rehab_ID
- FK1: FC_Segment_ID, Levee_Station_Code, Rehab_Date, Rehab_Cost, Rehab_Desc, From_Measure, To_Measure, Horiz_Accuracy, Vert_Accuracy, Coordinate_Method, Comments

SYSTEM_INSPECTION
- PK: System_Insp_ID
- FK1: FC_System_ID, Date_Approved, Inspection_Date, Inspection_Result, Inspection_Rating, Comments
Status

- FY06 – Questionnaire survey of all levees in the Corps program.
- FY07 - developed levee database model with FEMA and initiated five pilot districts (3256 miles of levees).
Authors

2007

“SEC. 9004. INVENTORY AND INSPECTION OF LEVEES.

(a) LEVEE DATABASE.— (1) IN GENERAL.—Not later than one year after the date of enactment of this Act, the Secretary shall establish and maintain a database with an inventory of the Nation’s levees. (2) CONTENTS.—The database shall include—

• (A) location information of all Federal levees in the Nation (including global information system information) and, for non-Federal levees, such information on levee location as is provided to the Secretary by State and local governmental agencies;
• (B) utilizing such information as is available, the general condition of each levee; and
• (C) an estimate of the number of structures and population at risk and protected by each levee that would be adversely impacted if the levee fails or water levels exceed the height of the levee.
Authorities (continued)

- (b) INVENTORY AND INSPECTION OF LEVEES.—
  - (1) FEDERAL LEVEES.—The Secretary, at Federal expense, shall establish an inventory and conduct an inspection of all federally owned and operated levees.
  - (2) FEDERALLY CONSTRUCTED, NONFEDERALLY OPERATED AND MAINTAINED LEVEES.—The Secretary shall establish an inventory and conduct an inspection of all federally constructed, non-federally operated and maintained levees, at the original cost share for the project.
  - (3) PARTICIPATING LEVEES.—For non-Federal levees the owners of which are participating in the emergency response to natural disasters program established under section 5 of the Act entitled “An Act authorizing the construction of certain public works on rivers and harbors for flood control, and for other purposes”, approved August 18, 1941 (33 U.S.C. 701n), the Secretary shall establish an inventory and conduct an inspection of each such levee if the owner of the levee requests such inspection. The Federal share of the cost of an inspection under this paragraph shall be 65 percent.
Objectives

- Background/Mission/Authorities
- Status of NLD Effort
- Path Forward
- Questions
Status

- FY06 – Questionnaire survey of all Federal levees in the Corps program.
- FY07 - developed levee database model with FEMA and initiated five pilot districts (3256 miles of levees).
- NLD collection was initiated in 10 additional districts.
- FY08 - Levee Inspection System was fielded to ensure uniform routine inspection of the Corps program levees.
- FY09 – NLD collection was initiated in 6 additional districts. Remaining districts to be completed by end of FY10.
- The National Levee Database is available to the USACE and other approved individuals through a web accessible application.
Details are in the Numbers
USACE Program Levees

- 2006 Questionnaire miles = 13582.18
- Known miles today = 14095.88
- Delta = 513.70
- Miles Completed (1-8-2010) = 9408.25 = 67%
- Miles under contract = 3059.54 = 22%
- Miles waiting contract award = 1628.09 = 12%
On-going NLD Collection
Levee Inspection System

A Set of Automated Tools that Assist Inspectors and Managers by Providing Greater Efficiency and Standardization to the Processes of:

- Inspection
- Data Collection
- Reporting
Application Components

• Levee Inspection Tools
  • Collecting Field Inspection Data and Updating Databases

• Photo Management Tool
  • Organizing and Assigning Digital Photos to Field Observations

• Data Management Tool
  • Managing Data Within the Organization

• Reporting – Advanced and Basic
  • Provides Organizational Standardization to Reporting Requirements
Levee Inspection Process:
Working with the System

Prepare and Configure
- Inspection Database
- Reference Data

Conduct Field Inspections

Post-Process
- Database
- Photos
- Geographic Files

Generate Reports and Submit to Levee Authorities

National Levee Database
Upward Reporting
Flood-Fight Efforts
System-Wide Queries
Historic Record
Cartographic Production
Levee Inspection Data Collection

- Levee Inspector Selects Create Inspection Point for Items Best Represented by a Point
- Record is Submitted to Database
LIS - Report Generator

- Report Options and Information are Stored in the Database and Allow for Generating Reports in Adobe PDF Format
- The Current Report Option will Generate a Report Based on the Categories and Rated Items Listed Under the Current Report Listing
Welcome to the US Army Corps of Engineers National Levee Database Web Reporting Tool

The Corps of Engineers became involved in flood damage reduction through the 1917 Flood Control Act, which authorized the Corps to have a significant role in flood activities nationwide. The Corps has long been active and concerned with the protection of life and property behind levees. The devastation caused by Hurricanes Katrina and Rita brought the issue of levee safety to the forefront of public debate, and the findings of subsequent investigations into the performance of the flood damage reduction system clearly point to the need for a periodic, comprehensive, and risk-informed approach to levee safety.

In response to recent Congressional action, the U.S. Army Corps of Engineers (USACE) has received the mandate and resources to design and assemble a National Levee Database (NLD). There is no existing national database or single source of information that provides information on national flood damage control structures for use in assessing or managing their condition, location, level of protection, or maintenance activities. While databases exist in some USACE Districts, there is no standard database structure across USACE, hampering national-level analyses. FEMA's recent flood map modernization efforts (MapMod) have also highlighted the lack of a national database and identified the need for a national inventory of levees.

The overall objective of this effort is to develop a geospatial National Levee Database structure including all necessary attributes of levees and floodwalls relevant to design, construction, operations, maintenance, repair, inspections, and potential for failure. This database model will consist of mandatory fields that must be populated, as well as optional fields that are specific to the management practices of specific communities of practice, users, and operators. The database structure will be the same at every District to assure commonality of levee data with other agencies (Federal, state and local).
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**List of Reports**

<table>
<thead>
<tr>
<th>Name</th>
<th>Report Link</th>
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</thead>
<tbody>
<tr>
<td>District Segment Detail Report</td>
<td>Run Report</td>
</tr>
<tr>
<td>District System Detail Report</td>
<td>Run Report</td>
</tr>
<tr>
<td>District Project Detail Report</td>
<td>Run Report</td>
</tr>
<tr>
<td>Previous and Current Inspection Report</td>
<td>Run Report</td>
</tr>
<tr>
<td>System Feature Report</td>
<td>Run Report</td>
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<tr>
<td>Segment Feature Report</td>
<td>Run Report</td>
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<tr>
<td>National Inspection Report</td>
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<tr>
<td>Condition Assessment Report</td>
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<td>DHS Levee Prioritization Report</td>
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<td>Recovery Act Report</td>
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<td>Validation Report</td>
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1 - 11
## Example Reports

**Web Reporting Tool**

<table>
<thead>
<tr>
<th>County</th>
<th>System Name</th>
<th>Segments</th>
<th>Miles</th>
<th>Levee Centerlines</th>
<th>Gravity Drain Lines</th>
<th>Pump Stations</th>
<th>Levee Relief Wells</th>
<th>Piezometer Point</th>
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<tbody>
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<td>Sacramento County</td>
<td>RD 1601 - Twitchell Island</td>
<td>1</td>
<td>2.5884</td>
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**Done**
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<tr>
<th>Sponsors</th>
<th>Project Types</th>
<th>Miles Of Levees</th>
<th>Segments</th>
<th>Design Frequencies</th>
<th>Population At Risk</th>
<th>Total Structure Value</th>
<th>Protected Area Acres</th>
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## Example Reports

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<th>Segment Name</th>
<th>Const. End Date</th>
<th>Non-Fed. Date</th>
<th>Org Name</th>
<th>Miles</th>
<th>Protected Area Acreage</th>
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<th>Previous Inspection Result</th>
<th>Previous Inspection File</th>
<th>Current Inspection File</th>
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<td>Ottawa KS</td>
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<td>North Kansas City Levee Unit</td>
<td>North Kansas City Airport Unit</td>
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<td>North Kansas City Levee Unit</td>
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<td>Seward, NE</td>
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Other National Dataset Integration
Integration with other National Datasets
Integration with other National Datasets
NLD and LST Demo
Other NLD Federal Activities

- FEMA MLI
  - Uses the NLD data model to track PAL status
  - MLI to be completed in November 2010

- NLD part of SDSFIE
  - First entered in version 2.5 (about 18 months ago)
  - Latest release 3.0 expected this winter/spring
  - NLD available at [www.sdsfie.org](http://www.sdsfie.org) but…

- NLD has been evaluated against the “Data Lifecycle Stages” as per OMB Circular A-16 Supplemental Guidance in July 2009.
Objectives

- Background/Mission/Authorities
- Status of NLD Effort
- Path Forward
- Questions
Future

- Staged Federal/State/Stakeholder/Public Release of NLD
- Completion of USACE Program Levees
- Final Integration of FEMA Mid-Term Levee Inventory
- American Recovery and Reinvestment Act
  - Questionnaire for other Federal Agencies & States
  - Periodic Inspection of USACE Program Levees
Objectives of NLD

Path Forward Activities

- Coordinate/Collaborate with Federal and Non-federal Levee Owners on Path Forward
- Transfer Technology of NLD
  - GIS Model and Database
  - Guidance and Operating Manuals
  - Training
  - Technical Assistance in Populating Data
- Transfer of Non-Corps Data to the NLD
- Provide Access to and Awareness of NLD to the Nation
- NLD Management...
NLD Management

- Plans
  - Implementation Plan
  - Management Plan
  - WRT User Guide
  - LST User Guide
  - Security Plan

- Tools
USACE Management Tools

- The USACE Levee Inventory Tools include the following four functional areas:
  - Levee Centerline Profile Plot Tool – plots profiles of levee centerline
  - Levee Cross Section Profile Plot Tool – plots profiles of levee cross sections from land side to water side
  - Load Data Tool – imports levee and floodwall features from external data sources.
  - QA/QC Tool – reviews NLD data for compliance with data model
Levee Centerline Profile Plot Tool Interface
Levee Cross Section Profile Plot Tool Interface
Phases of NLD Work

- **Phase I**: Administrative Survey of Levees (location, size, name, owner, LOP, certification, etc…)
  - Web Based
- **Phase II**: Physical Data Collection (GIS information, land surveys, )
- **Phase III**: Data input and Validation
  - Initial Data
  - Continuing Data
- **Phase IV**: Data Access and Use
- **On-Going Activities**: data input, management, system maintenance, and technical assistance to owners
“That’s all Folks!”