

DRAFT

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Map Modernization Plan for
The State of
Wisconsin

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Wisconsin Flood Map Modernization Plan

Introduction

The nation's floodplain maps are outdated and poorly defined. FEMA has established a broad goal of modernizing flood hazard maps nationwide and has developed a Flood Map Modernization Plan that has been funded by Congress. In this plan, FEMA has acknowledged collaborative partnerships with state, regional and local organizations will be necessary. States with interest and capability to assist with FEMA's multi-hazard flood map modernization effort have been asked to prepare a Business Plan detailing how the state and local mapping activities will contribute to FEMA's multi-hazard flood map modernization goals and objectives.

This Flood Map Modernization Business Plan for the State of Wisconsin (Plan) outlines:

- (a) how future funding will be used to develop and maintain the capability and capacity for managing the modernization effort in Wisconsin, as well as describe the program administration and management activities Wisconsin will undertake; and
- (b) The mapping projects to be completed over a 5-year period.

This Plan identifies the role the State of Wisconsin is requesting to play in Map Modernization Implementation and how these activities will be managed and performed. This Plan identifies mapping priorities, explains how mapping priorities were established for each county in Wisconsin, and outlines an approach for addressing these mapping priorities.

Background

Floods are the nation's most common and costly natural disaster. To reduce the ever-growing expense to the federal government related to flooding, Congress established the National Flood Insurance Program (NFIP) in 1968. The NFIP guarantees that flood insurance will be available in communities that agree to adopt land-use regulations so that new development is reasonably protected from flood damages.

Flood Hazard Maps produced by the NFIP are one of the basic and essential tools for flood insurance, floodplain management and flood hazard mitigation. However, due to the manual cartographic processes used and limited topographic information available

when they were initially developed today's flood hazard maps are inadequate to meet the current needs. Recognizing the need to upgrade the existing maps, FEMA developed a Flood Map Modernization Plan. Starting in FY03, Congress provided funding to FEMA to implement the Flood Map Modernization Plan.

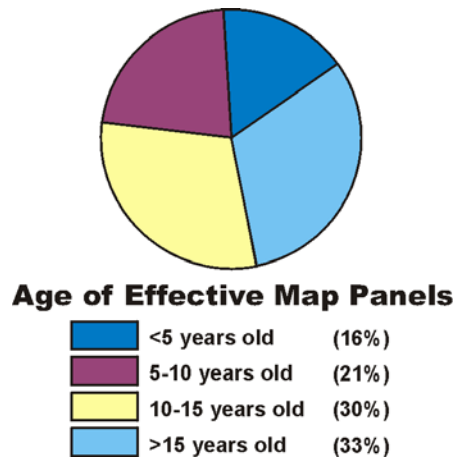
FEMA has developed the following Flood Map Modernization Performance Categories:

- Percent of Population with Digital GIS Flood Hazard Maps,
- Percent of Population with Adopted GIS Flood Maps,
- Leveraged effort toward digital GIS flood hazard data,
- And Percentage of Map Mod funding put through to CTPs.

The Wisconsin Experience

Floods cause a significant threat to life and property in Wisconsin. Wisconsin is tenth in the nation in documented flood damages. Flooding has been a principle cause in 16 out of 24 Presidential Disaster Declarations in Wisconsin from 1971 through 2001.

As shown in the figure below, most of the flood hazard maps in **Wisconsin** are outdated.



In many cases, the older maps reflect outdated flood hazard information that limits their utility for insurance and floodplain management purposes. Most of the maps were prepared using now outdated road network information and manual cartographic techniques, which introduced errors and make the maps difficult for State and local customers to use and expensive to maintain. In addition, there is

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development pressure on some Wisconsin streams and lakes where the flood hazard has not yet been mapped.

Floodplain Management Legislation

When Wisconsin became a state in 1848, rights of navigation of state waterways were incorporated into the State Constitution. The Wisconsin constitution indicates that navigable waters in the State of Wisconsin are held in trust for the citizens of the United States. Since becoming a state, a sizeable body of common law has established that the State has the affirmative duty to protect and preserve these public trust waters. This is called the Wisconsin Public Trust Doctrine.

Following major floods in 1965, the state legislature created Chapter 87.30. This chapter of the state statutes requires communities to enact floodplain zoning and requires the State “ensure that hydrologic and engineering studies are reasonable and accurate”. Since this chapter of the statutes was created, Wisconsin has reviewed and if “reasonable and accurate”, approved hydrologic and engineering studies used to develop floodplain zoning maps. WDNR maintains an archive of these approved flood hydrologic and hydraulic models.

Wisconsin has developed floodplain engineering standards more stringent than federal standards:

- Federal standards allow hydraulic models to assume encroachments into the floodway to the extent that filling of the flood fringe would cause a one-foot rise in flood heights above the published regulatory flood elevations. Wisconsin has what is called a “zero rise floodway”. Model encroachments are not allowed and the floodways in Wisconsin therefore are wider. Once the “zero-rise” floodway is established, before any encroachment into the floodway that causes a measurable rise (.01 feet) can occur, easements must be obtained from the affected landowners.
- Wisconsin floodplain standards require that for any flood hazard area to be removed from the floodplain, the area must be filled to one foot above the regulatory flood elevation and the first floor of any structure built on the fill must be 2 feet above the regulatory flood elevation. This helps account for ice and debris blockages and other uncertainties associated with flood height predictions when landowners are building in a mapped flood hazard area.

In addition to authorizing legislation and higher engineering standards than the minimum required by federal law, WDNR has the in-house engineering and Geographic Information System (GIS) technical expertise needed to successfully implement Flood Map Modernization in Wisconsin. WDNR has sixteen (16) Water Management engineers trained in hydrology and hydraulics working in floodplain management, dam safety and water regulation permitting. WDNR Water Management Engineers assist zoning administrators by doing the modeling necessary to set Regulatory Flood Elevations (RFEs) in Approximate Zones.

Wisconsin’s floodplain management program recently received a significant upgrade due to a successful budget request. In August of 2000, the Wisconsin legislature provided WDNR with funding to enhance the use of information technology (specifically GIS) to improve staff effectiveness and customer service in the water management programs. This budget item (called the Wisconsin Waters Initiative) provided funding to:

- improve WDNR’s IT infrastructure,
- provide GIS tools and training for staff,
- georeference FEMA’s scanned FIRMs,
- make these existing floodplain maps and the associated models available over the web via a “clickable map”
<http://maps.dnr.state.wi.us/fad> and
- develop an inventory of digital elevation data in Wisconsin.

State Role in the Flood Hazard Mapping Program

Level of Participation—Wisconsin is a Managing State.

Lead agency: The Wisconsin Department of Natural Resources is the agency responsible for the floodplain management program mandated by state statutes.

Other agencies and/or organizations involved, and their roles:

- **The Wisconsin Land Information Program** – Wisconsin passed legislation in 1989 funding the automation of land records. The legislation listed zoning as one of the six foundational elements. Funding from this program has

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enabled all 71 non-tribal counties in Wisconsin to develop GIS capability and create extensive local base data. Because of the Wisconsin Land Information Program, the quality and extent of base mapping available should substantially improve the integrity of the DFIRMs and minimize data acquisition costs.

- **Wisconsin Land Information Board** – The legislature created this board to oversee the implementation of the WLIP. This board has representatives from DOA, DNR, DOT, the Department of Agriculture, Trade and Consumer Protection (DATCP), local governments and is chaired by the State Cartographer. In August 2001, the board established an Elevation Task Force to develop a plan to upgrade the Digital Terrain Model (DTM) data in Wisconsin. In addition, the Wisconsin Land Information Board has some discretionary funding for strategic initiatives. In FY 03, the Board created a new strategic initiative grant category to support Wisconsin’s Map Modernization Implementation Plan. The Board allocated \$268,000 for Flood Map Modernization projects in Wisconsin. Grants have been awarded to 6 counties for DTM development or the collection of bridge metrics needed for Flood Map Modernization.
- **Wisconsin Emergency Management (WEM)** – FIRMs are used by WEM for disaster response and flood mitigation. WEM develops the State Hazard Mitigation Plan and manages FEMA funding to communities for development of community Hazard Mitigation Plans and flood hazard mitigation projects.
- **Wisconsin Dept. of Transportation** – WDOT conducts hydrologic and hydraulic analyzes on proposed bridges over waterways to determine if proposed bridges will increase flood profiles. WDNR and WDOT have a Memorandum of Understanding to address situations where the flood profile upstream of bridges is increased. WDOT develops topographic data when building bridges. Since bridges create restrictions that backup water and increase flood heights, topographic data at stream crossings is useful for hydraulic modeling. In addition, WDOT has initiated a height modernization project to upgrade the vertical control network in Wisconsin.
- **Wisconsin Department of Administration** – Wisconsin’s Coastal Management Program formulates strategies, goals and policies for managing Great Lake’s coastal hazards through the Interagency Coastal Hazards Work Group.

DOA, DNR, the University of Wisconsin Seagrant Program and WEM are represented on this work group.

- **Southeast Wisconsin Regional Planning Commission (SEWRPC)** – SEWRPC has an engineering staff devoted to floodplain modeling and mapping.

Wisconsin’s Vision for Map Mod

Over the next 5 years, Wisconsin – as a Managing State – in partnership with FEMA, generates reasonable and accurate flood hazard maps for all of the water bodies in the State identified as having a flood hazard. GIS tools minimize costs and help ensure that the flood hazard maps generated fit local base mapping and best available topography. All existing hydrologic and hydraulic models are evaluated and if necessary updated. All existing and new models are linked to GIS floodplain boundaries and stream cross sections as a component of the WDNR’s existing Geospatial Infrastructure and both the models and the maps are available over the web via WDNR’s “clickable map”. The data are consistent with the Federal Geographic Data Committee standards and are integrated with doppler radar, rainfall reporting, stream gage reporting, recorded high water marks, and 911 disaster response systems to most effectively improve the accuracy and utility of the digital GIS flood hazard boundary maps. Wisconsin proposes to do countywide studies in accordance with the priority ranking attached.

While this is a worthy vision, limited funding will not allow us to implement all components of the vision during this 5-year flood map modernization initiative. However, in order to reduce appeals and lower maintenance costs, Wisconsin has established a performance standard relating to the quality of the floodplain maps produced.

All floodplain maps provided to communities for adoption will be “reasonable and accurate” when compared to best available topographic and community base map data.

With this standard established, focus available funding from FEMA funding to:

- Ensuring that flood hazards in areas with the highest development pressure have up to date flood profiles and mapped floodways. In particular ensure that all incorporated communities and their extraterritorial

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jurisdictions have flood profiles and mapped floodways.

- Ensuring existing detailed studies match best available topographic data.
- Conducting limited detail studies on all streams presently mapped as approximate.
- Developing floodplain maps on unmapped streams experiencing development pressure.

The Plan contributes to FEMA's Flood Map Modernization objectives, which are to:

- Establish and maintain a premier data collection and delivery system
- Achieve effective program management
- Build and maintain mutually beneficial partnerships
- Expand and better inform the user community

Topographic Data

The availability of topographic data has a significant impact on both benefits and costs associated with floodplain mapping. Digital topographic data available in Wisconsin is generally from one of 2 sources – USGS or local government. The topographic data sets are:

- USGS – 30 meter DEMs, 10 meter DEMs, DRGs, DLGs, and TVCs.
- Local Government – DTMs and TVCs.

WDNR's GIS Section has incorporated USGS's DRGs and 30 meter DEM¹s into WDNR's Geospatial Infrastructure.

USGS 30 Meter Digital Elevation Models (DEMs) - While not adequate for hydraulic modeling or floodplain mapping, USGS's 30 meter DEMs have utility in hydrologic modeling. WDNR hydrated the Statewide 30 meter DEM with its hydrography GIS framework data layer and used it in the development of the Wisconsin Floodplain Hydrology Tool.

USGS DRGs – USGS calls their scanned and georeferenced 7 and ½ minute quadrangle maps Digital Raster Graphics or DRGs. Most floodplain maps in Wisconsin were developed using the contour lines on the USGS 7 and ½ minute quadrangle maps (quads). While DRGs are not in a format that allows them to be used in any of the automated H&H or

floodplain mapping tools that have become prevalent in the last decade, they are useful in evaluating digital conversions of FIRMs that have been developed by FEMA or local governments. In parts of the state where there is not significant population at risk and the contours on the quads are the best available topographic data, digital conversions of FIRMs may be adequate.

USGS Digital Line Graphs (DLGs) and Tagged Vector Contours (TVCs) - WDNR has recently obtained DLGs and TVCs where available from USGS. These vector topographic data *can* be used in automated H&H and floodplain mapping tools and are generally adequate for floodplain redelineation and limited detail studies.

USGS Tagged Vector Contours (TVCs)

In the process of developing DEMs, USGS contractors digitize the contour lines on DRGs to create vector contour data. The geospatial lines are then converted to a TIN and elevations at the spacing desired for the DEM are extracted from the TIN. WDNR has obtained USGS's Tagged Vector Contours for Wisconsin.

Local Government Digital Terrain Models (DTMs) and Tagged Vector Contours (TVCs) – Locally developed topographic data in Wisconsin are usually equivalent to 2 foot or 4 foot contours. DTMs are the most useable format for GIS automated H&H and mapping tools. TVCs are not quite as easy to use but generally are adequate for using with automated H&H and floodplain mapping tools. As indicated earlier, the Wisconsin Land Information Program has had a significant impact on the development of topographic and other GIS data in Wisconsin counties. WDNR maintains an inventory (Map 1) of which local governments have developed these 2 or 4 foot contour topographic data sets and has factored this information into the Wisconsin Flood Map Modernization priority list.

Mapping Needs Assessment and Priority Setting Approach

In FY 02, WDNR received funding from FEMA through the Community Assistance Program (CAP-MAP) to evaluate the mapping needs in Wisconsin and develop the state's Map Modernization Implementation Plan.

¹ These are both statewide data sets.

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WDNR field engineers surveyed communities to document community needs. Thirteen of Wisconsin's Water Management Engineering positions are located in field offices. These field engineers have routine contacts with community floodplain zoning administrators – making them knowledgeable about the floodplain mapping needs in the state.

Wisconsin DNR created a GIS data layer that identifies all of the waters in the state that presently have detailed studies, approximate mapping and mapping needs.

This mapping needs assessment included the following tasks:

- Soliciting mapping needs information from counties and communities;
- Reviewing available community-specific data (e.g. an inventory of Digital Terrain Model data has been developed);
- Conducting a benefit analysis on all streams that need to be remapped using the MNUSS benefits calculation formulas and U.S. Census data. The major focus of the MNUSS benefit calculation formulas was housing density and growth.
- Estimating costs - Watershed Concepts assisted WDNR in the cost analysis. The cost analysis took into account the availability of adequate topographic, base map and modeling data and the mapping needs for each county.
- Generating a priority listing by county based on the benefit/cost ratio; and
- Assessing the past flooding history based disaster declarations that have occurred in Wisconsin.

If you build it we will come

In the first few years of the Flood Map Modernization Initiative, Wisconsin will focus on counties with improved topographic data. In our outreach efforts over the past decade, WDNR has promoted the development of improved topographic data at statewide and regional meetings of local government officials, floodplain managers, zoning administrators and GIS staff. We have repeatedly indicated that our benefit cost analysis demonstrates

that counties with improved topographic data move up on Wisconsin's floodplain mapping priority list. We are aware of several counties in the process of developing improved countywide topographic data sets – Jefferson, Columbia and St. Croix. Several others (Eau Claire, La Crosse, Marathon, Wood) have digital 2 foot contour data for their largest cities.

If a county that presently does not have adequate topographic data for floodplain mapping later develops it, the ranking will be adjusted.

Proposed Approach to Map Production

Wisconsin proposes to manage all aspects of Flood Map Modernization in the state including but not limited to needs assessment, scoping, outreach & community coordination, digital base map collection/coordination, digital base map development, field surveys, hydrologic & hydraulic analyses, floodplain mapping, digital FIRM production, and post-preliminary processing.

- WDNR will direct/manage the Flood Map Modernization in Wisconsin. WDNR staff will conduct the engineering reviews and DFIRM production QA/QC needed.
- WDNR will utilize consultants it has prequalified to do floodplain modeling and mapping in Wisconsin. These firms have engineers and/or surveyors with H&H and floodplain mapping skills that are familiar with Wisconsin floodplain standards.
- WDNR will initially focus FEMA funding on H&H and floodplain mapping with local funding providing the necessary topographic and base map data. Our flood mapping needs assessment and associated benefit cost analysis supports this approach.
- WDNR will enhance our outreach efforts to inform local officials regarding the benefits of improved topographic data for floodplain mapping and the impact improved local funded topographic data has on their Flood Map Modernization priority ranking.
- WDNR will enhance the floodplain modeling and mapping tools developed with state funding (Wisconsin Waters Initiative).

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Appendix A Cost Estimates for Implementing Wisconsin's Flood Map Modernization Plan

The cost estimates for each of the countywide flood mapping projects are listed in Table 1 in priority order. This past September, WDNR entered into a CTP agreement with FEMA to complete one countywide mapping project and initiate 6 new countywide projects. FEMA authorized \$859,000 worth of FY03 funding to support this work effort. We estimate that the amount of FY04 funding needed to complete these projects is \$2,058,000. The breakdown in funding by project is as follows:

County	FY03	FY04
Brown	\$ 30,000	
Ozaukee	\$274,000	\$ 178,000
Rock	\$ 55,000	\$ 220,000
Waukesha	\$220,000	\$ 460,000
Milwaukee	\$ 75,000	\$ 260,000
Dane	\$150,000	\$ 500,000
Washington	<u>\$ 55,000</u>	<u>\$ 400,000</u>
Total	<u>\$859,000</u>	<u>\$2,018,000</u>

In addition, Wisconsin requests funding to begin the scoping and interim data collection process for 5 new countywide projects. **Funding requested: \$55,000 x 5 = \$275,000.**

Map Modernization Management Costs

Staff - Wisconsin DNR existing staff will provide approximately 2 FTE that will focus on Needs Assessment, Project Selection, Topographic Data Inventory, and Topographic Data Procurement. Regional engineers and planners provide additional assistance in needs assessment, scoping and outreach. WDNR requests funding for the following positions:

Position	Work Activity	Funding Requested
Water Management Engineer (2)	Engineering Analysis (H&H) QA/QC	\$200,000
GIS Specialist (1)	DFIRM Production QA/QC	\$ 80,000

GIS Mapping Applications - Wisconsin DNR has developed GIS tools and data sets to improve the floodplain modeling and mapping processes with funding from the Wisconsin Waters Initiative. Following is a list of GIS mapping support projects to enhance the existing tools and processes:

Application	Funding Requested
1. Upgrade to the Wisconsin Hydrology Tool	\$32,000
2. Integration of bridge and culvert data into modeling tools	\$48,000
3. Needs Assessment Tool Enhancements	\$32,000
4. Web Distribution/Dissemination	\$60,000
5. Upgrade of WDNR 24K Hydro to match the hi-res NHDinGEO	\$96,000

Descriptions for each of these projects are included in Appendix B.

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Alternatives/Varying Funding Levels

The FEMA guidance for preparation of the business plan instructs states to provide an analysis of state participation given four levels of FEMA funding – full funding at 100%, medium funding at 2/3 of full, low funding at 1/3 of full, and state or locally funded. The activities and costs described above and in the attachments represent the full funding alternative. The other alternatives are listed below.

Map Mod Management/Oversight

- Medium – At this level WDNR will eliminate GIS Applications Projects 4 & 5.
- Low - At this level WDNR will eliminate GIS Application Projects 3, 4 & 5 plus half of the staff support. WDNR would conduct half of the QA/QC activities and request assist from the NSP for the other half.
- State/Local – with no FEMA participation, the State would take on no FEMA QA/QC activities and do no GIS tool/applications enhancements.

CTP

- Medium – At this level WDNR will not initiate any new projects and will do no additional work on the Washington County project.
- Low - At this level Water will further eliminate the mapping needs assessment activities, and cut in half the effort for the other activities.
- State/Local – with no FEMA participation in FY 04, WDNR will complete only Ozaukee and Rock Counties. WDNR will complete the hydrology for Waukesha and Dane Counties. The Milwaukee County Oak Creek Watershed and the remainder of Milwaukee County would not be started.

Pipeline Projects

Wisconsin has a number of projects in the pipeline. Following are Wisconsin DNR's recommendations regarding projects that should be funded with FY04 dollars. Due to high population density and high growth, Wisconsin recommends that Pleasant Prairie, Kenosha County and City of Appleton, Outagamie County be completed. Due to "other compelling reasons" (political sensitivity), WDNR also recommends that Columbia County (Wisconsin River), La Crosse County, and Burnett County (Yellow River) be completed.

Flood Map Maintenance

Wisconsin is willing to modify our review processes to include FEMA requirements in WDNR's LOMR review process. This would eliminate the duplicative FEMA/WDNR engineering review process that presently exists. WDNR would need some training on FEMA's procedures. FEMA received an average of 75 LOMRs annually over the last five years. **Funding requested– 75 x \$3,000 = \$225,000**

LOMA Review – We propose to phase in LOMA review as county Flood Map Modernization projects are completed. Presently, Winnebago County is the only county in the state that has adopted updated maps that meet Wisconsin standards for Flood Map Modernization (match best available topo). WDNR would be willing to take on the issuance of LOMAs for Winnebago County in FY04. Winnebago County has averaged 31 LOMAs a year for the last 5 years. Winnebago County adopted updated DFIRMs in FY03. In FY04, FEMA received 22 LOMAs from landowners in Winnebago County. **Funding requested: 20 x \$400/LOMA = \$8,000.**

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Appendix B

Applications to be developed as part of Wisconsin's Flood Map Modernization Business Plan

Five key applications have been identified, in addition to the existing applications.

1. Upgrade to the Hydrology Tool

Description. The WDNR Hydrology Tool is an ArcView 3 application used for statewide estimation of peak flows at WDNR. It is based on USGS regression equations. This application was developed four years ago and has been in production throughout WDNR since. USGS is developing a StreamStats application that will provide similar functionality. It is based on ArcGIS and ArcIMS and can be used in both web and desktop environments. StreamStats allow calculation of both peak and low flows. To be applicable for Wisconsin, StreamStats needs to be updated to include computation of watershed characteristics pertinent to the Wisconsin regression equations and add functionality for basin comparison that StreamStats currently lacks.

Assumptions. Assumptions for the application are that the current geographic layers used in the hydrology tool can be used for StreamStats implementation with minimal modifications.

Results. The result of this development is standardized web and desktop application for peak and low flow computations using systematic methodology throughout the state implemented in a modern IT environment. It also coordinates the effort with USGS (equation developers), so that the long-term maintenance for the application is shared between WDNR and USGS, thus reducing the long-term ownership cost.

2. Integration of bridge and culvert data into modeling tools

Description. Bridge and culvert (structures) information is frequently used in the hydrologic and hydraulic (H&H) computations, either to assess the capacity of the structure to convey the flows, or the impact of the structure on the flow (back water effect/flooding). Many state and local agencies (e.g. DOT, Counties) have detailed inventories of structures, usually used for maintenance purposes (required inspection and maintenance cycle). When not already in a database, structures are often surveyed before H&H analyses and can be brought into a digital format. In general, these data, while in digital form, are not in a format that is easily used in hydrologic and hydraulic modeling, thus requiring manual interpretation and input of such data into H&H models. This process is tedious, time consuming, and often leads to quality issues (miss-interpretation or miss-typing). The proposed application would develop a database design for structures (following FEMA guidelines as much as possible) and tools for export of data from that format into several standard H&H models using structures data (e.g. HEC-RAS). This

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export process would be made generic so that later addition of models for which the export can be performed is made as simple as possible.

Assumptions. Storage of structure's data is in ESRI geodatabase format. Use of generic XML exchange structure for geodatabase to particular model export process. Use of HEC-RAS bridge/culvert input format as export prototype.

Results. Application that allows streamlined process for collection, storage, and export of structure's data into a H&H model. Generic implementation would allow easy addition of different formats for particular H&H models by end-users.

3. Needs Assessment Tool

Description. The Needs Assessment Tool streamlines the current WDNR process for determining the priorities and lengths for different types of floodplain studies. The tool would allow fast reassessment of WDNR flood mapping priorities as conditions in the State change (either due to changes in land development/county needs or availability of new floodplain studies, or similar external inputs). The tools would use several statewide layers such as 24K Hydro, old and new panel index layers, census data, etc. The end product of the tool is a characterized stream layer identifying reaches that required remapping.

Assumptions. The existing manual methodology and the supporting data are established and fully functional. The data might have to be converted into geodatabase format to optimize application's performance and utility. Maintenance of the data and its potential conversion is not part of this application.

Results. Application for quick assessment of types and priorities of floodplain studies in the State. This application would allow the State to be current with their needs and allocate the study funds in a systematic and current fashion.

4. Web distribution/dissemination

Description. Access to and dissemination of floodplain study results is one of the more important aspects of the map modernization plan. WDNR already serves existing information and hydraulic models to the public through their web site. The users are able to navigate through a web-based map interface, zoom to the area of interest, and identify the currently available flood map information for their area of interest. If available, they can also download the zip files of hydraulic models used to determine the flood elevations for that area. The new application would accomplish the following goals:

- 1) Update the data being used in the application to follow the new FEMA specifications for DFIRM mapping products.
- 2) Add functionality to download DFIRMS.
- 3) Add functionality to download data that have been used in the studies (currently only the models can be downloaded).
- 4) Enable use of WDNR data as web service for other users.

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Assumptions. Data and map development is not in scope of this application. The assumption is that the products to be served exist and are in the final format in which they will be delivered to the end users.

Results. A web-based application that will provide a one-stop for anyone interested in floodplain mapping, results, models, and data used in the floodplain delineation process. The web site can be made multi-tier, allowing access to certain functionality to certain type of users (e.g. not allow download of data for general public, but only for users that are registered with DNR for such activity).

5. Upgrade of WDNR 24K Hydro to match the hi-res NHDinGeo

Description. The WDNR 24K Hydro layer is one of the foundation layers used throughout WDNR for a variety of applications. 24K Hydro layer design is based on ESRI coverage data model and is specific to WDNR. While initial development is complete and the layer is currently in use, it needs constant maintenance that requires a lot of effort using custom-developed tools and process. USGS has a new data model standard for hydro layers for the nation that is based on the geodatabase design (NHDinGeo). NHDinGeo covers the same layer types and data development principles as are captured in the 24K Hydro. By converting the 24K Hydro to NHDinGeo format, WDNR can accomplish several things:

- 1) Develop a current database design for the hydro layer taking advantage of federal data standards.
- 2) Simplify and standardize the current data update process by taking advantage of the NHDinGeo editing tools and editing methodology developed by USGS.
- 3) Make 24K (high resolution) hydro data widely available to a broad range of users and thus further leverage the investment in the data development.
- 4) Take advantage of many applications built on top of NHDinGeo.

NHDinGeo format will be extended with the data types that are not of interest to general NHDinGeo users but are of interest to WDNR users.

Assumptions. Data quality and extent of the 24K Hydro data layers is at the same or higher quality level than the NHDinGeo specifications.

Results. Hi-res NHDinGeo database for Wisconsin. Long-term maintenance cost is reduced using standardized methodology for data maintenance.