Appendix G: Agency Implementation Plans

NWS Implementation Plan

The IWRSS FIM requirements and design were developed in alignment with the current efforts and future needs of NOAA NWS Hydrology Program to be implementable within the NWS AHPS Framework, NOAA Deployment Services (NDS), and NOAA's Internet Dissemination Program (IDP). There are pre-implementation activities which can be undertaken prior to or in parallel with the implementation of the IWRSS FIM Data Model. Pre-implementation activities for NWS are estimated to span from FY16 to FY21, following closely to the recommended start dates shown in figure 2 of Chapter 1. The start date might delay for one to 2 quarters depending on the acceptance of the IWRSS FIM Design. There is an inherent risk that the schedule may slip due to the NWS expanding roles in the water services arena.

Implementation activities could proceed upon agreement of the IWRSS FIM Standards and incorporation of the design guidelines as part of the IWRSS FIM Implementation Charter noted in Chapter 1. Implementation activities are estimated to span from FY16 to FY22 for the development, operations, and maintenance of tools/services.

During the implementation phase, existing NWS AHPS services would need to be adapted to conform to the newly adopted the IWRSS FIM standards. IWRSS FIM standards help enforce flood inundation map consistency nationwide across IWRSS FIM member agencies and allow maps to be shared, consumed, and exchanged. More importantly, IWRSS FIM users could better understand the NWS River Forecasts and Warning, by visualizing the extent of flooding and its associated flood impacts.

The recommended IWRSS FIM projects for NWS, which include a blend of pre-implementation and implementation activities, are listed in this section. The schedule of each project could change per recommendation of the implementation team based on the team's review, testing to verify whether deployed components meet original design intent, project dependencies, and agency constraints. The following Table J.1 provides the highly recommend pre-implementation to early implementation activities for NWS. The Gantt Chart shown in Figure J.1 below shows the parallel execution of the Pre-Implementation and Implementation activities.

Table J.1. NWS Proposed Pre-Implementation Activities

Activity No.	Activity Title	Timeframe
1	Establish Registry for Current and Planned FIM Libraries	FY16Q2 to FY16Q3 [6-months]
2	Provide FGDC Metadata Generation Tool	FY16Q2 to FY17Q1 [1-Year]
3	Migrate AHPS FIM Data to IWRSS Compliant Format	FY16Q2 to FY18Q1 [2-Years]
4	Develop IWRSS Guidance and Leverage Tools for New AHPS FIM Partnered Projects	FY16Q2 to FY18Q2 [2+ Years]

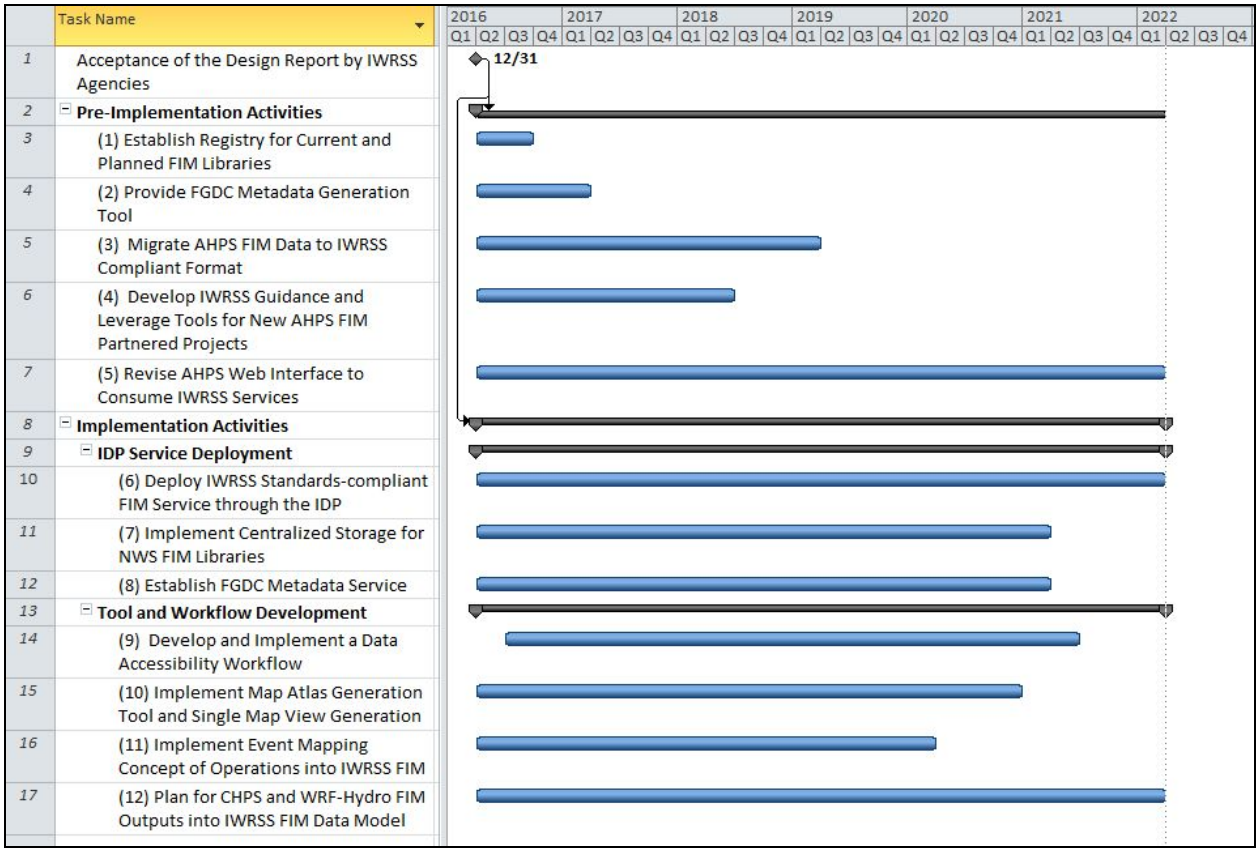


Figure J.1. Gantt Chart of Proposed NWS Pre-Implementation and Implementation Activities

Activity 1: Establish Registry for Current and Planned FIM Libraries: Develop a Google Documents spreadsheet and share it with other member agencies. The document will contain the list of FIM projects in progress and completed. This list will be updated and maintained.

- Activity Type:
    - Pre-Implementation (Required, Highly Recommended)

- Tasks:
    - Collaborate with agencies on what fields must be documented and shared for the projects and develop Google Docs spreadsheet.
    - Update spreadsheet continuously as new projects are added.
- Schedule:
    - FY16Q2 to FY16Q3 [6-months]
- Dependencies:
    - Acceptance of the Design Report.
- Constraints:
    - Organization Milestone and Priorities
    - Available Resources (Labor)
    - Available Resources (Funds)

Activity 2: Provide FGDC Metadata Generation Tool: Develop, acquire, or source a tool to generate FGDC metadata that meets the IWRSS requirements in order to simplify the process of metadata development for NWS and partners.

- Activity Type:
    - Pre-Implementation (Optional, Highly Recommended)
- Tasks:
    - Develop, acquire, or source a metadata documentation tool for mapping partners to use during the development of FIM maps.
- Schedule:
    - FY16Q2 to FY17Q1 [1-Year]
- Dependencies:
    - Member agencies to adopt IWRSS FIM Standards
    - Tool should be documented in Project
    - Develop IWRSS Guidance and
    - Leverage Tools for New AHPS FIM Partnered Projects.
- Constraints:
    - Organization Milestone and Priorities
    - Available Resources (Labor)
    - Available Resources (Funds)

Activity 3: Migrate AHPS FIM Data to IWRSS Compliant Format: Migrate the existing AHPS FIM libraries (133 as of September 2015) to the IWRSS FIM compliant Data Model with the minimum required project documentation.

- Activity Type:
    - Pre-Implementation (Required, Highly Recommended) and Phased Implementation (Required)
- Tasks:
    - Review geospatial data for IWRSS project documentation and geospatial data compliance.
    - Gather project information for undocumented libraries.
    - Reanalyze/correct libraries with missing or non compliant geospatial data.
    - Generate model metadata reports in IWRSS-compliant XML format.
    - Revise flat file structure for each library to IWRSS data model format flat file structure or geodatabase format.

    - Ensure the IWRSS compatible project files are available for download by public users on AHPS.
    - Pilot-test several AHPS FIM libraries by migrating a few into the IWRSS FIM Data Model.
    - Develop a plan to address remainder of the NWS AHPS FIM libraries.
    - Implement plan.
- Schedule:
    - FY16Q2 to FY18Q1 [2-Years]
- Dependencies:
    - IWRSS leadership input if a Services Charter is required (See Chapter 1 - Services)
    - NWS to conduct pilot-test, evaluate, and secure resources
    - Each agency develop plan and schedule for deploying IWRSS FIM services adhering to this design.
    - Each agency develop, test and deploy IWRSS FIM services.
    - IWRSS execute communication plan to promote broad national awareness of available IWRSS services.
- Constraints:
    - Organization Milestone and Priorities
    - Available Resources (Labor)
    - Available Resources (Funds)

Activity 4: Develop IWRSS Guidance and Leverage Tools for New AHPS FIM Partnered Projects: Evaluate AHPS FIM capability to deliver IWRSS FIM Services and then update existing documentation, identify tools, and train staff to partner and deliver future AHPS FIM libraries that meet the IWRSS FIM standards.

- Activity Type:
    - Pre-Implementation (Required, Highly Recommended) and Phased Implementation (Required)
- Tasks:
    - Evaluate AHPS FIM capability to deliver IWRSS FIM Services
    - Update Partnered Guidelines Document
    - Develop blank templates for file storage (flat file or geodatabase)?
    - Update the Project Development Template Document
    - Review and update the QC workflow review library
    - Retrain the QC reviewers to new standards
- Schedule:
    - FY16Q2 to FY18Q2 [2+ Years]
- Dependencies:
    - This task can start immediately upon acceptance of the Design Report.
    - Dependent upon the completion of the FGDC Metadata Generation Tool.
- Constraints:
    - Organization Milestone and Priorities
    - Available Resources (Labor)

Activity 5: Revise AHPS Web Interface to Consume IWRSS Services: Redesign AHPS FIM website to consume IWRSS FIM services from NWS IDP and partner agencies. Implementation

would allow for a CMS for Service Hydrologists to setup individual FIM locations provided by IWRSS.

- Activity Type:
    - Pre-Implementation (Required, Highly Recommended) and Phased Implementation (Required)
- Tasks:
    - Work with AHPS NDS Team and IWRSS Agencies to capture requirements and plan for future implementation.
    - Coordinate NIDS deployment timeline to align with the IWRSS agencies implementation of the services.
    - Train the Service Hydrologists to implement the workflow that will allow NWS to consume IWRSS partner map services and stand up new FIM services at AHPS forecast points.
- Schedule:
    - In Parallel with IDP deployment: FY16Q2 to FY21Q1 [5-Years]
- Dependencies:
    - IDP Deployment of IWRSS FIM service OR interim modification of the AHPS service.
    - Deployment of IWRSS FIM services by USGS and USACE
- Constraints:
    - Organization Milestone and Priorities (NDS, IDP)
    - Available Resources (Labor)
    - Available Resources (Funds)

Activity 6: Deploy IWRSS Standards-compliant FIM Service through the IDP: Create IDP, WMS, and REST services for AHPS FIM libraries and develop a workflow for submitting new data to the IDP services on an ongoing basis.

- Activity Type:
    - Implementation (Required)
- Tasks:
    - Document service requirements for IDP.
    - Develop a workflow for submitting stream reach FIM libraries to IDP on an ongoing basis.
    - Develop a workflow for submitting forecast crest event map and time-based forecast event map to IDP.
    - Schedule IWRSS FIM IDP Deployment with Geospatial Integrated Working Team (GIWT) and NWS Senior Management.
    - Coordinate the test, review and deployment process with IDP and GIWT.
- Schedule:
    - In Parallel with NWS AHPS Web Interface redevelopment: FY16Q2 to FY21Q1 [5-Years]
- Dependencies:
    - Deployment date is highly dependent on the priority of AHPS FIM within the queue of the IDP services.
- Constraints:
    - Organization Milestone and Priorities (NDS, IDP)
    - Available Resources (Labor)
    - Available Resources (Funds)

Activity 7: Implement Centralized Storage for NWS FIM Libraries: Establish a centralized NWS storage solution to aggregate projects in the IWRSS Data Model.

- Activity Type:
  - Implementation (Required)
- Tasks:
  - Develop a storage plan prior to IDP deployment of FIM services. (Note: Implementation team should decide if storage should be tightly coupled to IDP services or if the data should be stored in a disconnected location.)
  - Implement a centralized and backed up storage location for the data with adequate storage size available for existing and planned future projects.
- Schedule:
  - In Parallel with IDP deployment: FY16Q2 to FY20Q1 [4-Years]
- Dependencies:
  - Completed in parallel with IDP deployment.
- Constraints:
  - Organization Milestone and Priorities (IDP)
  - Available Resources (Labor)
  - Available Resources (Funds)

Activity 8: Establish FGDC Metadata Service: Develop a service to provide the FGDC metadata to partners with the IDP services.

- Activity Type:
  - Implementation (Required)
- Tasks:
  - Plan for deployment of a LayerInfo service with the IDP services. The LayerInfo service will provide access to additional metadata documentation which may include FGDC, graphics, legends and time-aware data information.
- Schedule:
  - In Parallel with IDP deployment: FY16Q2 to FY20Q1 [4-Years]
- Dependencies:
  - This project has direct ties to the IDP Deployment (LayerInfo) service and the AHPS FIM Data Migration project and should be developed in parallel with both of these initiatives.
- Constraints:
  - Organization Milestone and Priorities (FGDC, IDP)
  - Available Resources (Labor)
  - Available Resources (Funds)

Activity 9: Develop and Implement a Data Accessibility Workflow: Develop a data access capability to enable external or FOUO users (as appropriate) to retrieve data and supporting documentation from their systems.

- Activity Type:
  - Implementation (Required)
- Tasks:
  - Develop an authentication system that would allow only authorized FOUO agencies or IWRSS partners to view and extract the data from the centralized storage

    - Identify steps in the workflow
    - Implement system
- Schedule:
    - FY16Q3 to FY21Q2 [5-Years]
- Dependencies:
    - Completion of AHPS FIM Data Migration to IWRSS Compliant Format task.
    - Completion of Develop IWRSS Guidance and Tools for New AHPS FIM Partnered Projects task.
    - This may be able to be developed in parallel with the IDP implementation but significant further investigation of IDP capabilities for handling FOUO information would be required.
- Constraints:
    - Organization Milestone and Priorities (IDP)
    - Available Resources (Labor)
    - Available Resources (Funds)

Activity 10: Implement Map Atlas Generation Tool and Single Map View Generation Tool: Implement tools that generate map atlases and the map data frame view in pdf or other graphical formats.

- Activity Type:
    - Implementation (Required)
- Tasks:
    - Implement the map atlas generation tool and single map view tool developed by the lead agency (USACE or USGS).
- Schedule:
    - In Parallel with IDP deployment: FY16Q2 to FY20Q4 [5-Years]
- Dependencies:
    - Dependent on the development schedule of the lead agency.
    - AHPS interface must be revised to develop and use these tools.
    - IDP services must be implemented in IWRSS compliant format in order for these tools to operate.
- Constraints:
    - Organization Milestone and Member Agency Priorities
    - Available Resources (Labor)
    - Available Resources (Funds)

Activity 11: Implement Event Mapping Concept of Operations into IWRSS FIM Data Model: Develop, test, and implement NWS IDSS (Impact Decision Support Services) Concept of Operations for Event Mapping services to be provided by the NWS via the IWRSS FIM Data Model with the overarching goals of sharing, consuming, and exchanging FIM-related Event Maps prescribed by NWS amongst IWRSS member agencies.

- Activity Type:
    - Implementation (Required)
- Tasks:
    - Develop NWS IDSS (Impact Decision Support Services) Concept of Operations by identifying NWS roles, responsibilities, and actions required to generate Event Mapping services.

    - Test and implement the Concept of Operations for sharing, consuming, and exchanging FIM-related Event Maps amongst IWRSS member agencies..
- Schedule:
    - FY16Q2 to FY19Q1 [3-Years]
- Dependencies:
    - Dependent on development schedule of NOAA and NOAA NWS.
    - NOAA National Water Center
    - NWS RFC
    - NWS WFO
    - NWS AHPS
    - NOAA IDP
- Constraints:
    - Organization Milestone and Member Agency Priorities
    - Available Resources (Labor)
    - Available Resources (Funds)

Activity 12: Plan for CHPS and WRF-Hydro FIM Outputs into IWRSS FIM Data Model: Provide requirements to NWS CHPS and WRF-Hydro Developers to help align related FIM outputs and services to be shared, consumed, and exchanged amongst IWRSS member agencies and guide implementation.

- Activity Type:
    - Implementation (Required)
- Tasks:
    - Provide requirements to NWS CHPS and WRF-Hydro Developers to help align related FIM outputs and services to be shared, consumed, and exchanged amongst IWRSS member agencies
    - Work with NWS CHPS and WRF-Hydro Developers to design capability for CHPS and WRF-Hydro to provide related FIM output
    - Test capabilities,
    - Develop Concept of Operations Plan for RFC and NWC
    - Guide implementation.
- Schedule:
    - FY16Q2 to FY21Q1 [5-Years]
- Dependencies:
    - Dependent on development schedule of NOAA and NOAA NWS
    - NOAA National Water Center
    - NWS NCEP Weather and Climate Operational Supercomputing System
    - NWS RFC
- Constraints:
    - Organization Milestone and Member Agency Priorities
    - Available Resources (Labor)
    - Available Resources (Funds)

USACE Implementation Plan

The IWRSS FIM requirements and design were developed to align with the current efforts and future needs of USACE civil works transformation programs and initiatives and to be implementable within existing USACE systems (HEC-RAS, CWMS, CorpsMap).

The IWRSS FIM data standard and its associated logical data model is the most comprehensive solution for flood inundation maps that exists within the federal family. Likewise, the IWRSS FIM cartography template provides a solid standard for how flood inundation maps should be presented. Adoption of these IWRSS FIM standards would provide consistency for USACE flood inundation maps nationwide and would further benefit a number of USACE organizations, programs and initiatives:

- **Modeling, Mapping and Consequences (MMC) Production Center**
  The MMC Production Center develops emergency action plan maps for USACE dams and USACE program levees. Through the national Flood Inundation Mapping Cadre it also supports districts to produce inundation maps when needed as part of response efforts for significant flood events. The MMC Production Center will modify its existing FIM database, FIM tools and emergency action plan flood inundation map standards to conform to the IWRSS standards.
- **Hydraulic Models**
  HEC-RAS outputs can be structured to conform the the IWRSS standards, either natively within a future version of RAS or through a post-processing tool. Additionally, numerous USACE programs have identified the benefits of developing a searchable catalog of hydraulic models that exist within the agency. the IWRSS FIM data standard provides a blueprint for how to structure models and information about the models within a searchable database.
- **Corps Water Management System (CWMS)**
  Significant investment is being made in CWMS model development and district CWMS implementation. When fully deployed CWMS will be operated in over 220 basins nationwide. Aligning CWMS FIM outputs to fully conform to IWRSS standards will make CWMS a nationwide solution for flood inundation maps. The Access to Water (A2W) CWMS national reporting tool should be expanded to display IWRSS FIM-compliant inundation maps.
- **CorpsMap database**
  The MMC Production Center database discussed above is fully CorpsMap-compliant. Once the MMC physical data model update is complete, adopting this data model within the CorpsMap national database will provide a single IWRSS-compliant consolidation mechanism for all inundation maps developed by USACE.
- **CorpsMap viewers**
  A number of map viewers built on the CorpsMap platform already display inundation

maps. Examples are the MMC Production Center's data viewer and the USACE Operation Center's data viewer. Modifying CorpsMap viewers to consume IWRSS-compliant FIM services will streamline USACE internal data sharing processes and will allow USACE to display flood inundation maps produced by other IWRSS member agencies.

- **CorpsMap - Maps on Demand**
  The MMC Production Center has deployed a service capability within the CorpsMap environment that allows novice users to generate publication-quality static inundation maps in PDF format. Maps on Demand currently generates maps compliant with the USACE dam EAP map standard and the IWRSS cartography standard. Modifying Maps on Demand to work with the IWRSS data standard would provide a robust mapping capability that includes documentation and methodology reports in addition to map pages. It would allow users to generate static maps from any IWRSS FIM-compliant dataset. Once deployed outside the USACE firewall it would work seamlessly with any IWRSS-compliant data service.
- **Silver Jackets**
  A number of Silver Jackets projects have been funded to generate inundation maps for communities. Adopting the IWRSS standards for Silver Jackets inundation map deliverables would provide consistency across the projects.
- **Emergency Management**
  USACE Emergency Management is a consumer of flood inundation maps during emergency events. USACE adoption of IWRSS FIM standards as described above would streamline processes to deliver flood inundation maps during emergencies.
- **Dam Safety and Levee Safety**
  By aligning EAP map standards with IWRSS standards the dam safety and levee safety programs can leverage best practices and tools developed by a broader federal community.

The 5-year implementation strategy establishes a roadmap for IWRSS-FIM related development by USACE, with the goal of aligning the programs and initiatives described above with the IWRSS FIM standards. More detail is provided for the first two years' of effort (FY16 and FY17). It assumes an iterative development approach where each major task would follow a similar multi-step design and development process:

- **Requirements validation -** review IWRSS FIM requirements, determine if additional USACE-driven requirements are needed to support unique mission requirements.
- **Design -** Sufficient to trace completion of all requirements, verify adherence to standards and verify sufficient budget.
- **Build -** Development effort.
- **Testing & Deployment -** Testing performed prior to deployment on production servers. Example: Testing services to verify that they meet performance benchmarks.
- **Training -** Envisioned tools either affect small user groups requiring informal training or are simple workflows that will not require substantial training. Whenever possible,

training materials will be developed as simple how-to documents or videos and made available online from links within the tools. As they are deployed, overviews of the tools will be incorporated into the flood inundation modeling and mapping training courses already provided by HEC and MMC.

The approach assumes that long-term operation and maintenance costs of the IWRSS FIM capabilities will not meaningfully impact the current O&M budgets of the systems within which they will be deployed. If this assumption does not hold, O&M budget needs will be identified during requirements and design phases and O&M impacts addressed (approach changed or O&M increase approved) prior to build, testing and deployment.

The purpose of each task is described below. Priority, schedule and resource needs are identified in the gantt chart.

Tasks

Prior to work beginning on the implementation tasks the IWRSS FIM design needs to be briefed at HQs and a USACE internal review is needed. This would result in a design/build scope decision that could modify the tasks as drafted below.

It is expected that IWRSS FIM implementation coordination meetings will occur among the IWRSS member agencies. Within the proposed schedule these are noted as (assumed) quarterly coordination meetings. Coordination is necessary to provide implementation status, to share best practices and lessons learned and to complete recurring review of IWRSS FIM data and cartography standards.

1.0 Implement IWRSS FIM data model

Modify the MMC database as a pilot project, followed by the USACE enterprise geospatial database, to store inundation map layers and attributes compliant with the IWRSS FIM data standard. Completion of the MMC Production Center Pilot will yield an IWRSS-compliant Oracle physical data model for incorporation into the USACE enterprise database with minimal modification. Later, schedule is uncertain but as early as FY17, adjust CWMS toolkit to support posting CWMS-produced inundation maps into the USACE enterprise database.

2.0 Deploy IWRSS FIM-compliant map and data services

Once the MMC and USACE enterprise geospatial databases are updated, internal services can be deployed to IWRSS design standards. Later, after thorough testing, the USACE can deploy external map and data services that allow secure access to other IWRSS member agencies.

3.0 Consume IWRSS-compliant services

CorpsMap-compliant data viewers that display inundation maps will be configured to read IWRSS-compliant services. The first step will be integrating the USACE services. Once deployed, services hosted by the other IWRSS member agencies will be integrated as well.

Documentation will be developed to guide USACE users linking to IWRSS inundation map services from common desktop and web platforms.

4.0 Maps on demand update

An initial version of the maps on demand capability was deployed by the MMC Production Center in 2015. This task will first modify the existing tool to work with the IWRSS data standard IWRSS-compliant data services. Next, enhancements will be made to modify the Maps on Demand architecture for portability and performance, and capabilities will be added to generate IWRSS-compliant map notes/reports in addition to the PDF-format map sheets already generated by the tool. Once complete, Maps on Demand can be deployed externally, either by USACE or by a different IWRSS member agency, making the tool available to all IWRSS members and to the the public for public-accessible inundation map libraries.

5.0 IWRSS-compliant model outputs

Capabilities are needed so that USACE can efficiently produce IWRSS-compliant products. Developing tools to efficiently format hydraulic model map outputs and to document models to IWRSS standards is necessary to achieve efficient routine production. This task will result in a tool to convert HEC-RAS map layers to the IWRSS data standard and a tool to support authoring IWRSS-compliant model documentation and storing it within existing model description fields.

6.0 MMC SOP revisions

The MMC Production Center is committed to fully implementing IWRSS data standards within its routine production processes. The center will also modify the USACE dam and levee emergency action plan map standards to align with IWRSS standards. Update of the MMC SOPs in FY17 will finalize MMC adoption of IWRSS standards. Additionally, the IWRSS FIM map data templates produced as part of MMC SOP update will be valuable to groups tasked with producing IWRSS-compliant inundation maps as their use will ensure adherence to standards.

7.0 IWRSS-compliant data exports

A strategic objective of the dam safety and levee safety programs' data management initiative is to ensure that users do not feel like information is "trapped" once it is loaded into the enterprise database. One method for opening up access to corporate data is providing tools so that users can export it out into common desktop formats. Since it is funded by dam and levee safety, the MMC database must ultimately meet this open data objective.

8.0 Single Map View Tool

Whereas the Maps on Demand capability develops publication-quality map atlases to USACE and IWRSS standards, this tool is needed to satisfy an IWRSS FIM requirement to generate single-page map sheets. It can be implemented via a simple enhancement of Maps on Demand, but it may also be developed by another IWRSS member agency.

9.0 FGDC metadata generation

IWRSS standards adopt FGDC standards for metadata. Significant metadata is required to adequately document the purpose and use of inundation map libraries. A tool is necessary for efficient production. The first task is for the MMC Production Center to implement a subset of IWRSS-compliant metadata needed for its routine production processes. The second task is to expand the initial, MMC-focused tool to support creation of the full spectrum of IWRSS-compliant metadata. This second task may be performed by a different IWRSS member agency, but in close collaboration with the MMC to minimize duplication of effort.

10.0 Registry tool

The dam safety and levee safety programs have defined a requirement for a search tool integrated with multiple USACE corporate document and data repositories and capable of providing search results from the multiple repositories through a single query. Similar in concept to a search engine. Within this concept an IWRSS-compliant data service is simply another corporate data repository to be searched. As requirements for the broad search tool are refined the cost effectiveness of developing the IWRSS registry requirements within the solution will be evaluated. This IWRSS capability may also be developed by a different IWRSS member agency.

11.0 Guidance

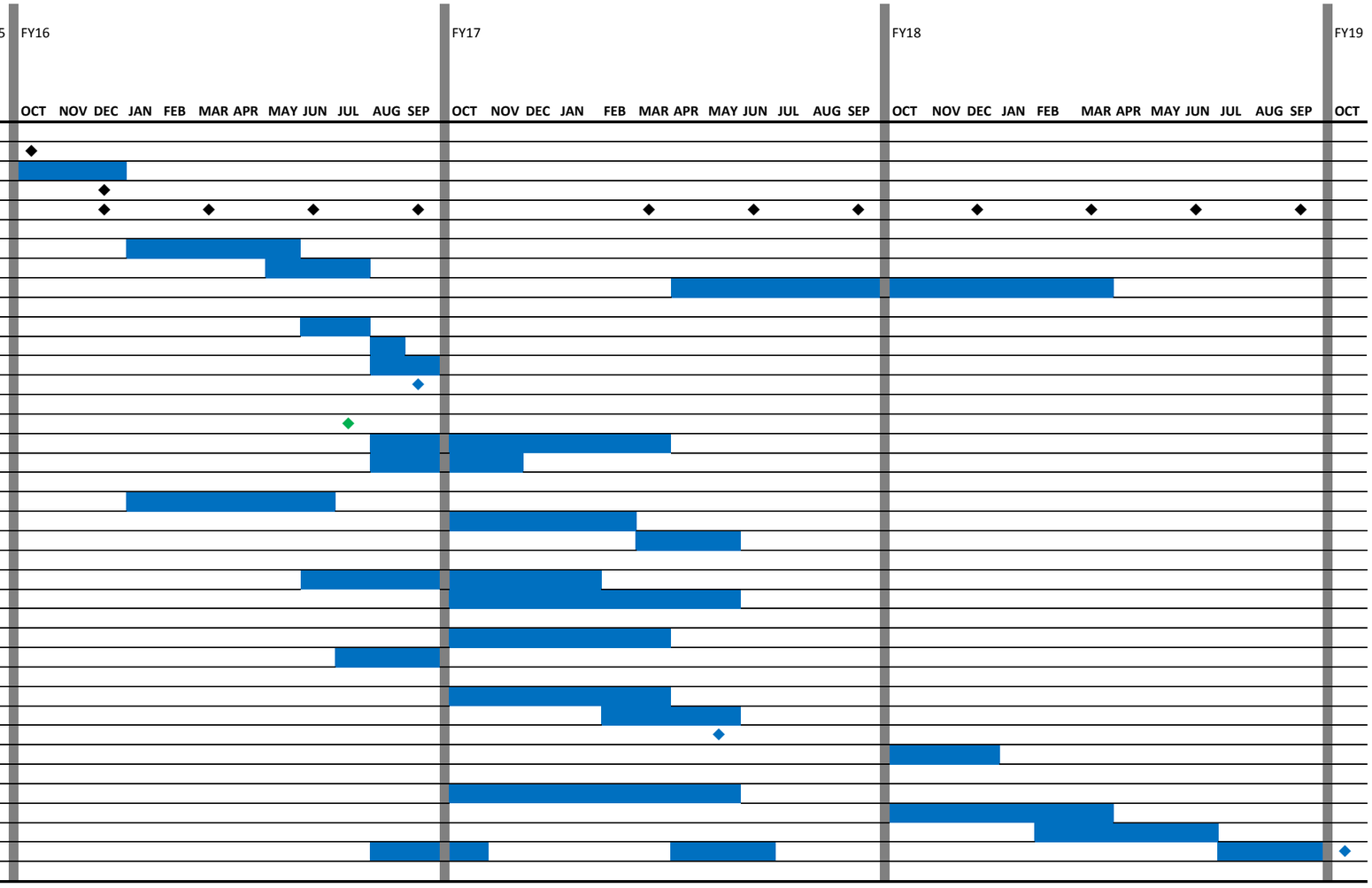
Documentation and training materials will be necessary as the above capabilities are implemented. This task is schedule and cost for documentation and training, generally greatest effort towards the end of the three implementation plan milestones: USACE database and map/data services deployed, USACE tools fully IWRSS-compliant and Scope of IWRSS FIM requirements fully implemented.

Prioritized USACE Tasks to Implement IWRSS Services and Tools

Key

Rollup Task
Task within lead org current budget
Task with additional funding required
IWRSS Program Objective Completion Milestone
External Milestone

Line	Task	Description	Dependencies	IWRSS Component	USACE Action: Lead	Partner	Support	Lead Org
1		IWRSS FIM Design delivered						
2		USACE IWRSS FIM design briefing						
3		USACE IWRSS FIM design review						
4		USACE IWRSS FIM design/build scope decision						
5		IWRSS FIM implementation coordination meetings						
6	**1.0**	**Implement IWRSS FIM data model**		**Database**				
7	1.1	MMC database			X			MMC
8	1.2	CorpsMap national database	SF 1.1		X			CRREL
9	1.3	CWMS integration (feed national database)	SF 1.2		X			HEC?/CRREL?
10	**2.0**	**Deploy IWRSS FIM-compliant map & data services**		**Services**				
11	2.1	Internal - MMC database	SF 1.1		X			MMC
12	2.2	Internal - CorpsMap national database	SF 1.2		X			CRREL
13	2.3	External - CorpsMap national database	SF 1.2		X			CRREL
14		**USACE database and map/data services deployed**						
15	**3.0**	**Consume IWRSS-compliant services**		**Viewer**				
		USGS, NWS IWRSS-compliant services deployed						
16	3.1	MMC data viewer	SF 2.1, USGS/NWS services		X			MMC
17	3.2	CorpsMap UOC viewer	SF 2.1		X			CRREL
18	**4.0**	**Maps on Demand service update**		**MapGen**				
19	4.1	Phase 1 - data standard	SF 1.1		X			MMC
20	4.2	Phase 2 - end state architecture, reports	SF 4.1		X			MMC
21	4.3	External deployment	SF 4.2			X		USGS?
22	**5.0**	**IWRSS-compliant model outputs**		**Model**				
23	5.1	Map layers			X			HEC
24	5.2	Model metadata reports			X			HEC
25	**6.0**	**MMC SOP revisions**	**FF FY17 SOP**					
26	6.1	Align to IWRSS standards			X			MMC
27	6.2	FIM data templates for ArcGIS	SF 1.1			X		MMC
28	**7.0**	**IWRSS-compliant data exports ("zip-n-ship")**		**Data access**				
29	7.1	MMC database	SF 1.1, 2.1, FF 3.1		X			MMC
30	7.2	CorpsMap national database	SF 1.2, 3.2		X			CRREL
31		**USACE tools fully IWRSS-compliant**						
32	**8.0**	**Single Map View Tool**		**MapGen**			**X**	**MMC**
33	**9.0**	**FGDC Metadata Generation**		**Metadata**				
34	9.1	MMC documentation interface	SS 6.0		X			MMC
35	9.2	Full IWRSS capability	SF 9.1				X	CRREL
36	**10.0**	**Registry Tool**				**X**		**MMC**
37	**11.0**	**Guidance**				**X**		**MMC**
		Scope of IWRSS FIM Requirements fully implemented						



Prioritized USACE Tasks to Implement

Key

Rollup Task
Task within lead org current budget
Task with additional funding required
IWRSS Program Objective Completion Milestone
External Milestone

Line	Task	Description	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
														FY20											
1		IWRSS FIM Design delivered																							
2		USACE IWRSS FIM design briefing																							
3		USACE IWRSS FIM design review																							
4		USACE IWRSS FIM design/build scope decision																							
5		IWRSS FIM implementation coordination meetings		◆			◆			◆			◆			◆			◆			◆			◆
6	**1.0**	**Implement IWRSS FIM data model**																							
7	1.1	MMC database																							
8	1.2	CorpsMap national database																							
9	1.3	CWMS integration (feed national database)																							
10	**2.0**	**Deploy IWRSS FIM-compliant map & data services**																							
11	2.1	Internal - MMC database																							
12	2.2	Internal - CorpsMap national database																							
13	2.3	External - CorpsMap national database																							
14		**USACE database and map/data services deployed**																							
15	**3.0**	**Consume IWRSS-compliant services**																							
		USGS, NWS IWRSS-compliant services deployed																							
16	3.1	MMC data viewer																							
17	3.2	CorpsMap UOC viewer																							
18	**4.0**	**Maps on Demand service update**																							
19	4.1	Phase 1 - data standard																							
20	4.2	Phase 2 - end state architecture, reports																							
21	4.3	External deployment																							
22	**5.0**	**IWRSS-compliant model outputs**																							
23	5.1	Map layers																							
24	5.2	Model metadata reports																							
25	**6.0**	**MMC SOP revisions**																							
26	6.1	Align to IWRSS standards																							
27	6.2	FIM data templates for ArcGIS																							
28	**7.0**	**IWRSS-compliant data exports ("zip-n-ship")**																							
29	7.1	MMC database																							
30	7.2	CorpsMap national database																							
31		**USACE tools fully IWRSS-compliant**																							
32	**8.0**	**Single Map View Tool**																							
33	**9.0**	**FGDC Metadata Generation**																							
34	9.1	MMC documentation interface																							
35	9.2	Full IWRSS capability																							
36	**10.0**	**Registry Tool**																							
37	**11.0**	**Guidance**																							
		Scope of IWRSS FIM Requirements fully implemented																							

USGS Implementation Plan

The IWRSS FIM requirements and design were developed to align with the current efforts and future needs of USGS Flood Inundation Mapping Program. Pre-implementation activities for USGS are estimated to span from FY16 to FYXX, following the recommended start dates shown in figure 2 of Chapter 1.

Implementation activities can be followed after the adoption of the IWRSS FIM Standards and incorporation of the design guidelines. Implementation activities are estimated to span from FY16 to FYXX for the development, operations, and maintenance of tools/services.
During the implementation phase, existing USGS FIM Mapper services would need to be adapted to conform to the newly adopted the IWRSS FIM standards. After the adaptation of the services have been completed, performance testing of these service should be conducted before the service are to be deployed. Adaptation of IWRSS FIM standards to the existing services can help keep flood inundation map consistency across IWRSS FIM member agencies and allow maps to be shared, consumed, and exchanged seamlessly.

Following is a list of recommended IWRSS FIM design implementation activities for USGS which include pre-implementation and implementation activities. The schedule of each project could change per recommendation of the implementation team based on the team's review, testing to verify whether deployed components meet original design intent, project dependencies, and agency constraints.

1.0 Implement IWRSS FIM data model

Upgrading the USGS FIM geodatabase to an enterprise database that meets the IWRSS standards (Chapter 3) will be the first task. The database is currently in an ArcGIS Server and an SQL Server. The data will be reattributed to the agreed upon conventions under the guidance of the Implementation Team. We anticipate the data will become IWRSS compliant in stages beginning with the products and metadata (currently stored) and later focus will be on the hydraulic and terrain model storage. The rough scope of the database upgrades is $75,000 and will take approximately 1 year. Work can be started immediately with current development changes but will be guided by the Implementation Team. Existing USGS FIM libraries (roughly 100) will be migrated to the IWRSS data model as part of the upgrade.

2.0 Deploy IWRSS FIM-compliant map and data services

Once USGS enterprise geospatial databases are updated, internal services can be deployed to IWRSS design standards. The USGS can deploy external map and data services that allow secure access to other IWRSS member agencies. In the current FY16 OSW FIM development budget, we can move forward with subtle design changes that help the cartography meet the IWRSS Cartographic Standards. Deploying data services will be $55,000 and cartographic services will be $20,000; both will take approximately 1 year (following completion of 1.0).

3.0 Consume IWRSS-compliant services

USGS data/map viewers that display inundation maps will be configured to read IWRSS-compliant services. The first step will be refactoring the application to support USGS deployed IWRSS services. Once deployed, services hosted by the other IWRSS member agencies will be integrated as well. Documentation will be developed to guide USGS users linking to IWRSS inundation map services from common desktop and web platforms. We will continue to support both the public and peer-review mappers (FOUO and in review data). Completed as part of 2.0.

4.0 Data Accessibility Tool

USGS uses publications warehouse (http://pubs.er.usgs.gov/) as our ftp repository for full reports, shapefiles and grids of products and metadata. Terrain and hydraulic models are available via the WSC archive policy (i.e. business card). Minimal modifications or updates are required to meet minimum IWRSS Standards. The USGS may choose to implement the full IWRSS database but that is out of the scope of this effort.

5.0-6.0 Maps on Demand Tool updates

This task will first modify the existing single-page pdf tool (Table 5.5, Appendix I) to work with the IWRSS data standard IWRSS-compliant data services. If needed, the single-page pdf tool can be extended so that other IWRSS partners can generate maps using the tool. Extension of this tool to meet the needs of other agency mapping products will be a task to be scoped by the implementation team.

For meeting the Map Atlas products, we recommend working with the already developed USACE tools (Appendix H). In order for the USGS to duplicate the USACE capability, further understand of the construction of their tools are needed and should be scoped by an interagency team during implementation (USACE and USGS).

7.0 FGDC metadata generation

IWRSS standards adopt FGDC standards for metadata. USGS provides an XML file with downloadable data but has no plans to convert it services. As part of the IWRSS implementation, an automatic metadata generation could be developed to support all the maps in the database that builds from the standard database. Our current system works well at our scope and this is not a priority for the USGS. This task may be performed by a different IWRSS member agency, but in close collaboration with the Implementation Team to minimize duplication of effort.

8.0 Develop a Public FIM Mapping Project Registry

The USGS currently has a registry of current and future map libraries for the USGS. It is currently in a SharePoint list and could be easily transitioned to a public webpage and even give password access to the other member agencies with minimal effort but would be more complex to maintain in the long term. A larger step envisions a small database could be setup to provide a registry with more robust mapping/access tools. A public list with password based updating privileges would cost roughly $75,000 and take 4 months to complete. It would be available for all agencies and teams that work on flood mapping.

9.0 Guidance

USGS already has templates in wide use that match our current data and service architecture. Guidance will need to be updated to meet the USGS implementation of the IWRSS data model. The intent of the common IWRSS model is to have the same guidance since we all have the same data structure. The Implementation Team will support the development of guidance for each member agency's implementation for the IWRSS data model. A blank geodatabase template or other database delivery may be part of that process.

10.0 IWRSS-compliant model outputs

Capabilities are needed so that USGS can efficiently produce IWRSS-compliant products. Developing tools to efficiently format hydraulic model map outputs and to document models to IWRSS standards is necessary to achieve efficient routine production. The USGS modeling package iRIC can build a module to output model results in the IWRSS data standard format. (www.i-ric.org)