

CERP Guidance Memorandum

South Florida Water Management District – Jacksonville District, U.S. Army Corps Of Engineers

CGM NUMBER: 028.01

EFFECTIVE DATE: 10/08/2009

CATEGORY: General

SUBJECT: Technical Specifications for CERP Geographic Information System (GIS)

DESCRIPTION:

This memorandum establishes procedures, policy and guidance to the Jacksonville District, U.S. Army Corps of Engineers (USACE) and the South Florida Water Management District (SFWMD) staffs, as well as members of the Project Delivery Teams (PDTs) on the technical specifications for CERP GIS. This memorandum provides guidelines and recommendations covering all GIS datasets and applications that are being created or have been created for any Comprehensive Everglades Restoration Plan (CERP) project or program. The overall goal is to ensure that a high quality, well-documented CERP GIS is built and maintained. The primary objectives of these standards are to provide the technical specifications that GIS data must meet to be accepted into the CERP GIS Database and the requirements that GIS applications must meet to be incorporated into the CERPZone. The specifications are grouped into two categories:

1. Required Technical Specifications
2. Recommended Technical Guidelines.

Any Recommended Guideline that is not met must be fully documented. CERP GIS datasets are considered to be spatial data that has been created or altered by any individual, including SAJ or SFWMD Staff members and internal or external contractors, designed to fulfill a specific CERP need or task, including any data that is utilized in analysis. Spatial data, as defined by the CERP Data Management Project Management Plan (PMP), is defined as “information about the location and shape of, and relationships among, geographic features, usually stored as coordinates and topology.” CERP GIS applications are considered to be any commercial (off the shelf) or custom built application that involves the use of “spatial technology” and may require the use of ESRI licenses. The CERP GIS Applications Guidance must be followed in order for any developed application to be published within the CERPZone environment.

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GIS DATA GUIDANCE:

Required Technical Specifications

Software, Format and Media:

ESRI's suite of GIS and Mapping products were approved by the DCT as the Geographic Information System (GIS) for CERP. CERP Data Management maintains the ESRI suite of GIS and Mapping products (ArcGIS) as the standard GIS Software platform for CERP planning and decision making. All GIS data presented for inclusion in the CERP GIS database must be in a format immediately usable within at least one of the ArcGIS modules. The geo-database is the native data structure for ArcGIS and is the **primary data format** used for editing and data management for CERP. In the case of geo-databases, they must be version 9.3 or later, high precision, with X, Y, Z and M domains set appropriately for the projection, units and areal extent used. All formats will have projections defined. ESRI maintains a list of currently acceptable data formats at [http://webhelp.esri.com/arcgisdesktop/9.3/index.cfm?id=3093&pid=3092&topicname=An overview of data support in ArcGIS](http://webhelp.esri.com/arcgisdesktop/9.3/index.cfm?id=3093&pid=3092&topicname=An%20overview%20of%20data%20support%20in%20ArcGIS).

All GIS data will be submitted on appropriate removable media. Examples include CD-ROM, DVD, USB memory stick and USB or Fire wire portable disk. The submittal media becomes the property of the government. All media should be clearly labeled and dated with contact information for the person who is responsible for the data. No assumption should be made about the platform or operating system that will mount the media. Specifically, embedded blanks in file names and directories are not supported.

Historic and Legacy Data:

Historic and legacy GIS data is defined as data that has been created or used for CERP projects prior to acceptance of these standards. This data will be archived in its original format. Any GIS data provided for CERP after the implementation of this CGM must comply with these approved standards.

Until recently, most spatial data collected in South Florida was referenced to the North American Datum of 1927 (NAD 27) and the National Geodetic Vertical Datum of 1929 (NGVD 29). Since these datums are no longer the national standards, and are not supported by NGS, they are referred to as "superseded datums." There are a smaller number of very old datasets based on a variety of local datums (Ft. Myers, Punta Rassa, Okeechobee, etc.).

There are several applications that depend on GIS data that is referenced to superseded datums for which compliance with this standard will be a challenge. Systems that require GIS data to be referenced to superseded datums should devise a plan for conversion to the

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current NGS supported datums. This plan should include a timeline that indicates when these systems will be able to use spatial data referenced to the supported datums. Stewards of these systems may then request data producers to provide the GIS data in both datums for as long as their conversion timeline indicates. CERP Guidance Memorandum (CGM) 36.0 addresses Vertical Datum Standards for CERP.

Coordinate System:

Horizontal Datums

The horizontal datum for CERP is the North American Datum 1983 (NAD83), as required by Federal Register (Vol. 54 No 113 p 25318) 14 June 1989. Since there are several adjustments of NAD83, the adjustment used should be specified in the metadata.

Vertical Datums

The vertical datum for CERP is the North American Vertical Datum 1988 (NAVD88) as required by Federal Register (Vol. 58 No 120 p 34245) 24 June 1993. If a geo-id model is used to convert ground surface elevations from GPS measured ellipsoid heights to NAVD88 orthometric heights, then the geo-id used should be specified in the Data Lineage section of the metadata. CERP Guidance Memorandum (CGM) 36.0 addresses Vertical Datum Standards for CERP.

Below is an example of FGDC vertical datum metadata.

Altitude System Definition

Datum Name: North American Vertical Datum of 1988

Resolution: 1.000000

Distance Units: feet

Encoding Method: Explicit elevation coordinate included with horizontal coordinates

Projection:

The projection used for CERP is Florida State Plane East, NAD83 (HARN), feet (NAD_1983_HARN_StatePlane_Florida_East_FIPS_0901_Feet). The data must have an ESRI defined projection.

Below are the details of the projection.

Projection: Transverse_Mercator

False_Easting: 656166.666667

False_Northing: 0.000000

Central_Meridian: -81.000000

Scale_Factor: 0.999941

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Latitude_Of_Origin: 24.333333
Linear Unit: Foot_US (0.304801)

Geographic Coordinate System: GCS_North_American_1983_HARN
Angular Unit: Degree (0.017453292519943299)
Prime Meridian: Greenwich (0.000000000000000000)
Datum: D_North_American_1983_HARN
Spheroid: GRS_1980
Semimajor Axis: 6378137.000000000000000000
Semiminor Axis: 6356752.314140356100000000
Inverse Flattening: 298.257222101000020000

It is recognized that there are numerous projections available for the extent of the South Florida region. CERP Stakeholders who work in a different projection are required to provide their data in both their working projection and the CERP Standard Projection for inclusion in the CERP GIS Database. Projections must be documented correctly in the data's metadata.

Metadata:

All GIS datasets must be provided with FGDC compliant metadata. This metadata should be associated to the geo-database feature class via ArcCatalog or in the format of an XML file for shapefiles. Additional details regarding CERP Metadata for both data and map documents is available in the CERP GIS Standard Operating Procedures (<https://www.cerpzone.org/Teams/GIS/Documents/Default.aspx>).

FGDC Metadata standards publications are available at http://www.fgdc.gov/standards/standards_publications/index.html/.

FGDC Content Standard for Digital Geospatial Metadata, Version 2 (CSDGM), FGDC-STD-001-1998 has been adopted by CERP Data Management as the documentation or metadata format for all GIS data that is to be included in the CERP GIS geo-database. The standard can be found at <http://www.fgdc.gov/metadata/geospatial-metadata-standards>, and in an annotated workbook format at http://www.fgdc.gov/metadata/documents/workbook_0501_bmk.pdf.

If the spatial data is also biological in nature, the [Biological Data Profile](http://www.fgdc.gov/standards/projects/FGDC-standards-projects/metadata/biometadata/standards/projects/metadata/biometadata/biodatap.pdf), <http://www.fgdc.gov/standards/projects/FGDC-standards-projects/metadata/biometadata/standards/projects/metadata/biometadata/biodatap.pdf>, may be appropriate. In either case all applicable sections must be completed. Specifically, if the geospatial data has attributes, the Entity_Attribute Section must be filled out, and the attributes and their domains and ranges documented. Likewise, the various accuracy items

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in the Data_Quality Section must be completed whenever the items to which they apply are present. Positional accuracy reporting in metadata must be consistent with Geospatial Positioning Accuracy Standards FGDC-STD-007.1-1998: Part 1: Reporting Methodology (<http://www.fgdc.gov/standards/projects/FGDC-standards-projects/accuracy/part1/chapter1>), and use the Geospatial Positioning Accuracy Standards FGDC-STD-007.3-1998 Part 3: National Standard for Spatial Data Accuracy (<http://www.fgdc.gov/standards/projects/FGDC-standards-projects/accuracy/part3/chapter3>). “Positional Accuracy Handbook: Using the National Standard for Spatial Data Accuracy to measure and report geographic data quality” is a convenient workbook, including example calculations, and is available at http://www.mnplan.state.mn.us/pdf/1999/lmic/nssda_o.pdf. Completing the Lineage and Process_Step entries of the Data Quality Section is also required. The metadata should be delivered in ASCII text format in a file capable of passing the USGS metadata parser "mp" without error. MP can be downloaded from <http://geology.usgs.gov/tools/metadata/tools/doc/mp.html>.

Recommended Technical Guidelines

Accuracy:

Cartographic Accuracy

Cartographic products for CERP must meet the National Map Accuracy Standards. This accuracy must be documented in the metadata. More information on National Map Accuracy Standards is available at <http://rockyweb.cr.usgs.gov/nmpstds/nmas.html>

Accuracy of Digital Spatial Datasets

The spatial accuracy of individual CERP geospatial datasets will be determined by the purpose for which they are collected. As stated above, spatial accuracy will be reported in accordance with Positional accuracy reporting in metadata and must be consistent with Geospatial Positioning Accuracy Standards FGDC-STD-007.1-1998: Part 1: Reporting Methodology (<http://www.fgdc.gov/standards/projects/FGDC-standards-projects/accuracy/part1/chapter1>), and use the Geospatial Positioning Accuracy Standards FGDC-STD-007.3-1998 Part 3: National Standard for Spatial Data Accuracy (<http://www.fgdc.gov/standards/projects/FGDC-standards-projects/accuracy/part3/chapter3>). All statements about accuracy must be thoroughly substantiated in the metadata.

Geometry:

All geospatial datasets created for CERP shall have no geometry errors. Each feature class shall pass (with no errors) the “Check Geometry”

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([http://webhelp.esri.com/arcgisdesktop/9.2/index.cfm?TopicName=Check%20Geometry%20\(Data%20Management\)](http://webhelp.esri.com/arcgisdesktop/9.2/index.cfm?TopicName=Check%20Geometry%20(Data%20Management))) tool available in ESRI's Geoprocessing Toolbox.

Attributes:

GIS attribute standardization and documentation is an important aspect of CERP data management. We depend on it to enable piecewise assembly of project datasets into system-wide themes for regional analysis. On the other hand, given the variety of spatial data types, formats and uses, and the number of data producers, many of whom are following mandates from some level of government; it is not easy to make concise statements of wide generality about attribute schemas. Some quality guidelines are given below.

Attribute Guidelines

1. All datasets must be properly attributed.
2. The codes for attribute values, their domains, ranges and meanings must be thoroughly documented in the metadata.
3. The tests used to establish the accuracy of the attribution will be reported in the Entity_Attribute Section of the metadata.

Published Attribute Standards

The following are examples of published content standards, which have been adopted by CERP.

- Florida Land Use, Cover and Forms Classification System (FLUCCS), January 1999, FDOT Surveying and Mapping, Thematic Mapping Section for land use and land cover.
(<http://www.dot.state.fl.us/surveyingandmapping/Manuals/fluccmanual.pdf>)
- USACE is required to use the Spatial Data Standards for Facilities, Infrastructure and the Environment (SDSFIE) from the CADD/GIS Technical Center (CGTC) at the Engineering Research and Development Center (ERDC) (<http://www.sdsfie.org/>). Unused attributes can be eliminated from the framework and locally necessary attributes (such as FIPS codes) and locally defined tables can be added within the SDS framework. Datasets which are stewarded by other agencies who have mandates and authorities to do so, such as DLG, NHD, EPA STORET, FDOT FLUCCS, Census and Tiger/Line, and those that are updated periodically in their native format, such as GDT and NavTech, should not be converted to SDS. SDSFIE

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should be considered for new vector datasets. The CERP GIS Data Management Team needs to be made aware of any new data creation that is occurring for CERP Projects.

Attribute Basics

When not following a published standard, attributes must at least:

1. Begin all attribute item names with a letter.
2. Eliminate punctuation, i.e. hyphens, periods, and capitalization from item names and attribute codes. Underscores are permitted.
3. Allow for as many different foreseeable uses of the data as possible
4. Do not use "Reserved Words" published in the CERP GIS Data Steward Manual.

GIS APPLICATION GUIDANCE:

Required Technical Specifications

GIS Application Development Process:

The GIS Application Development Process (<https://www.cerpzone.org/Teams/GIS/Documents/Default.aspx>) follows a Software Development Lifecycle (SDLC) approach (<https://www.cerpzone.org/Teams/GIS/Documents/Default.aspx>). Any CERP customers that outsource GIS development services will be required to follow this process and provide associated documentation and deliverables outlined in the process guidelines. The GIS Application Development Process document and SDLC templates will be provided at the project start.

GIS Application System Overview:

The GIS Application System Overview (<https://www.cerpzone.org/Teams/GIS/Documents/Default.aspx>) provides details on the current infrastructure, development platform and programming languages supported by CERP GIS application services. All applications developed for CERP Projects or Programs will comply with these specifications and will be built to operate within the existing environment. These guidelines may be changed or updated on a frequent basis depending

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on hardware replacement, software upgrades, or other technology developments. The most current version of this document will be provided at the project start.

GIS Application Development Best Practices:

The GIS Application Development Best Practices (<https://www.cerpzone.org/Teams/GIS/Documents/Default.aspx>) document lists programming conventions that the contractor is expected to adhere to when developing application code. These conventions have been compiled based on knowledge gained from internal agency GIS application projects and will ensure that code runs efficiently, with minimal maintenance or overhead. It is expected that, over time, the Best Practices document will be expanded to accommodate conventions gleaned from additional project experience. The most current version of this document will be provided at the project start.

APPLICATION:

Effective the date of this memorandum, the above-mentioned standards will be adhered to for all CERP Project and CERP Program GIS data and applications. This information or a reference to this memorandum will be included in any Scope of Work or Contract that involves geospatial data.

LIST OF ACRONYMS:

CADD Computer Aided Design and Drafting
CERP Comprehensive Everglades Restoration Plan
CSDGM Content Standard for Digital Geospatial Metadata
DLG Digital Line Graph
EDEN Everglades Depth Estimation Network
EPA Environmental Protection Agency
ERDC Engineering Research and Development Center
FAQ Frequently Asked Questions
FDEP Florida Department of Environmental Protection
FDOT Florida Department of Transportation
FGDC Federal Geographic Data Committee
FIPS Federal Information Processing Standards
FLUCCS Florida Land Use, Cover and Forms Classification System
GIS Geographic Information System
HARN High Accuracy Reference Network
NAVD88 North American Vertical Datum of 1988
NAD83 North American Datum of 1983

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NHD National Hydrography Dataset
NSSDA National Standard for Spatial Data Accuracy
PMP Project Management Plan
SAJ Jacksonville District, US Army Corps of Engineers
SDS Spatial Data Standards
SDSFIE Spatial Data Standards for Facilities, Infrastructure and Environment
SFWMD South Florida Water Management District
STORET STORage and RETrieval

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