

# GIS Data Standard Operating Procedure

## Revision Log

Revision	Description of Change	Author	Effective Date
1	Original draft	G. Sanders	10/01/2005
1.1	Added additional documentation	G. Sanders	12/06/2005
1.2	Added additional documentation	G. Sanders/M. Lehman	06/21/2007

## Purpose

This SOP identifies the standards (data formats, coordinate systems, spatial scale and resolution) for all spatial data collected and managed by the National Capital Region I&M Network.

## Scope

The standards outlined in this SOP are applicable to all geographic datasets created or managed by Network staff or cooperators. This document does not provide guidance relating to the collection of GPS data but is applicable to how such data is formatted after collection. For detailed information regarding the collection of GPS data, refer to the NCRN SOP for GPS data collection.

## Key Terms

NCRN – National Capital Region Network

MrSID – Proprietary compressed image format (see <http://www.lizardtech.com/>).

FGDC – Federal Geographic Data Committee

ESRI – Environmental Systems Research Institute

Metadata – Data documentation that should accompany all digital data sets and conform to FGDC standards.

## Procedures and General Requirements

### *Data Formats:*

- All vector data will be supplied as an ESRI Shapefile. Data may also be submitted as an ArcGIS Geodatabase in addition to the shapefile (*not instead of*) that is compatible with the current version of ArcGIS.
- All raster data will be supplied as an ArcINFO GRID or ArcINFO interchange file (\*.e00) that is compatible with the current version of ArcGIS.

**Note:** Be aware that when ArcINFO GRID files are converted to interchange files (\*.e00) the interchange file size is often much larger than the original GRID. Therefore, this may not be the most appropriate method of transferring this data.

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- Digital imagery (e.g. aerial photos) is to be supplied as tagged image file format (.TIFF) with the proper header file for geo-referencing purposes. Depending on the intended use of the imagery, it may be preferable to receive and store the imagery in an uncompressed format therefore, consult the project leader or data manager prior to storing imagery in a compressed format such as MrSID. All digital imagery will be properly orthorectified unless it is decided ahead of time that two dimensional georeferencing is appropriate. All imagery must be accompanied by appropriate header or world files.

### *Data Requirements:*

- Data file names should not contain spaces. If a space is desired in a field name, use an underscore ("\_"). In addition, field names should not exceed 10 characters due to limitations in ArcINFO and dbase.
- All GIS layers (rasters, vectors and imagery) should all be submitted with complete and FGDC compliant metadata. Metadata should be created based on the NPS Metadata Templates. Please refer to the NCRN Metadata SOP for more details on.
- All spatial data, regardless of format, must also have defined projections (in the case of shapefiles, an accompanying \*.prj file).

### *Coordinate Systems:*

- All spatial data collected for and/or submitted to the NCRN will be projected as UTM, Zone 18, NAD83 (meters). Note that individual parks may maintain geographic data in a different coordinate system (see Table 1). The steps used to ensure that the data conform to these standard projections must be documented in the accompanying FGDC compliant metadata. Prior approval from the project or data manager must be received to deviate from these specifications.

### *Spatial Scale and Resolution:*

- Specific scale and spatial resolution requirements for image data will be specified in the contract or cooperative agreement for each project. For example, vegetation classification projects under the NPS/USGS vegetation classification and mapping program will use 1:12,000 color infrared aerial photographs (or better) with 60% overlap (endlap) and 30% sidelap.
- In general, new data should be compiled with an accuracy level better than US National Map Accuracy Standards (NMAS) for a 1:24,000 scale map; unless other requirements exist (which would then be included on a protocol-specific basis). However, all spatial data collected will be analyzed for their spatial accuracy and will meet or exceed NMAS for the appropriate scale (for more information, please see <http://mapping.usgs.gov/standards>).

**Note:** Adhering to these standards is very important especially when one considers that parks in the NCRN are not that large. Some parks contain very small disjunct parcels while others are long and narrow parks. If strict mapping accuracy standards are not followed, it is likely that mapped features may not fall inside the boundary of the parks when plotted in a GIS.

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Table 1. Standard projections used by parks in the National Capital Region.

Park	Projection	Datum	Spheroid	FalseEasting	False Northing	Units
All	UTM	NAD83	GRS 1980	500,000	0	Meters
All	Geographic	NAD83	GRS 1980			Decimal Degrees
ANTI	UTM, Zone 18	NAD83	GRS 1980	500,000	0	Meters
CATO	UTM, Zone 18	NAD27	CLARK 1866	500,000	0	Meters
CHOH	State Plane MD	NAD83	GRS 1980	1,312,333.33	0	Feet
GWMP	State Plane VA	NAD83	GRS 1980	11,482,916.67	0	Feet
HAFE	State Plane WV	NAD27	CLARK 1866	500,000	0	Feet
NACC	State Plane MD	NAD83	GRS 1980	2,000,000	0	Meters
NACE	State Plane MD	NAD83	GRS 1980	400,000	0	Meters
MANA	UTM, Zone 18	NAD83	GRS 1980	500,000	0	Meters
MONO	UTM, Zone 18	NAD83	GRS 1980	500,000	0	Meters
PRWI	UTM, Zone 18	NAD27	CLARK 1866	500,000	0	Meters
ROCR	State Plane MD	NAD83	GRS 1980	400,000	0	Meters
WOTR	UTM, Zone 18	NAD83	GRS 1980	500,000	0	Meters

- For maps on publication scales larger than 1:20,000, not more than 10 percent of the points tested shall be in error by more than 1/30 inch, measured on the publication scale; for maps on publication scales of 1:20,000 or smaller, 1/50 inch. These limits of accuracy shall apply to positions of well-defined points only. Well-defined points are those that are easily visible or recoverable on the ground: monuments or markers, such as benchmarks and property boundary monuments; intersections of roads and railroads; and corners of large buildings or structures (or center points of small buildings). In general, what is well defined will also be determined by what is plot-able on the scale of the map within 1/100 inch.
- Table 2 provides the allowable horizontal error for some common scales:

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Table 2. Allowable error based on USGS National Mapping Accuracy Standards.

Scale	Allowable Error
1:40,000	33.8 meters (111 feet)
1:31,680	16.1 meters (53 feet)
1:24,000	12.2 meters (40 feet)
1:20,000	10.1 meters (33 feet)
1:12,000	6.1 meters (20 feet)
1:9,600	4.9 meters (16 feet)
1:4,800	2.4 meters (8 feet)
1:2,400	1.2 meters (4 feet)
1:1,200	0.6 meters (2 feet)

- Any calculations done with location data should be done at double precision with the results rounded or truncated to the appropriate propagated error limits. All calculations and processing completed on the spatial data shall be reported in the FGDC compliant metadata that accompanies the GIS layer.

## Responsibilities

- Project Staff (NPS or cooperator/contractor) – The staff member creating or editing either geo or non-geospatial data is also responsible for ensuring that the data meets the standards listed above. If there are any questions regarding these standards, please contact the NCRN GIS Specialist or the NCRN Data Manager.
- Network GIS Specialist/Data Manager – The NCRN GIS Specialist and/or Data Manager are responsible for reviewing geospatial data products received from cooperators or produced by NCRN staff members to ensure that the products meet the standards described above. If standards are not met, the personnel responsible for creating the data set should be contacted and instructed to address the issues. The Network GIS Specialist is also responsible for properly storing and archiving all GIS products.