



US National Grid for work with FEMA During Natural Disasters

By Jerry Knisley

Working with the New Haven Fire Department illustrated the need for a custom geodesy to support the US National Grid. The use of the custom geodesy allows the survey to locate targets and produce maps that support the relief and rescue efforts during a natural disaster similar to hurricane Florence which recently came ashore in Wilmington, NC.

To modify the HYPACK® Geodesy to support the USNG is the same as creating a custom geodesy:

1. To begin, the **GEODETIC PARAMETERS must be set to the reference**. In the case of the US National Grid, they must be set to the appropriate UTM zone in meters.

FIGURE 1. GEODETIC PARAMETERS Set for UTM North

Geodetic Parameters

File Tools Options Help

Predefined

Grids

UTM North

Zone

Zone 18(78W-72W)

Distance Unit

Meter

Depth Unit

same as horizontal

Elevation Mode (Z-axis positive going up)

Ellipsoid

WGS-84

Semi-Major Axis

6378137

Flattening

298.257223563

Datum transformation parameters

Delta X 0.000 Delta rX 0.00000

Delta Y 0.000 Delta rY 0.00000

Delta Z 0.000 Delta rZ 0.00000

Delta Scale 0.00000

Datum shift file

Projection

Transverse Mercator

Central Meridian 075 00 0 W

Reference Latitude 00 00 0 N

Scale Factor 0.9996000000

False Easting 500000.0000

False Northing 0.0000

Local Grid Adjustment Local Grid

RTK Tide Method

Not using RTK tide

(K-N) from KTD file

N from geoid model, K from KTD file

N from geoid model, K from VDatum

N from geoid model, K from user value

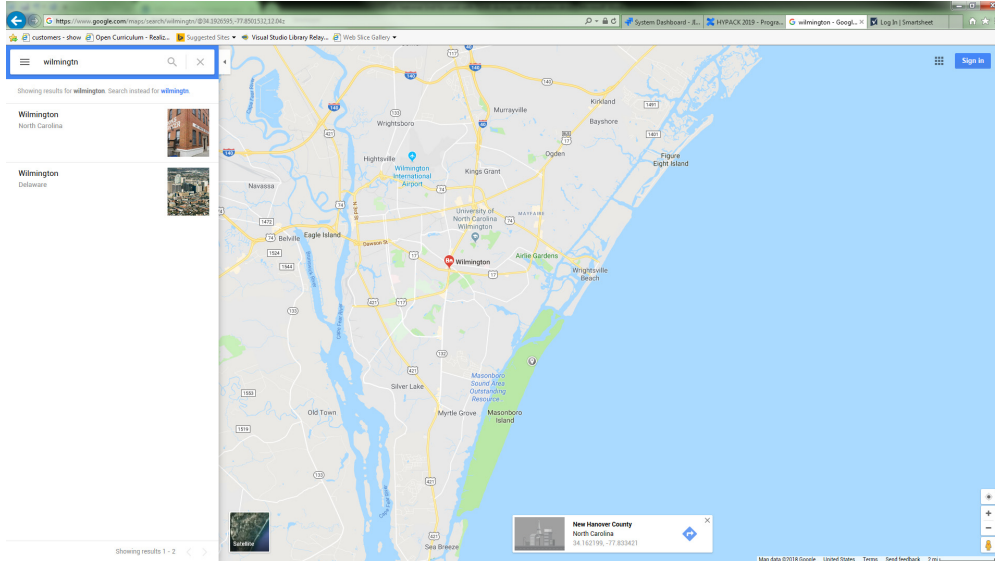
(K-N) from user value

Chart Datum Level 0.00

OK Cancel

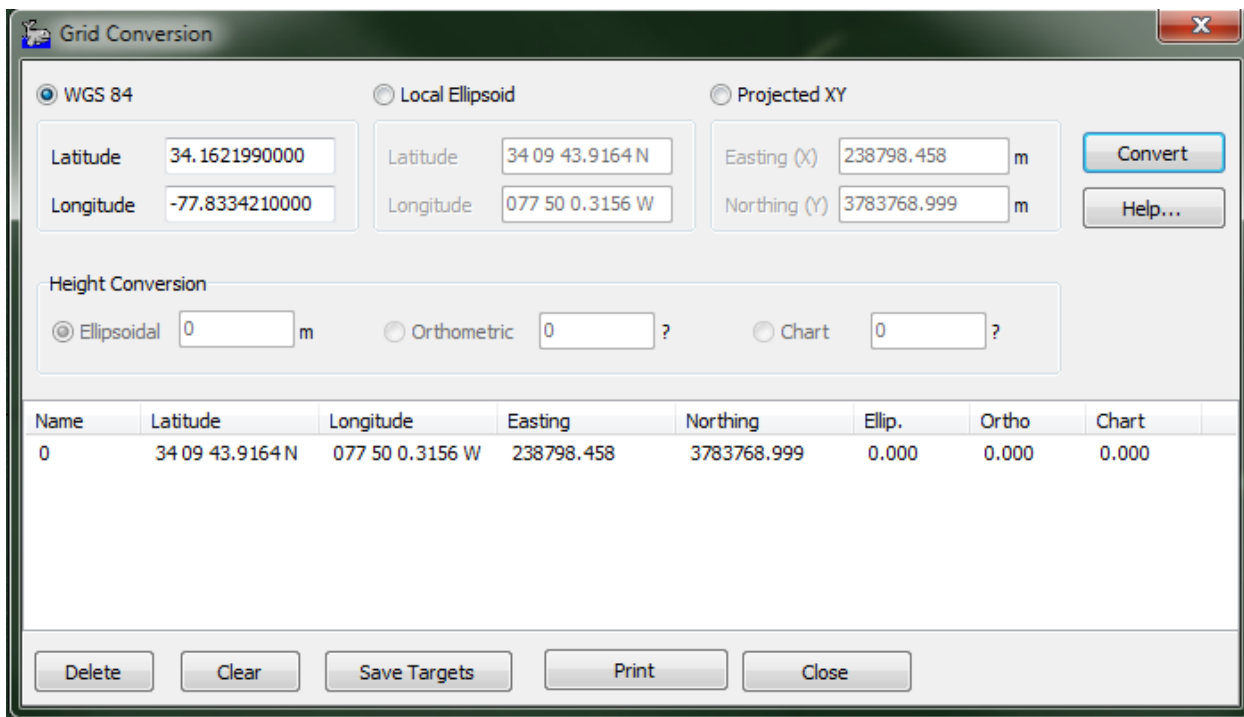
2. Obtain a local grid coordinate that will be the base point for the local grid.
 - a. In [Figure 2](#), I used Google Maps online to obtain a in Latitude and Longitude point near Wilmington, NC.

FIGURE 2. Getting a WGS84 Lat/Lon Point at the Survey Site



- b. Using the HYPACK® GRID CONVERSION program, the coordinate is translated into an Easting and Northing. This coordinate is the base point that will be used later to supply the local grid.

FIGURE 3. Converting the Lat/Lon from Google Maps to UTM XY Coordinates in GRID CONVERSION



3. I converted the coordinates to USNG using the link to the NOAA Converter here <https://www.ngs.noaa.gov/NCAT/> .

The converted USNG coordinate is 18STC3879883768. This is a 5 digit coordinate that exists in the 18STC grid. The Easting is 38798 and the Northing is 83768.

FIGURE 4. Converting the HYPACK® XY to USNG

The screenshot shows the NOAA NGS Coordinate Conversion and Transformation Tool (NCAT) interface. The browser address bar shows the URL <https://www.ngs.noaa.gov/NCAT/>. The page title is "NGS Coordinate Conversion and Transformation Tool (NCAT)" and it is part of the "National Geodetic Survey".

The interface includes a navigation menu with options like "Single Point Conversion", "Multipoint Conversion", "Web services", "Downloads", and "About Conversion Tool". The "Convert from:" section has radio buttons for "LLh" (selected), "SPC", "UTM", "XYZ", and "USNG".

Input fields are provided for:

- Lat: 34.1621990000
- Lon: -77.8334210000
- Lat (degrees-minutes-seconds): N 34-09-43.91640
- Lon (degrees-minutes-seconds): W 077-50-00.31560
- Ellipsoid Height (m): [empty]
- Input datum: NAD83(2011)
- Output datum: NAD83(2011)

A "Convert" button is present. Below it, there are "Export Results to" options for PDF, Excel, and Print.

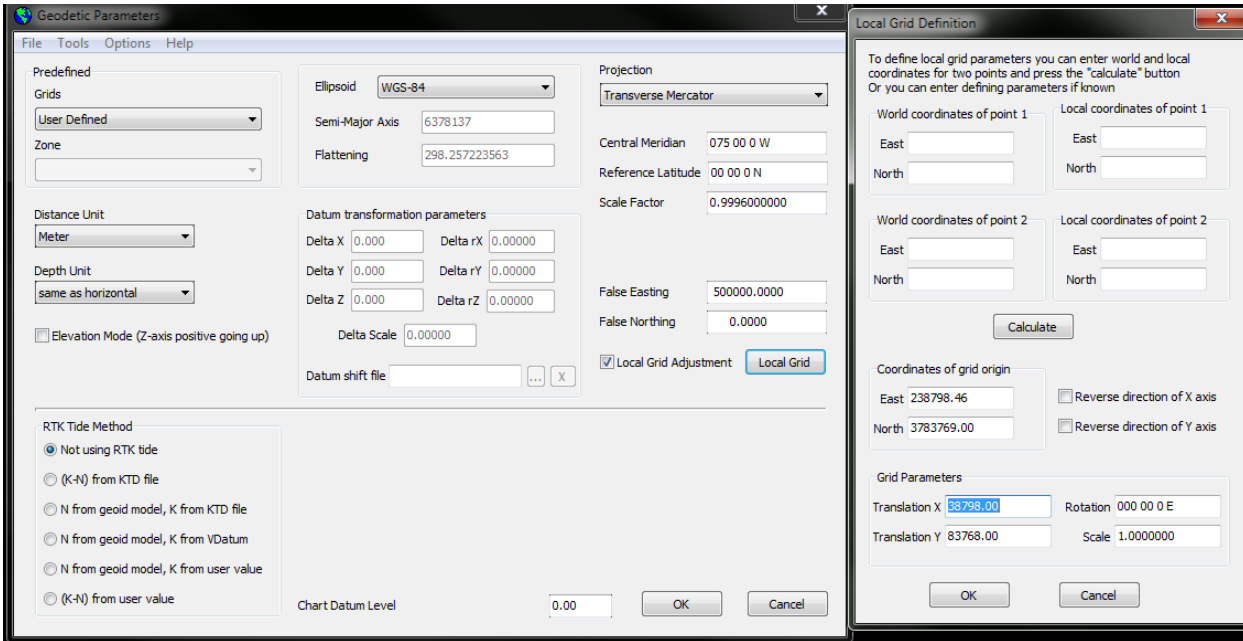
	LLh	SPC	UTM (m)	XYZ (m)	USNG
SrcLat	34.1621990000	Zone	18	X: N/A	18STC3879883768
DestLat	34.1621990000	Zone		Y: N/A	
SrcLon	-77.8334210000	Zone		Z: N/A	
DestLon	-77.8334210000	Zone			
SigLat	±0.000000	Zone			
SigLon	±0.000000	Zone			
SigEht	N/A	Zone			
DestEht	N/A	Zone			
SigEht	±N/A	Zone			

Additional data from the table:

- SPC: NC-3200
- SPC Northing (m): 46,359,695
- SPC Northing (usft): 152,098,433
- SPC Northing (ft): 152,098,737
- SPC Easting (m): 717,173,161
- SPC Easting (usft): 2,352,925,711
- SPC Easting (ft): 2,352,930,416
- SPC Convergence (dms): 00 40 23.93
- SPC Scale factor: 1.00005179
- SPC Combined factor: N/A
- UTM (m) Northing: 3,783,768,999
- UTM (m) Easting: 238,798,458
- UTM (m) Convergence (dms): -01 35 31.10
- UTM (m) Scale factor: 1.00044110
- UTM (m) Combined factor: N/A

4. In HYPACK® GEODETIC PARAMETERS, both the origin point (the point in UTM North Zone 18), as well as the converted point (the point in USNG) are entered to provide a proper adjustment from WGS-84 GPS coordinates to the US National Grid.

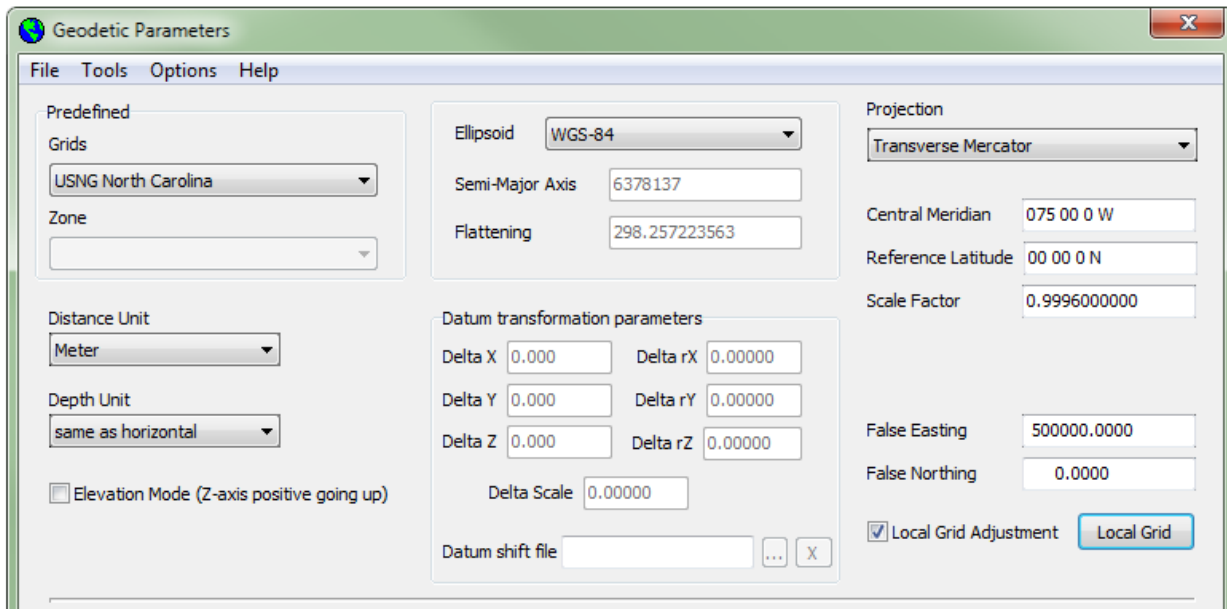
FIGURE 5. Defining the USNG Local Grid in GEODETIC PARAMETERS



5. And the final step is to **save the Custom Grid** in the GEODETIC PARAMETERS program under the Tools menu item.

Once the grid is saved it can be accessed as any other Predefined Grid in the GEODETIC PARAMETERS program.

FIGURE 6. Selecting the New, Predefined USNG North Carolina Local Grid



To verify the location, the Web Maps for the coordinate were loaded into HYPACK® under the USNG North Carolina custom grid that was created. The Easting and Northing grid and all positions recorded including targets are now referencing the USNG for North Carolina.

FIGURE 7. HYPACK® Project in the USNG North Carolina Grid

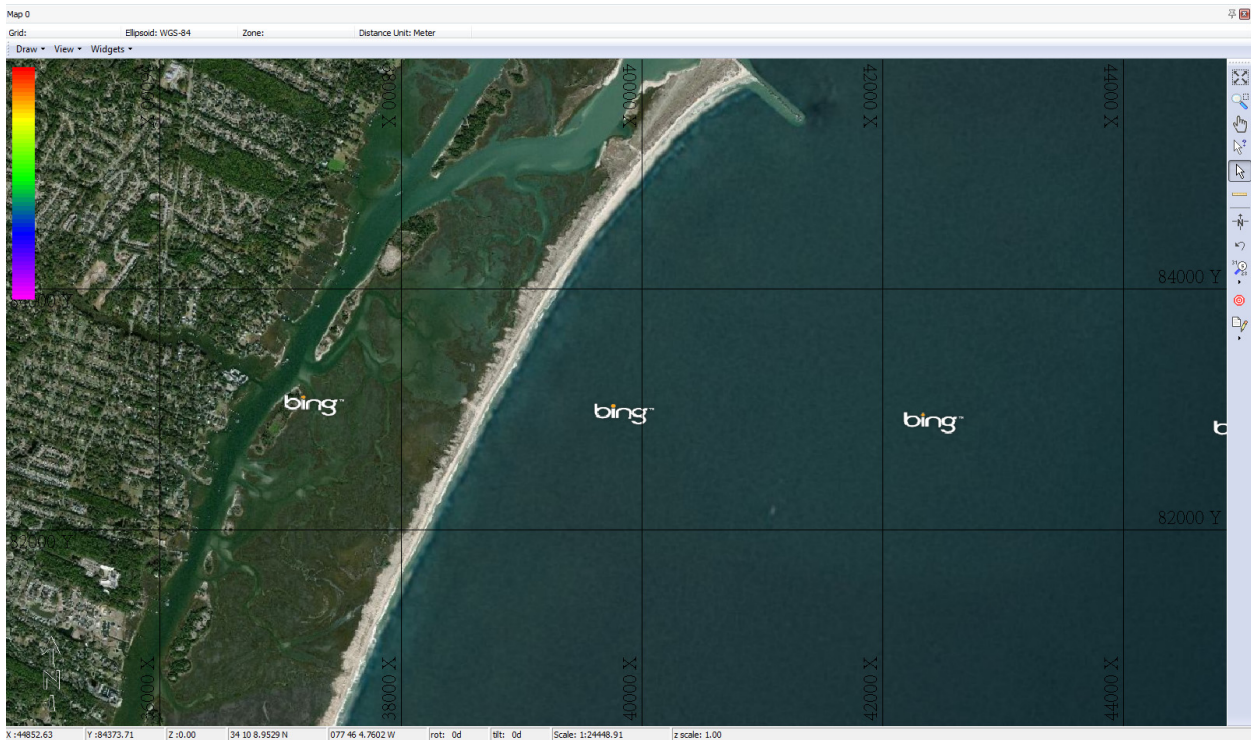
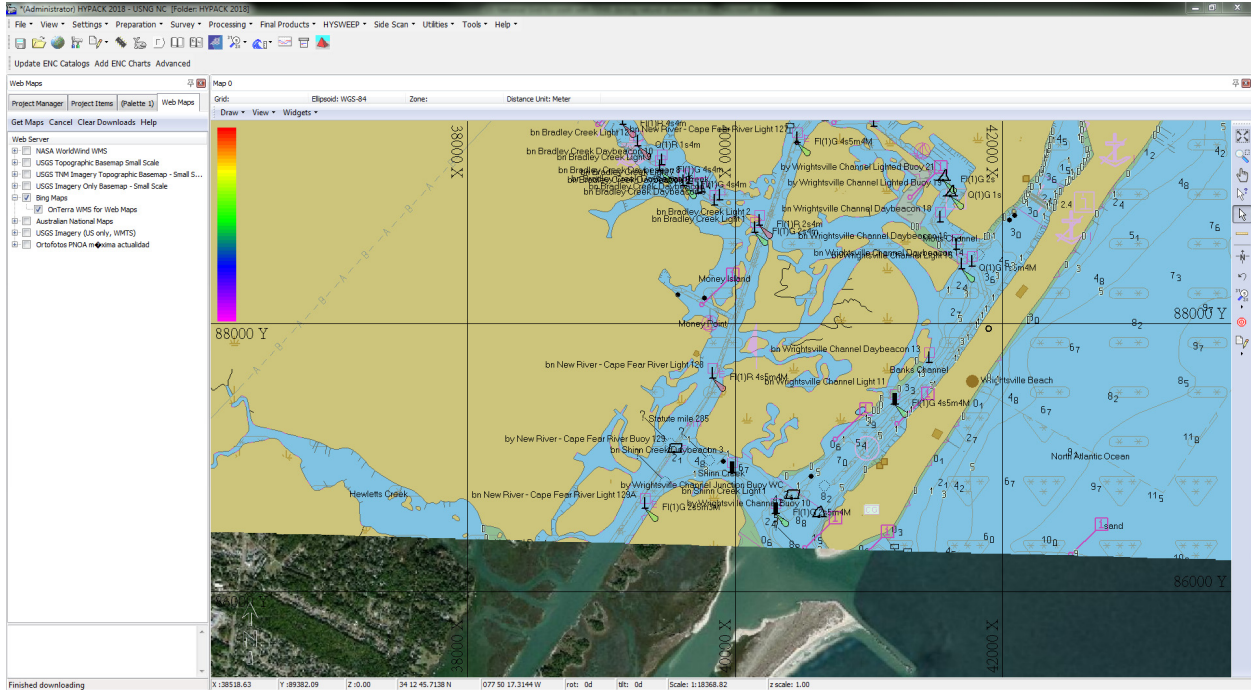


FIGURE 8. The ENC charts are properly translated to the USNG as well.



If there is a need for the Custom Grid created for this article please contact Help@HYPACK.com and the grid can be provided.