Appendix III.

Statistical Test for Initial US 113 North-South Study Area

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Analysis of CRS Point Accuracy

Attribute Accuracy:
Sample size = 100 (5.7% sample n = 1797)
Fine = 68
Initial Problems = 32
After fixing: % of Errors/%of Sample
- Structures Destroyed = 11 – 34.4%/11%
- Problems unconfirmed = 10 - 31.3%/10%
- Problems determined as not problems (Good) = 5 – 15.6%/5%
- Miss-plotted by JMA = 4 – 12.5%/4%
- Field checking errors = 2 – 6.3%/2%

Unconfirmed – need to go to SHPO to fix
Destroyed – no solution
Good – Good
Misplots - true errors in accuracy
Field errors - error only in checking, not accuracy
For full spatial DB: n = 1797
- Destroyed = 0.6 %
- Unconfirmed = 0.6 %
- Misplots = 0.2 %

Based on 5.7% sample of all plotted points, extrapolated misplots = 0.2 %
Based on 5.7% sample of all plotted points, extrapolated Destroyed = 0.6 %
Based on 5.7% sample of all plotted points, extrapolated Uncertainties = 0.6 %

Independent Sample:
Pseudo-Random sample:
RAND()*100
RAND() = $R_n = (R_1 \ldots R_2 \ldots R_{n+1}$ ((9821* .5 + 0.211327) – (INT (9821* .5 + 0.211327)))

Sorted ascending and the lowest 100 digits were taken as the 100 Cultural Resource Survey Property sample.

Logical Consistency:
Check for spatial dupes, check for table dupes (CRS_ID), and value conformation, no attribute consistency necessary, data drawn and recorded as is.

The fidelity of relationships within and between the data structure and the spatial points for this data set, the logical consistency, is determined through tests that check for duplications and value conformation. The attribute table is checked for reoccurrences of the identifying binomial qualifier, the 'CRSNUM', to assure that duplicate Cultural Resource Survey Property entries do not exist. A unique Cultural Resource Survey Property qualifier, the 'CRS_ID", was added to assure that entries unique so that

duplicate problems could be resolved. Spatial reoccurrences were tested for by identifying points that occupied the same coordinate point. Being that multiple point themes were amalgamated in the creation of the final data set, duplicate spatial occurrences were present. Finally, the data structure of this data set was proven consistent by constraining attribute values to a precompiled list of possible values. The duplications in the attribute table and the reoccurrence of exact spatial points were corrected and these data were retested to confirm the logical consistency.

Horizontal accuracy:
1:24,000 DRG, 1m BW DOQQ, 1964 Aerial sources, manually transferred, errors due to poor quality of source material and human error.

Variations in horizontal accuracy are contributed to manual error, poor source material quality, and a geodetic shift in the projection of the "Ellendale" Digital Raster Graphic (DRG) used for this project. There are no quantitative tests performed on these points for horizontal accuracy, but visual inspection reveals minor discrepancies in the horizontal position of Cultural Resource Survey Properties across source material. The original maps, housed at the Delaware State Historic Preservation Office (DE SHPO), used to gather these data points are paper maps 1964 aerial photographs. Due to a loss of quality in the reproduction of the original aerial photographs, manually mapping and transferring the locations of Cultural Resource Survey Properties to these maps and the into digital form produces positional error. Further, while some Points were transferred, through "heads-up" digitization, to the 1992 series DRG's other points were transferred to 1997/98 series Digital Ortho Quarter Quads (DOQQ). The projection and rectification of these two data sets is not always consistent. Gross horizontal position errors that were noted in this point theme are corrected and adjusted for, small scale variations in horizontal accuracy, based on manual transfer and source material, are present.

Attribute Accuracy:
Dupes checked, Independent Sample Check – results, attribute/visual accuracy conformation

The accuracy of the attribute data contained within this dataset is assured and measured by the results of three tests performed on the spatial and table data. First, the spatial and table data sets are tested for duplications in spatial occurrences and duplications in the 'CRSNUM' field of the data table. All duplications are checked and resolved. The second test performed resulted in an expected error rate as derived from an independent sample check of Cultural Resource Survey Properties pseudo-randomly selected from within the survey area. The sample set consisted of 100 Cultural Resource Survey Properties, equating to a 5.7% sample of all mapped Cultural Resource Survey Properties. The selection of this sample set was conducted by assigning a pseudo-randomly generated number to every mapped point. The assignment of the pseudo-random numbers utilized the RAND() function of Microsoft Excel XP in that, RAND() = $R_n = (R_1 \ldots R_2 \ldots R_{n+1}$ ((9821* .5 + 0.211327) – (INT (9821* .5 + 0.211327))), followed by RAND()*100. This process assigns a, for all intents and purposes, random number between 1 and 100 to each of the 1797 Cultural Resource Survey Properties. The entire

data set is sorted (ascending) by the field containing the random number and the lowest 100 values were selected form the independent sample test. The data for the test sample was extracted from the data set and visually field checked to assure 1) correct mapping location 2) condition of Cultural Resource Survey Property 3) accuracy of attribute data. The independent sample check results in an extrapolated, based on a 5.7% check sample, error rate of 0.2% for Cultural Resource Survey Properties being mapped incorrectly by either the Delaware Historic Preservation Office (DE SHPO) or John Milner Associates (JMA). Secondly, the independent sample check results in an extrapolated, based on a 5.7% check sample, error rate of 0.6% for Cultural Resource Survey Properties to be no longer existing at the location recorded by the DE SHPO. This error rate entails Cultural Resource Survey Properties that have been destroyed, removed, or otherwise withdrawn from the assigned geographic location. The final test of attribute accuracy is conducted through comparing attributes recorded within the data base for each Cultural Resource Property to an examination of property attributes and photographs (color digital and black/white print) for each Cultural Resource Survey Property taken or recorded during the independent sample field check. The results of this test demonstrate that the attributes recorded within the data base of mapped Cultural Resource Survey Properties are entirely consistent with attributes observed from photographs taken during the field check.

Completeness Report:
The Cultural Resource Survey Properties represented in this layer are the cumulative product of a manual transfer mapping process using Cultural Resource Survey data derived form the Delaware State Historic Preservation Office (DE SHPO). These points represent all of the Cultural Resource Survey Properties that John Milner Associates were permitted to map, as per the discretion of the DE SHPO, within the survey area defined by Rummel, Klepper & Kahl, LLP.