

Why is the CLU Digitized on 1-Meter Imagery?

Common Land Units (CLU) are digitized on 1-meter resolution images. The source image is either a digital ortho quarter quad (DOQQ-NDOP), mosaicked digital ortho quad (MDOQ-NDOP), or a compressed county mosaic (CCM-NAIP). With the current National Agricultural Imagery Program (NAIP), the 1-meter imagery is intended to provide an updated digital orthoimagery base for states. The 2-meter imagery is intended to support USDA programs, such as crop compliance, that require current imagery acquired during the agricultural growing season but do not require a higher spatial resolution.

Spatial resolution describes how much detail in a photographic image is visible to the human eye and refers to the smallest possible feature that can be detected. The higher the resolution, the sharper the image is, and many small details can be seen. Images are composed of pixels. A pixel is the smallest element of an image that can be individually processed.

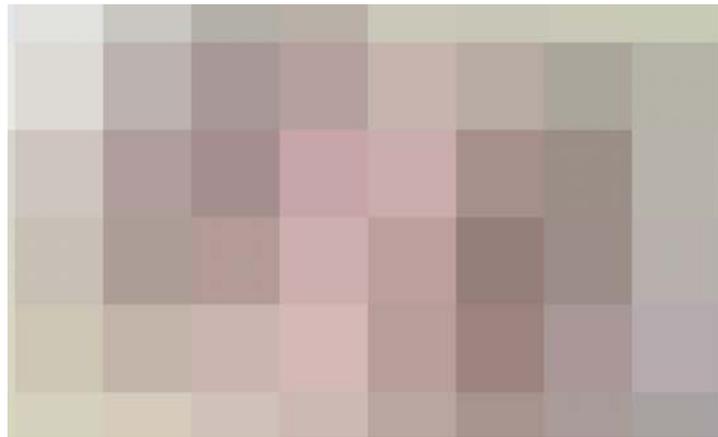


Figure 1: *Close up image of 1-meter pixels*

A 1-meter image means each pixel represents a 1 meter by 1 meter square on the ground; 2-meter = 2 meter by 2 meter square. In the following two examples, note how much more “grainy” and “pixilated” the 2-meter image is when zoomed in to the same scale (**1:1000**).



Figure 2: *Sac County, IA 1 meter NAIP image with CLU*



Figure 3: *Sac County, IA 2 meter NAIP image with CLU*

When the spatial resolution is relatively “low” (i.e. 2-meter imagery), it becomes difficult to digitize around features because the sharpness and contrast are tougher to differentiate. So, when creating the CLU polygons, a 1-meter image is necessary. A 1-meter resolution image allows the user to see fence lines, drainages, ditches, etc. much easier. Notice the difference in the features in the following examples where the scale is set at **1:2500**:



Figure 4: *Sac County, IA 1 meter NAIP image*



Figure 5: *Sac County, IA 2 meter NAIP image*

The fuzziness is very visible in the 2-meter image when looking at structures and linear features.

Because acreage calculation is an important component of the CLU attributes, it is very important that the field boundaries be digitized accurately. A poorly digitized field boundary will compromise the acreage data. As seen in the above examples, a 1-meter image allows the accuracy to be maintained when digitizing. With a 2-meter, or even lower resolution image, accurate digitizing is very difficult as the important features are hard to see.

The obvious question is, “If 1-meter resolution imagery is better than 2-meter for digitizing, then why not use an even higher resolution image?” There are two main reasons for this. First, the 1-meter image meets the USDA business requirement that was set up in 1998 and outlined in FSA Handbook “8-CM: Common Land Unit”. Second, when using a higher resolution image (i.e. 1-foot, 2-foot, .5-meter), file size becomes an issue. Image file sizes become much greater when increasing the resolution. For example, a 2-meter DOQQ in Iowa is about 33 megabytes; the 1-meter DOQQ is 133 megabytes. The same DOQQ in .5-meter resolution would be over 500 megabytes; a 1-foot resolution image would be over a gigabyte! The following diagram illustrates this:

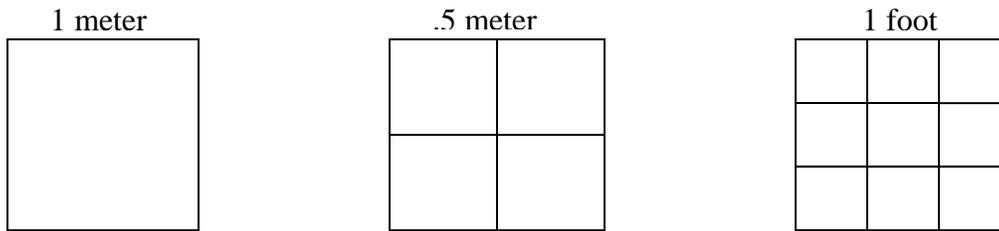


Figure 6: *Pixels in relation to file sizes*

Above, the first box represents a 1 meter pixel. In the second box each square represents a .5 meter pixel; the third box each square is a 1 foot pixel. As can be seen, the .5 meter box is 4 times larger in file size and the 1 foot box is 9 times larger in file size than the 1 meter box. Obviously, these large file sizes create issues with file storage capacities and the hardware capabilities of the end users doing the CLU digitizing.

For more information, please contact the USDA/FSA/Aerial Photography Field Office, Service Center Support Section.

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