

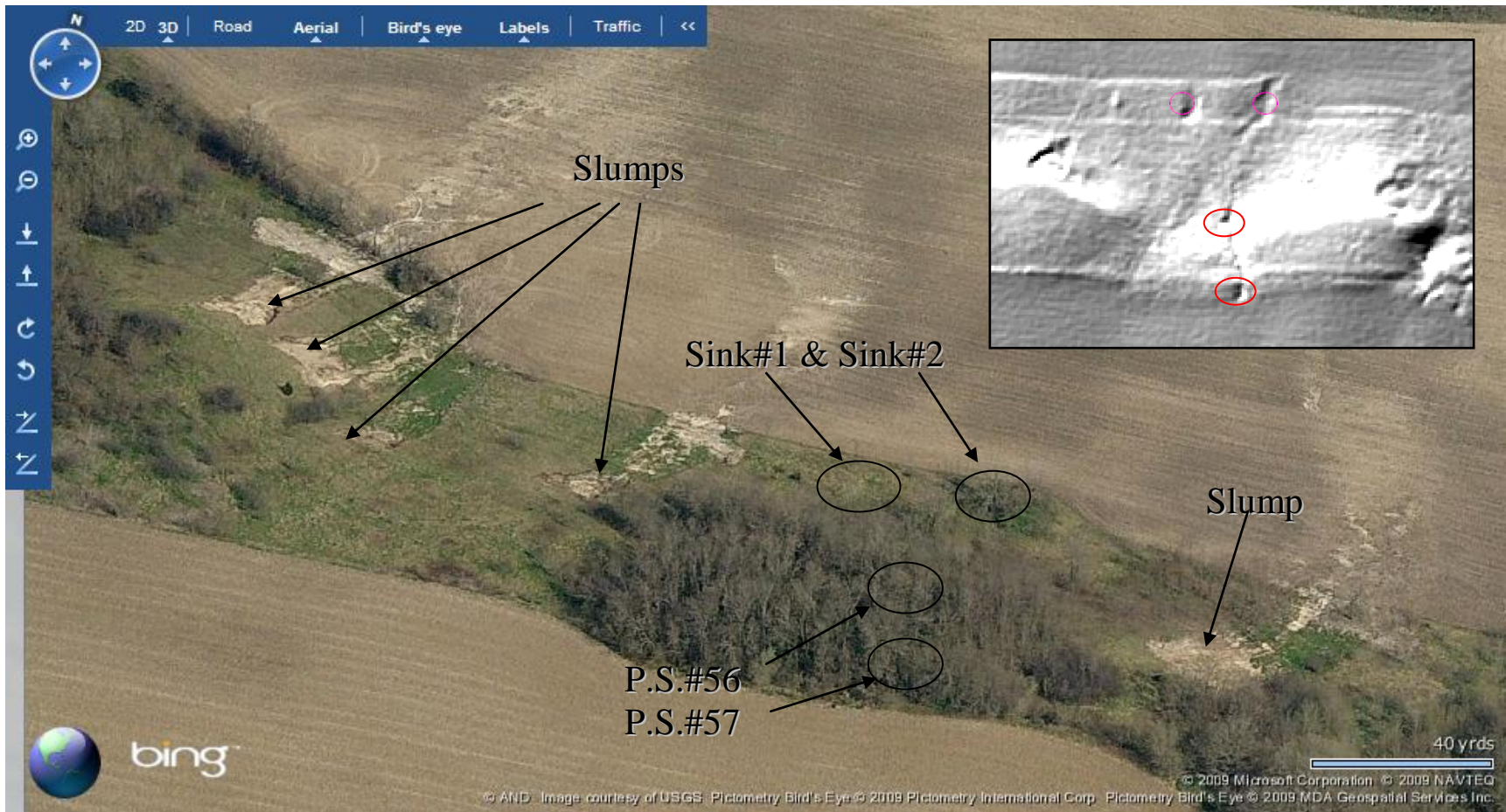
# The Combined Application of LiDAR, Aerial Photography and Pictometric Tools for Sinkhole Delineation

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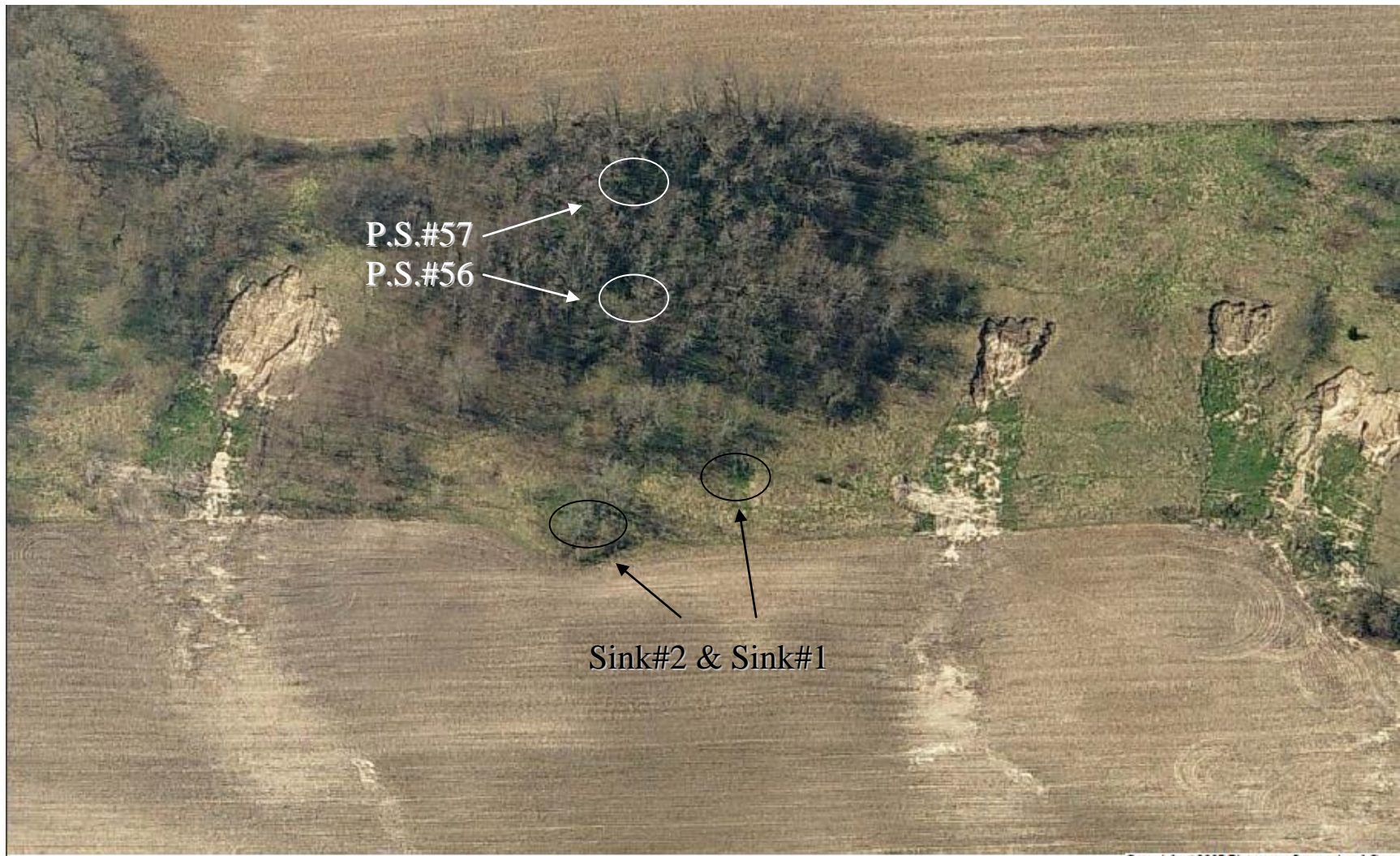
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The location of sinkholes in karst and silici-karst environments has taken on increasing importance in land use planning and zoning regulations across South East and East Central Minnesota. The delineation of sinkholes has traditionally depended on extensive field work, using topographic maps, intensive networking with local landowners, and the luck of the observer to spot a feature that is often rapidly filled or concealed within croplands.

The application of aerial tools now allows mappers to identify potential sinkholes and eliminate holes generated by other surficial processes. LiDAR mapping across Minnesota now allows high resolution imaging of very small depressions in Karst landscapes without interference from vegetation. These depressions can then be compared to aerial photography flown periodically by the USDA to verify persistence and/or reappearance of features through time. Additionally, low angle, high resolution pictometric imagery allows overhead views from several angles to further identify and verify the genesis of a given depression. While field verification is still the ultimate standard many obvious sinkholes can be identified and numerous non-sinkhole depressions eliminated from consideration greatly reducing field time.

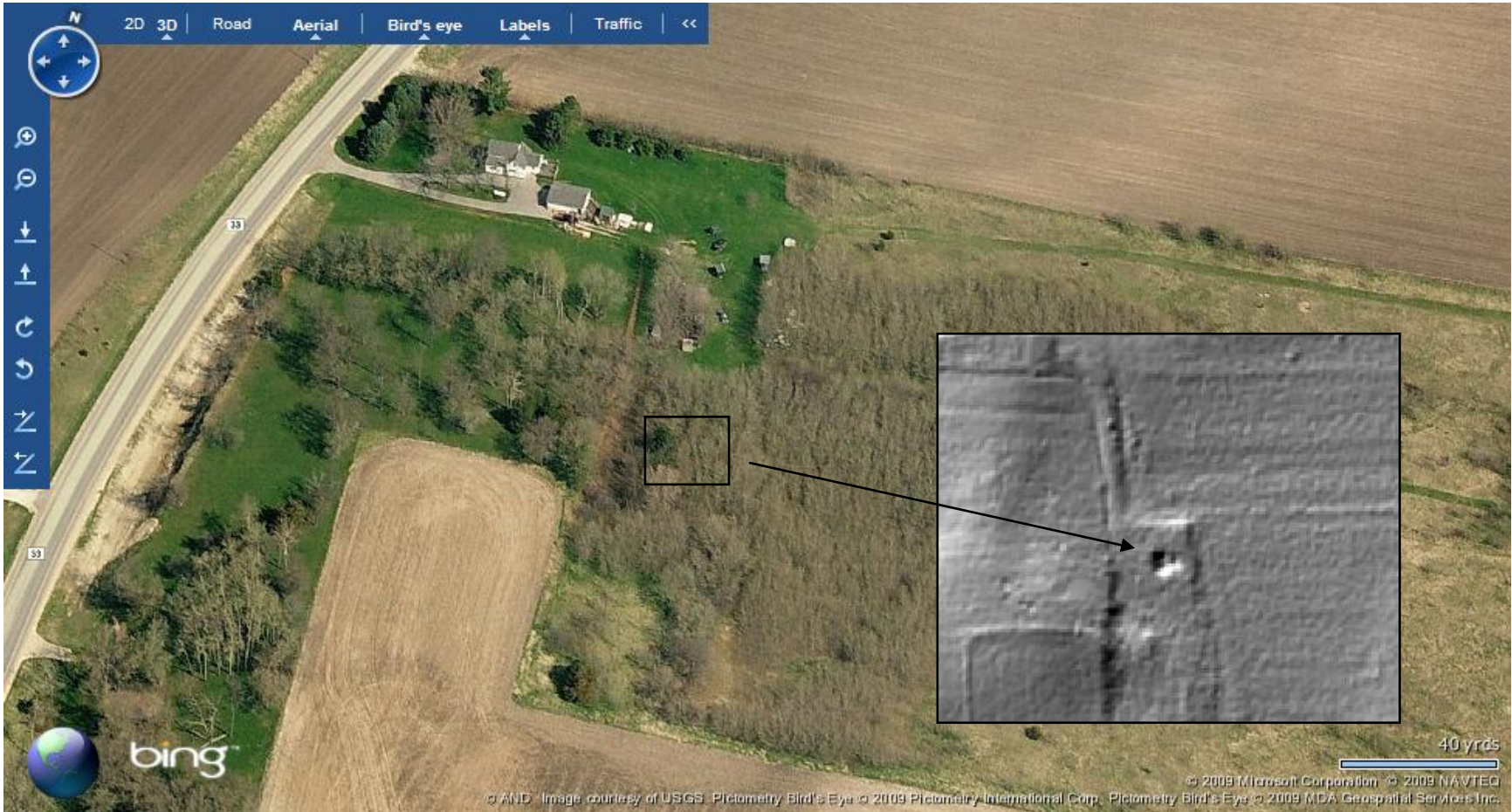


Lidar and Pictometric view to the North. Circled areas to be field checked. Possible sinks or may be related to older slumps.

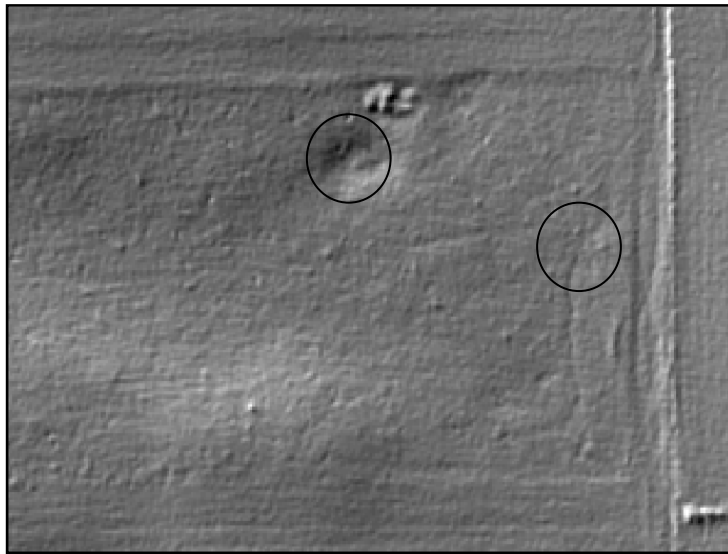


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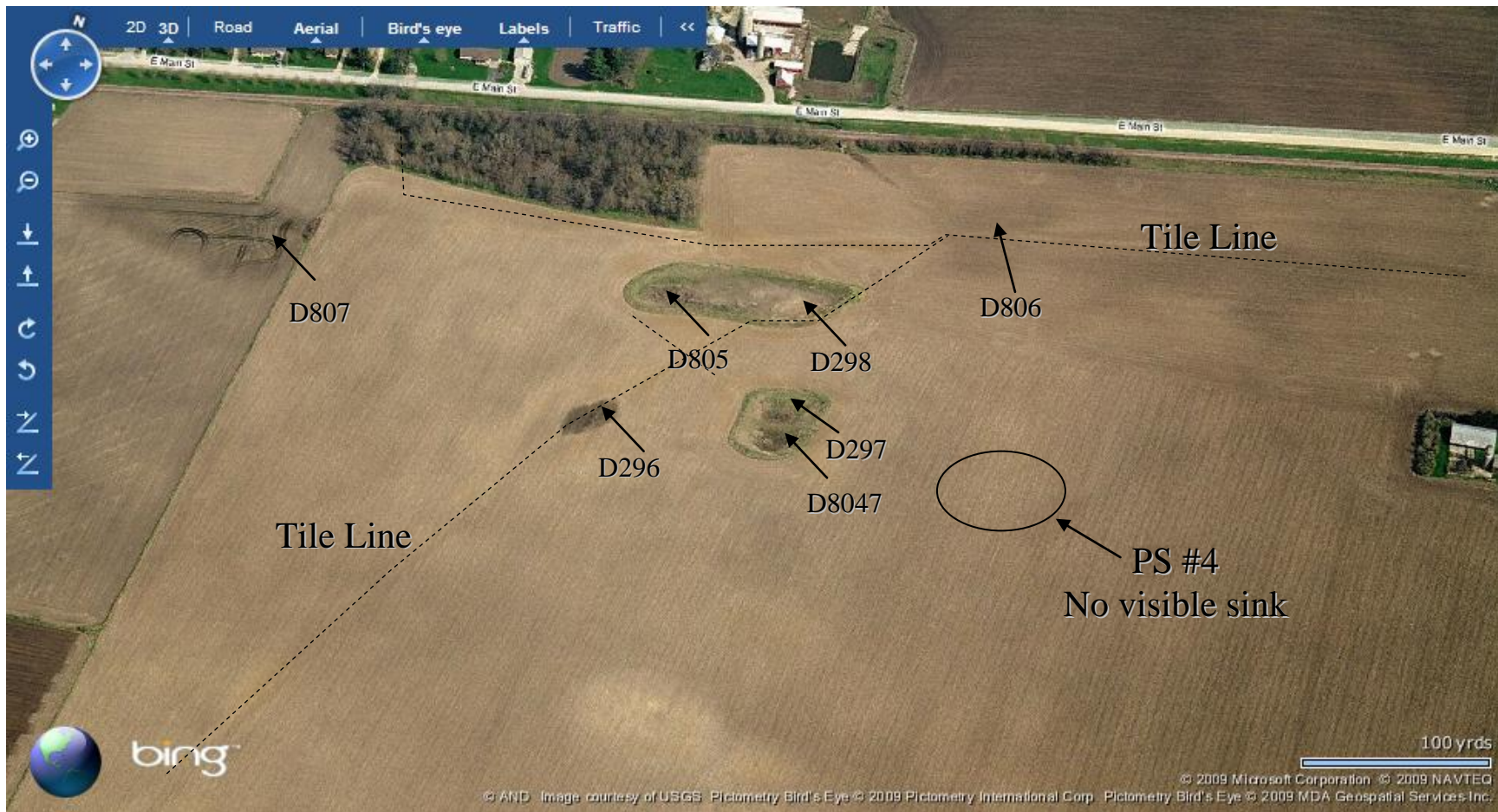
Based on this Southward Pictometric view Sink#1 and #2 are sinkholes. Possible sinks #56 and #57 need to be field checked.



Location in farmyard and rectangular shape of depression suggests that it is an old building foundation.



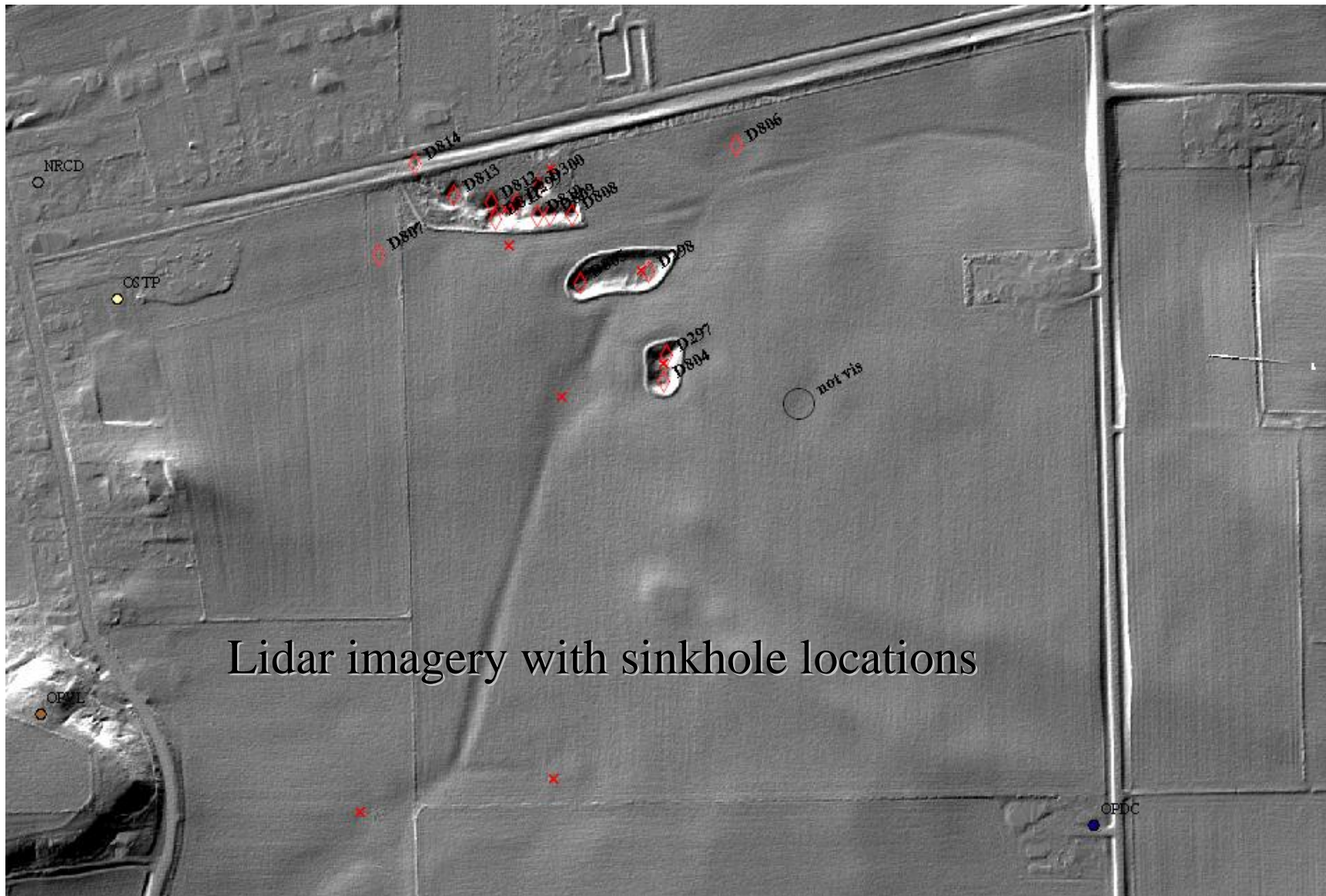
Example of a sinkhole (D904) and a bull wallow.



Possible sinkhole #4 is not visible on air photo, is not related to a tile line and is minimally a closed depression. P.S. #4 is probably not a sinkhole. However, many other sinks are visible in the photo.



Google Earth image showing the same area with tile lines and sinks in April 1991.



Lidar imagery with sinkhole locations





2D 3D Road Aerial Bird's eye Labels Traffic <<

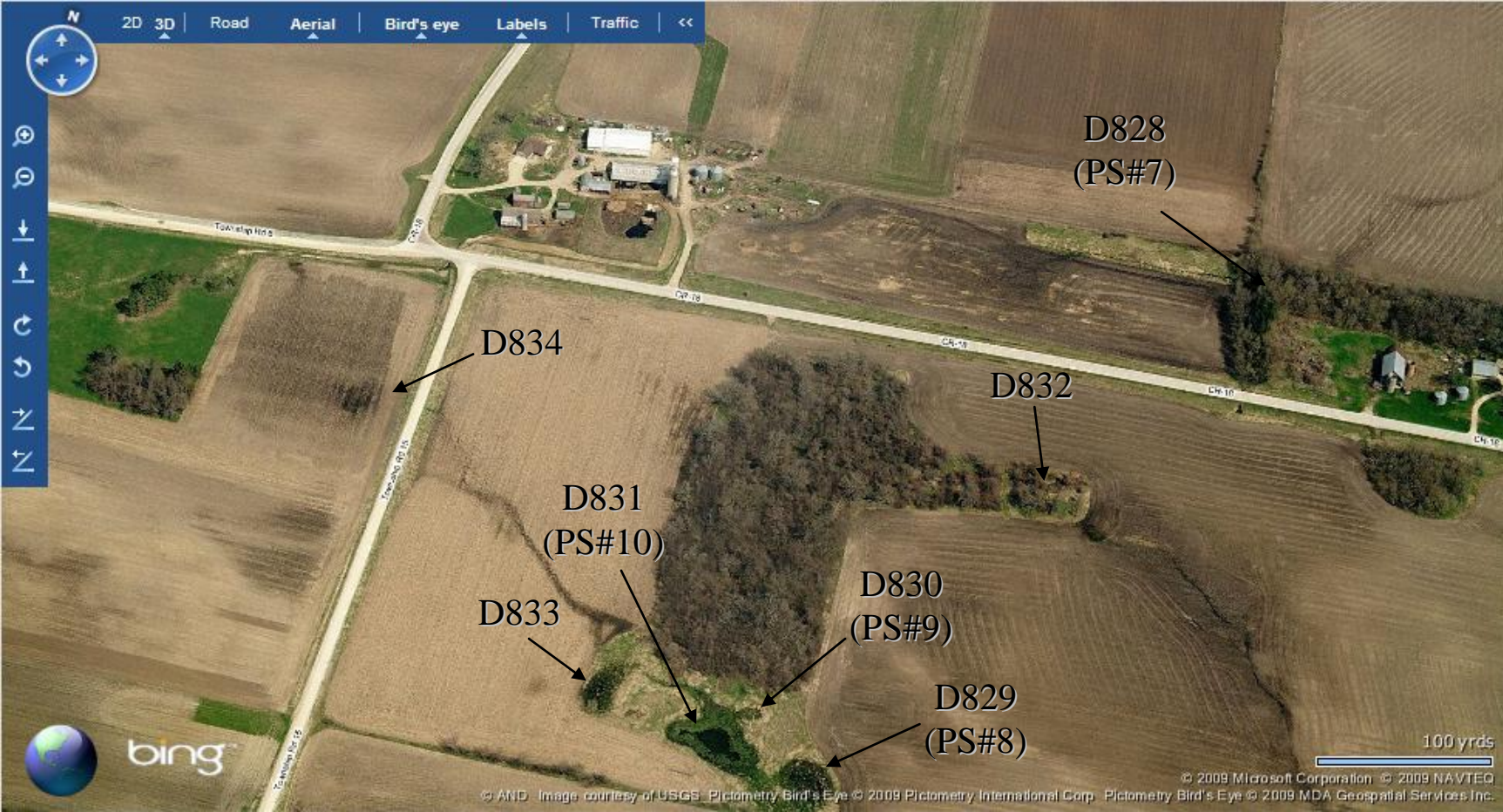


D815  
D816  
D817



50 yds

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D527

D879

D880 PS#53

D526

D881

D878  
PS#54



bing

100 yds

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