IV. AGGREGATE RESOURCE CONSIDERATIONS

A. Regional Consumption

The United States Geological Survey (USGS) rates aggregate quality and availability nationwide. Clay County is located in the Western Lakes and Lacustrine Plains section and has an availability rating of "limited to problem:"

> "The major type of aggregate is sand-gravel of glacial origin. Crushed stone sources are limited…large areas are completely void of aggregates; viz., large old glacial lakebeds. Sand-gravels, where available, frequently are contaminated by sandstone and shale particles from the dominant regional bedrock." (USGS, 2001)

Generally speaking, the Red River Valley is an aggregate poor region. Bedrock is buried beneath 200-400' of glacial and lacustrine deposits. The best source of gravel is the Agassiz beach ridges. On the North Dakota side of the valley, most of the beach ridge material is sand and the quality is lower than that found on the Minnesota side. The haul distance from North Dakota sources for high quality gravel to Fargo-Moorhead is also greater than from Clay County deposits.

B. Clay and Cass County Consumption

Aggregate provides the foundation for all infrastructure and development in Fargo-Moorhead, the primary market for aggregate resources in Clay County. The region grew 14% from 1990 to 2000 and is projected to grow another 4% by 2010 (see Table 2). The sand and gravel industry estimates U.S. consumption to equal 10 tons per person per year. Consumption in the Red River Valley will exceed that because local soils are poorly drained and have low strength or bearing capacity. The use per person in this region is approximately 13 tons per year (Squires, 2001). USGS estimates that nationally the amount of aggregate needed over the next 25 years will equal all of the material mined in the twentieth century. Sand and gravel use is projected to increase 0.5% annually nationwide and will probably exceed this rate in Fargo-Moorhead because crushed stone is not economically available to the market at this time.

	POPULATION			AGGREGATE USE
YEAR	**CLAY COUNTY**	**CASS COUNTY**	**TOTAL**	**Yards/year**
1990	50,422	102,874	153,296	1,423,463
2000	51,229	123,138	174,367	1,619,122
2010	54,850	127,259	182,109	1,691,012

Table 2: Population (US Census Bureau, 2000) and estimated aggregate consumption based on a consumption rate of 13 tons per person per year.

DNR mapped aggregate potential for Clay County in 1996 (MN DNR, Aggregate Resources, 1997) and found that the eastern part of the county where the beach ridges are located has the greatest potential for aggregate. The report specifically cited the area near Felton as having one of the best and largest sources of concrete aggregate in the Red River Valley. Currently Clay County has approximately 70 permitted mining operations. Nearly all of these mine gravel from the beach ridges. The county's gravel pit seen in Area 1A, Figure 27, supplies 6% of the total aggregate used in Clay County.

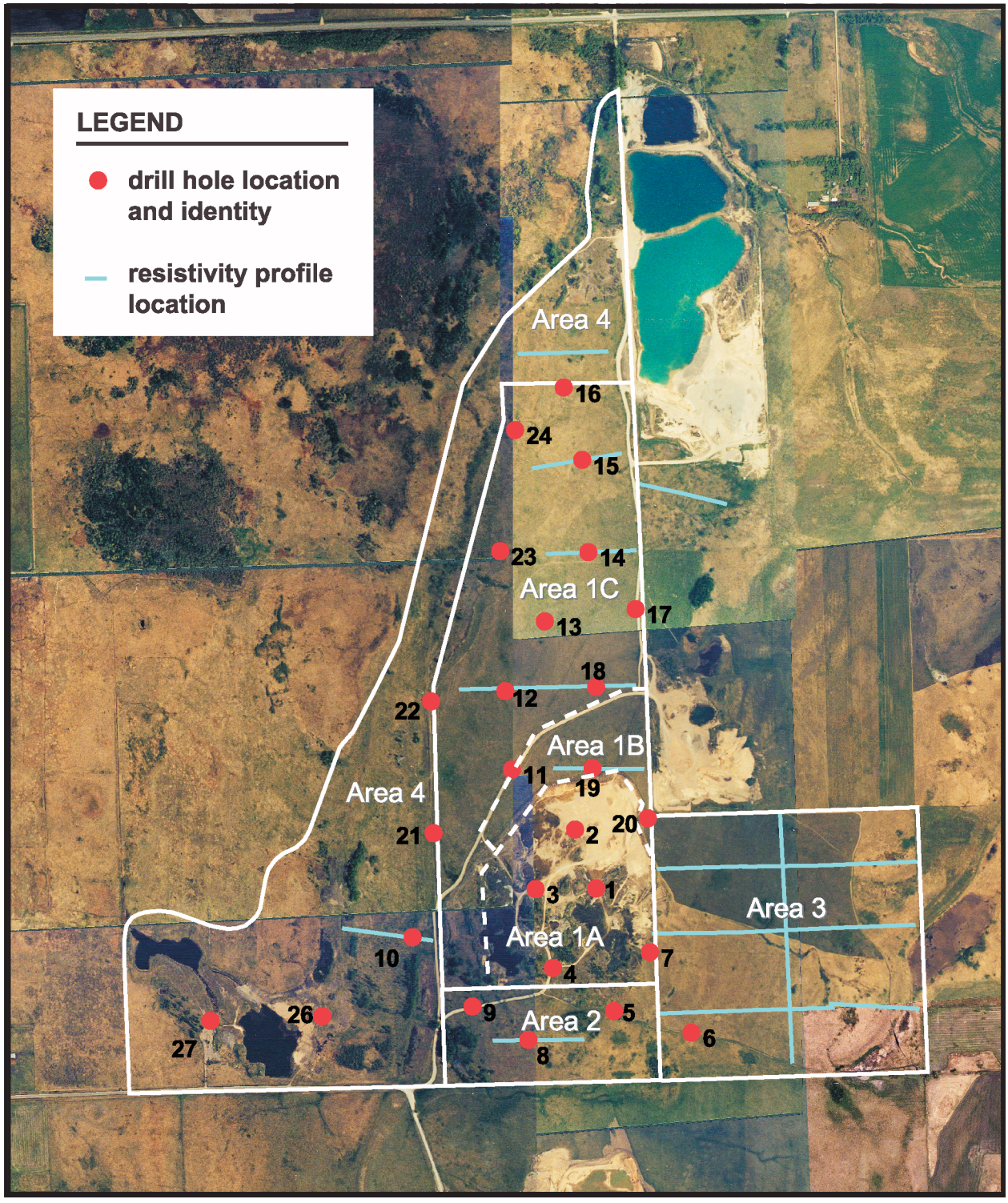

Figure 27: Location of rotosonic drill holes in red, resistivity profiles in blue, and identification of areas analyzed by the Aggregate Resource Evaluation (MN DNR, 2000).