

## **1995 PROJECT ABSTRACT For the Period Ending June 30, 1997**

This project was supported by MN Future Resources Fund (ML 95, Chp. 220, Sec. 19, Subd. 5 (e)).

**TITLE:** Glacial Lake Agassiz Beach Ridges: Mining and Protection.

**PROJECT MANAGER:** Cindy Buttleman

**ORGANIZATION:** DNR - Minerals Division

**ADDRESS:** 2115 Birchmont Beach Road NE, Bemidji, MN 56601

**LEGAL CITATION:** ML 95, Chp. 220, Sec. 19, Subd. 5 (e).

**APPROPRIATION AMOUNT:** \$85,000

### **I. Statement of Objectives**

**A. Develop plan with a local forum:** A local forum was convened to develop a plan for the beach ridges in Clay County. The project was staffed by the DNR and led by the Forum.

**B. Build customized Geographic Information System (GIS):** This project integrated existing digital resource information for Clay County into a customized geographic information system on CD-ROM that is accessible to the Forum, the public and land managers.

**C. Public Outreach:** This Forum developed a variety of informational products to involve and inform the public about the project and the value of the beach ridges in Clay County. The Forum also hosted many events open to the public.

### **II. Overall Project Results**

**A. Develop Plan:** Despite incredibly challenging weather in the Red River Valley over the past two years, the project ends with about 35 people participating. The Forum hosted many events including: 20 business meetings, 1 field trip, 4 public meetings, 1 technical data session, and 23 school presentations. A quarterly newsletter was also distributed to about 500 people. In addition, the Forum made 3 presentations to the Clay County Board, 1 presentation to the Planning Commission, and 1 presentation to township officers. The Forum's final report contains a comprehensive slate of recommendations. Two subcommittees are already in place to work on implementation. The final report together with the ongoing work of the subcommittees constitute a plan for the future. The relationships that have been fostered through the Forum, however, are perhaps the greatest legacy of this project. The Forum provided a setting for building relationships among people who did not often have the chance to meet informally. After more than a year of discussion, debate and deliberation, the issues on the beach ridges remain complex. The work of the Forum is clearly a starting point upon which others can build. As a result of this project, there is local interest, momentum and commitment to move ahead.

**B. Build GIS:** Numerous existing digital datasets were collected and put into a format that could be used in combination with other datasets. The datasets were then captured on a CD-ROM which has been installed on computers in the regional library, the science center and the courthouse. The CD-ROM is also available to individuals. This is one of the first projects in the state to use GIS technology in a public setting. It is also one of the first efforts to consolidate data from several different agencies onto a CD-ROM. Another innovation is the placement of the data in public locations.

**C. Public Outreach:** The informational products devised by the Forum include: 1) computerized resource information on CD-ROM and documentation, 2) maps, 3) coloring book, 4) information handbook, 5) final report, and 6) video.

### **III. Project Results Use and Dissemination**

**1. Computerized resource information on CD-ROM.** "Exploring Clay County on CD-ROM" (June 1997), contains a demo, users' guide, datasets, data documentation, and selected maps. The CD-ROM is supported by a users' guide ("Clay County Demo Users' Guide", June 1997) and a data catalogue ("Documentation for the Computerized Resource Information of the Clay County Beach Ridges Forum", June 1997). All are available for public use at the regional library, science center, and courthouse.

**2. Maps.** Three maps displaying gravel and prairie resources were distributed to all town halls and community centers in the county. The maps are: 1) Natural Communities and Biodiversity Significance; 2) Aggregate Resources; 3) Prairie and Gravel Pits (June 1997).

**"Lake Agassiz Beach Ridges: A Coloring Book for Children" (April 1997).** This coloring book depicts the value of both the prairie and gravel resources. It was presented to all third grade classrooms in Clay County on Earth Day by the Forum (about 23 presentations at 10 different schools).

**4. "The Beach Ridge Landscape in Clay County: An Information Handbook" (June 1997).** This handbook is a series of one page fact sheets that provide information on key topics relating to gravel and prairie resources. Will be distributed at county fair.

**5. "Final Report: Clay County Beach Ridges Forum for Gravel Mining and Prairie Protection" (June 1997).** The final report documents all aspects of the project and includes a summary of the process, resource information, analysis and recommendations.

**6. Video.** Minnesota public television station KAWK/KAWB-TV (Bemidji/Brainerd) featured the project in a locally produced show called Beyond the Backyard that highlights natural resource management around the state (May 1997, show #105).

**Date of Report: July 1, 1997**

**LCMR Final Work Program Update Report**

**I. Project Title and Project Number:** Glacial Lake Agassiz Beach Ridges: Mining and Protection.

**Program Manager:** Cindy Buttleman

**Agency Affiliation:** DNR - Minerals Division

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**A. Legal Citation:** ML 95, Chp. 220, Sec. 19, Subd. 5 (e).

**Total biennial LCMR appropriation:** \$85,000

**Balance:** \$ 0

**Appropriation Language:** This appropriation is from the future resources fund to the commissioner of natural resources to coordinate a long-term plan for the beach ridges in Clay County that balances protection of native prairies with a sustainable aggregate industry.

**B. Status of Match Requirement:** N/A

**II. Project Summary:** Beach ridges are remnants of the beach lines left by Glacial Lake Agassiz which once covered northwestern Minnesota. Composed of sand and gravel, they form linear features on the landscape, slightly higher in elevation than the surrounding lands. The beach ridges in Clay County are important for several reasons. The aggregate resource that comprises the beach ridges are the primary source of construction gravel for the Fargo-Moorhead area. Just as significant, the beach ridges support some of the largest and best remnants of

native prairie in the state (Felton Prairie complex, for example). With most of the land under private ownership, conflict between competing land uses on the beach ridges is escalating in Clay County. As the region's swelling population and the resulting demand for aggregate drives an expansion of the gravel mining industry, the last vestiges of native prairie are becoming increasingly more valuable to our natural heritage. There is a sense of urgency for a local group to take a comprehensive and long-term view of the remaining resources on beach ridges.

This project then, is a forum for landowners, the environmental community, the gravel industry, interested public, and governmental agencies to discuss in a proactive setting the balanced use of the remaining resources on the beach ridges in Clay County. The expected products are 1) a process to develop local solutions to complex issues; 2) a customized geographic information system for Clay County's beach ridges that will promote ecosystem management; and 3) a plan that will guide the future use of the remaining resources on the beach ridges. The plan will attempt to balance protection of native prairies with a sustainable aggregate industry so that future generations can have access to both. Recognizing that other land uses also occur on the mostly privately-owned beach ridges, this plan must go beyond a simple land use allocation. To achieve a balance, the plan must be a collaborative effort of local interests.

**III. Final Work Program Update Summary:** July 1, 1997. The project met or exceeded all objectives, was completed on schedule and stayed within budget.

**Results for Objective A:** This objective included local leadership of the project. The Steering Committee of the Forum which included 35 people at the close of the project was effective in providing local leadership. The Forum hosted many events over the last two years including business meetings, field trips, technical sessions, public meetings, and presentations. The Forum's final report contains a comprehensive slate of recommendations. Two subcommittees are already in place to work on implementing some of the recommendations. The final report and recommendations together with the work of the two subcommittees constitutes the plan for the future. The relationships that have been fostered through the Forum, however, are perhaps the greatest legacy of this project.

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**Results for Objective B:** This objective included the technical side of the project. Numerous existing digital datasets were collected and put into a format that could be used in combination with other datasets. The datasets together with data documentation, a demo, users' guide and selected maps were then captured on a CD-ROM which has been installed on a computer in a regional library, a science center and the courthouse. The CD-ROM is also available to anyone with the appropriate hardware and software. This is one of the first projects in the state to use GIS technology in a public setting. It is also one of the first efforts to consolidate data from several different agencies onto a CD-ROM. Another innovation is the placement of the data in a library and other locations for use by the public.

**Results for Objective C:** The objective included the development of balanced and accurate information for the public. The Forum wanted the information gathered through this project to be summarized in different ways for future use by a full range of the public. The informational products devised by the Forum range from computerized resource information on CD-ROM to a children's coloring book. The following list briefly describes the informational products developed by the Forum: 1) computerized resource information on CD-ROM; 2) map displays; 3) coloring book distributed on Earth Day; 4) information handbook; 5) final report with recommendations; and 6) video.

#### IV. Statement of Objectives:

**A. Develop plan with a local forum:** A local forum will be convened to develop a long-term plan for the beach ridges in Clay County with special emphasis on Felton Prairie. The forum will seek to prepare a plan that balances protection of native prairies with a sustainable aggregate industry. The project will be initiated by the DNR but led by the forum.

**B. Build customized Geographic Information System (GIS):** This project will integrate existing natural resource information for Clay County into a customized geographic information system that is easily accessible to local users and compatible with LMIC guidelines.

**C. Public Outreach:** This project will have an outreach component to involve and inform the public about the project and the values of the beach ridges in Clay County.

### Timeline for Completion of Objectives:

	7/95	1/96	6/96	1/97	6/97
A. Develop plan	xx				
B. Build GIS	xx				
C. Public outreach		xx			

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V. Objectives/Outcome:

A. **Develop plan with a local forum.** The final product associated with Objective A is a plan to balance protection of native prairies with a sustainable aggregate industry.

A.1 **Activity:** A local forum will be convened to steer the project. The project is supported by Clay County, the Nature Conservancy, and two local aggregate producers but this group has not been formalized. The first six months of the project will be devoted to organizing a forum, establishing smaller work groups, finding a meeting place, and creating a meeting structure and schedule. In addition to the project supporters, other groups that are expected to participate include landowners, lease holders, governmental agencies, aggregate producers, environmental groups, and the interested public. The forum represents a broad range of interests that have not historically come together. Project supporters realize the potential long-term benefits to all parties if solutions can be achieved locally and proactively by participating in this project.

Information sessions will be conducted early in the project to bring all forum members to a common understanding of the resources, current land uses, and ownerships on the beach ridges. Field trips to gravel mining operations, native prairie preserves, reclaimed and unreclaimed sites throughout the county will also be conducted. In preparation for drafting the plan, the forum will work closely with GIS technical staff from DNR and Clay County to assure a customized fit of the GIS information and delivery system.

By January 1996, the forum will more precisely define the study area, review the digital data catalogue associated with the development of the GIS, and identify additional information needs for the plan (i.e., projected population growth, anticipated need for aggregate, rate of native prairie loss, etc.).

A.1.a. **Context within the project:** As a process to develop locally based

decisions, organizing the local forum is a key activity.

A.1.b. **Methods:** The DNR will coordinate activities, serve as staff to the forum, and facilitate initial forum meetings. As the project progresses, there may be a need for an outside meeting facilitator (someone locally or from another state agency).

Products associated with this activity are: 1) documentation on the organizational structure of the forum such as member roster, meeting schedule, list of smaller work groups; 2) initial field trips and information sessions held to inform forum about the beach ridges; 3) study area precisely defined; and 4) information needs identified for the plan.

A.1.c. **Materials:** The budget for this activity covers costs for supporting the local forum including meeting and field trip expense, meeting room rental, mailings, travel expense for the Project Manager, photocopies, supplies, and expenses for an outside facilitator. This budget will also partially support a Project Analyst position who will assist in coordinating forum activities, among other duties. (Note: One unclassified half-time position with a classification of Project Analyst will be created for a duration of two years to support this project. Project activities that will be performed in part by the Project Analyst are noted at appropriate places in this work program.)

A.1.d. **Budget**  
**Total Biennial LCMR Budget:** \$15,000  
**LCMR Balance:** \$ 0

A.1.e. **Timeline:**

	7/95	1/96	6/96	1/97	6/97
Forum structured	xxxxxxxxxxxxxxxxxxxx				

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Field trips held                   xxxxxxxxxxxxxxxx  
Study area defined               xxxxxxxxxxx  
Information needs identified       xxxxxxxxxxx

**A.1.f. Workprogram Update:**  
**1/1/96 Progress Report:** Project Analyst hired in July. Project Manager met with Clay County Board in August to discuss project. Mailing list compiled. One page informational flyer prepared and distributed. Organizational meeting for forum held on October 23. About 40 people attended representing all of the interests. Steering Committee established. Twelve people volunteered to serve on the Steering Committee including private landowners, gravel companies, supporters of native prairie, and local government. Initial meeting of Steering Committee on November 13 to begin work on defining mission and objectives for project. Next meeting scheduled for 1/24/96. Information needs in terms of data and maps are under discussion. More discussion on this topic will occur at next meeting. Field trips planned to active mining properties, abandon & reclaimed sites and native prairie in 1996. Project Manager met with township clerks in November to discuss project. Project update distributed to all parties on mailing list.

**7/1/96 Progress Report:** Former Project Analyst accepted another position. New Project Analyst hired in January and trained. Steering Committee (also referred to in this work plan as the “local forum”) has met ten times since January. Three of those meetings were seminar type sessions where information on key topics was presented. Steering Committee formulated a draft mission and goals which were circulated for public review with the April newsletter. Final mission and goals were adopted in June along with a schedule for completion. It has been a more lengthy process than anticipated for the Steering Committee to coalesce around common goals because they are a new group with no previous working relationships. A field trip to the Felton Prairie complex is currently being planned for July to be hosted by the Steering Committee.

**1/1/97 Progress Report:** The Steering Committee has grown to 31 as public awareness increases about the project. About 15 to 20 people regularly attend the Steering Committee

monthly meetings. However, blizzard conditions and severe weather resulted in poor attendance at the November meeting and cancellation of the December meeting. Consequently, the Steering Committee is somewhat behind but hopes to recover with a longer meeting in January.

In July, the Steering Committee hosted a field trip attended by 37 people to observe prairie and gravel resources. In September, 7 Steering Committee members made a progress report to the Clay County Board which was well received. The Board indicated support and enthusiasm for the work of the forum. All acknowledged the complexity of the issues involved. Steering Committee to make another report to the Board early in 1997. Public meeting was held in October and attended by 21 people (despite bad weather). Another public meeting is tentatively planned for April 1997.

**7/1/97 Final Results:** Despite incredibly challenging weather over the past two years including wind storms, extreme cold, unusually cruel blizzards, and devastating floods, the project ends with an increasing number of people interested in this work. The Steering Committee concluded with about 35 people participating.

Over the past two years, the Forum hosted many events and activities. More than 20 business meetings were held (all open to the public with visitors often attending), a field trip was organized to view prairie and gravel resources, four public meetings were conducted, a technical session was organized to discuss the data generated by the project and 23 presentations were made to local schools by a team from the Forum in celebration of Earth Day. A quarterly newsletter was also distributed to about 500 people (a total of 7 issues). In addition, the Forum made three presentations to the Clay County Board, a presentation to the Planning Commission, and a presentation to township officers. All of these events were well attended.

One of the legacies of this project will be the relationships that have been fostered by the Forum. The Forum provided a setting for building relationships among people who did not often have the chance to meet informally. It created an organizational framework for people to first discuss and

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then make recommendations about the beach ridges. The resource discussions that took place in the Forum centered on information generated by a customized geographic information system that was compiled for the project. As such, it is one of the first projects in Minnesota to use GIS technology in a public setting.

**A.2 Activity:** The local forum will draft a plan for the beach ridges seeking a balance between native prairie preservation and aggregate mining based on geographically-based resource information. This plan will be a first attempt to deal with the emerging issues on the beach ridges in a proactive way using integrated resource information. Until now, these issues have been dealt with principally through various permitting actions at the local unit of government, which makes it difficult to consider the beach ridge ecosystem as a whole. The plan will be a tool for promoting greater public knowledge of both native prairie and the gravel industry and will ultimately put these activities into perspective with other land uses on the beach ridges.

An important activity for the forum will be to work with GIS professional staff from DNR and Clay County to build a customized data base and information delivery system. The forum will have a key role in the "customizing" of the data. Using the GIS information, the forum will formulate a draft plan, circulate it for review and then prepare the final plan. The forum will also develop strategies to involve and inform the public about the project and the values of the beach ridges.

This plan will go beyond an allocation of land uses on the beach ridges by including innovative methods for implementation. Although the precise terms of the plan are for the forum to shape, it is likely that reclamation may be a critical component. Reclamation is discussed here to provide an example of the innovative approach the plan may take. For example, the plan might include an overall reclamation scheme for the beach ridges that promotes the restoration of gravel mining areas using native prairie grasses. The plan may provide an opportunity for some companies, especially those working in close proximity, to collaborate on joint reclamation plans. As a result of the plan, a cooperative research program could be initiated to develop cost-effective methods

for reclamation with native grasses. The plan might also identify abandoned gravel pits and make recommendations for reclamation of selected pits (especially those that could provide a corridor to link isolated remnants of prairie). Abandoned gravel pits could also be identified through this plan as possible wetland mitigation sites. Finally, the plan could explore opportunities for prairie management on parcels owned or held in reserve by gravel companies. Other outcomes might include recommendations for amendment to current local zoning ordinances, conditional land use permits pertaining to reclamation, and the Aggregate Material Tax, especially that portion of the tax allocated to the reclamation fund. The plan could allow for better coordination and more efficient permitting and environmental review.

The Steering Committee, representing many points of view, has invested a considerable amount of time defining a common mission and goals. They have now added the detail that was difficult to provide in the proposal phase of this project. The Steering Committee views the plan as a series of findings and recommendations based in part on the information and GIS maps that have been prepared to this point. These findings and recommendations will be conveyed to the county board for their consideration. Specifically, the Steering Committee will attempt to identify areas where there is presently a conflict between gravel mining/prairie and indicate what might be done (if anything) to minimize it. They will try to identify where there may be a conflict in the future and what might be done to avoid it. And finally, they hope to identify where the greatest need for reclamation is and how it might be accomplished in the future.

**A.2.a. Context within the project:** The customized resource data base and the plan upon which it is based are the primary outcomes of the project.

**A.2.b. Methods:** The local forum will develop the plan and the DNR will be responsible for its production and distribution. Products from this activity are: 1) review of all the components of the GIS completed by June 1996, 2) draft plan prepared by January 1997; and

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3) a final plan by June 1997; including recommendations for initial implementation.

**A.2.c. Materials:** The budget will cover the expense of preparing and distributing a draft plan and a final plan. Anticipated expenses are primarily supplies, mailing costs, and salary support for the Project Analyst position.

#### A.2.d. Budget

**Total Biennial LCMR Budget: \$10,000**

**LCMR Balance: \$ 0**

### A.2.e. Timeline:

	7/95	1/96	6/96	1/97	6/97
Review GIS		XX			
Draft plan			XXXXXXXXXXXXXXXXXXXX		
Final plan				XXXXXXXXXXXXXXXXXXXX	

#### A.2.f. Workprogram Update:

**1/1/96 Progress Report:** This activity was initiated in 1995 with the majority of work scheduled to take place in 1996. GIS Specialist met with county staff to review GIS component of project and ensure compatibility with county system. List of existing data coverages was developed and reviewed with county board and steering committee. Completed LMIC data compatibility standards survey and discussed project with LMIC staff. GIS demonstration planned for steering committee in 1/96.

**7/1/96 Progress Report:** The GIS Specialist and the Project Analyst have worked closely with the Steering Committee to customize and refine the data. Many customized maps have been prepared from the data coverages. Interacting with the steering committee and informing

members about GIS technology has been a time-consuming task. Two GIS demonstrations for steering committee were conducted. A GIS subcommittee met to talk about technical issues and other local agencies interested in GIS attended this meeting. Steering Committee agreed to limit scope of work to beach ridge portions of the eastern 18 townships. Steering committee has reviewed and understands the components of the GIS (digital data, map atlas, data catalogue, and user's guide). LMIC data compatibility standards are being met.

In the preceding months, as part of the mission and goals discussion, the Steering Committee has defined the plan. They have also developed a methodology for systematically reviewing the 18 townships and a schedule for doing so.

**1/1/97 Progress Report:** As a group, the Steering Committee has learned much about the prairie and gravel resources in Clay County. They acknowledge the complexity of the issues and further recognize that the recommendations to come forward will be a strong beginning towards resolution of the ongoing land use questions. The Steering Committee likes the approach used in this project but all agree that it can be a difficult and time-consuming process. The questions at the core of the forum are very complex. The Steering Committee will not solve all the issues with their recommendations. Rather, they hope to provide thoughtful and local insight into some difficult land use questions.

In the last six months, the Steering Committee completed an analysis of the prairie and gravel resources for the eastern 18 townships. This analysis was conducted using customized GIS maps and information. Results of analysis will be presented in final report and in a map atlas. There are many other ways in which the data could be analyzed and considered. Time constraints permitted the Steering Committee to pursue only one analysis. After the project ends, other groups could analyze the data in different ways. The resource data assembled for use by the Steering Committee will have many applications to future work in the county. LMIC data compatibility standards continue to be met.

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Customized maps were featured at the field trip in July. The computerized data base was demonstrated at the public meeting in October to allow people to query about a unique parcel. This was a very popular attraction.

Steering Committee has begun to consider preliminary recommendations. A draft report including findings and recommendations is under preparation by the Project Manager for review by the Steering Committee.

**7/1/97 Final Results:** A slate of comprehensive recommendations was developed by the Forum and these are itemized in the Forum's final report entitled: "Clay County Beach Ridges Forum for Gravel Mining and Prairie Protection, Final Report" (June 1997). Two subcommittees have already formed to begin work on the recommendations found in the report. One subcommittee with about 10 members is led by Clay County and has broad representation by industry, prairie conservation advocates and landowners. The other subcommittee is currently chaired by DNR and also enjoys wide participation. The final report and recommendations together with the ongoing work of the two subcommittees constitutes the plan for the future. After more than a year of discussion, debate and deliberation, the issues on the beach ridges remain complex. Throughout the process, the Forum tried to consider the needs of the future in terms of both the gravel and prairie resources. The work of the Forum is clearly a starting point upon which others can build. The people participating in the Forum invested considerable time to learn about Clay County's prairie and gravel resources and to systematically review the information. As a result of this project, there is local interest, momentum and commitment to move ahead.

**B. Build customized GIS.** The final product for Objective B is the customized GIS including the digital data set, hardcopy large format color maps, and user's guide.

**B.1 Activity:** Identify and obtain or develop appropriate digital data sets and compile an integrated data catalogue for Clay County. Important natural resource information already exists for Clay County, but these data have yet to be interpreted, analyzed, or applied to

a specific land use question. Some of the data sets that will be combined into a GIS include: information from the County Biological Survey including boundaries for Scientific and Natural Areas, Aggregate Survey (in progress), National Wetlands Inventory, Public Land Survey and other base map data, Land Use Cover Types, county ownership data, scanned images of USGS quadrangle maps, among others. The GIS resulting from this project will be consistent with LMIC Geographic Data Compatibility Guidelines.

**B.1.a. Context within the project:** Assembling a data catalogue is the first step in building a customized geographic information system which is the foundation of the project.

**B.1.b. Methods:** Geographic information system specialists within the DNR and Clay County will work together to identify and obtain appropriate data sets for the data catalogue. The data that will be the most costly to integrate will be the county land ownership information (where parcels are given a tract ID number) with the public land survey data (which describes parcels by legal descriptions). These data must be merged in order to correlate ownership data with resource information. The products from this activity are 1) a data catalogue for Clay County by January 1996; 2) integration of county ownership data with public land survey information by January 1997, and 3) a companion set of preliminary large format color maps depicting the data by June 1996.

**B.1.c. Materials:** Some existing data sets will have to be purchased from outside sources. For example, scanned images of USGS quadrangle maps for use as a backdrop for displaying other data will need to be purchased from the USGS. It is also expected that LMIC will be involved in the preparation and printing of large format color maps. Data scanning, cdrom data storage, and other services may have to be purchased from outside vendors. This budget will cover the expense of acquiring necessary data sets, the cost of map preparation, and other services like scanning and cdrom storage of large data sets. A substantial portion of this budget will support the Project Analyst to integrate the public land



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survey information with Clay County land ownership records.

**B.1.d. Budget**

**Total Biennial LCMR Budget:** \$20,000

**LCMR Balance:** \$ 0

**B.1.e. Timeline:**

	7/95	1/96	6/96	1/97	6/97
Data catalogue	xxxxxxxxxxxxxxxxxxxx				
Integrated county ownership	xxxxxxxxxxxxxxxxxxxx	xxxxxxxxxxxxxxxxxxxx			
Draft map set		xxxxxxxxxxxxxxxxxxxx			

**B.1.f. Workprogram Update:**

**1/1/96 Progress Report:** Draft data catalogue is completed and contains more than 25 existing data coverages that can be potentially merged into an integrated data set. Scanned images of USGS quadrangle maps for use as a backdrop for displaying other data were purchased. Project Analyst received courthouse orientation by Clay County staff and established working relationships. A methodology was developed for integrating county ownership records with public land survey data. Hardcopy data has been collected for parts of 18 townships in Clay County where active mining is taking place. The ownership databases are complete for three of the most complex townships and others are in progress. Approximately 35% of the ownership integration work is completed.

**7/1/96 Progress Report:** Hiring and training a new Project Analyst has delayed completion of the ownership database by several months. Inputting the data has also proven to be a more complex task than anticipated. Approximately 55% of the ownership information is now completed and steady progress is being made. Should be completed by January 1997. Protocol developed

for printing of custom map products. Preliminary map set is being used by the Steering Committee.

**1/1/97 Progress Report:** The methodology for integrating the county ownership records with public land survey data was simplified to expedite completion. The ownership proved to be much more time consuming than anticipated, primarily because this kind of large-scale integration work has not been done before. The simplified methodology allowed for the completion of the ownership work in October. Design of the map atlas and standard map products was accomplished. The Digital Raster Graphics (DRG's) arrived from the contract vendor in late November. They are being incorporated into the data set as a hot button item.

**7/1/97 Final Results:** The data side of this project proved to be almost as challenging as the weather. A critical goal of the project was to consolidate existing digital datasets for the study area into a more useable format where data could be looked at in combination. This project was one of the first applications of GIS technology in a public setting. It was also one of the first times that data from several agencies was collected and integrated on a CD-ROM. The CD-ROM that results from this project is called "Exploring Clay County" (June 1997). The CD-ROM contains numerous resource-based datasets, documentation about the datasets, a demo, users' guide and selected maps. This CD-ROM is state of the art and represents a tremendous amount of detailed analytical work. Below is a partial list of the datasets captured on CD-ROM:

**Locational datasets:** Clay County boundary, geographic names, civil subdivisions, roads, public land survey, towns

**Ownership datasets:** managed areas, prairie bank areas, surface ownership

**Physical features datasets:** digital raster graphics (DRGs) which are georeferenced images of USGS topographic quadrangle maps, ecological classification units, land use and land cover, digital elevation model, original vegetation, soils

**Aggregate resource datasets:** aggregate potential of eastern Clay County, aggregate source information system (ASIS), Clay County gravel tax information, drill core data, mining permits

**Prairie resource datasets:** occurrence records, county biological survey

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**Water datasets:** lakes, national wetland inventory (NWI), streams, watershed boundaries.

Documentation for each dataset is found in a data catalogue that resides on the CD-ROM and is available as a 116 page hard copy document entitled "Documentation for the Computerized Resource Information of the Clay County Beach Ridges Forum" (June 1997). Copies of the CD-ROM were made and distributed to governmental agencies, educational institutions, and other interested parties. A technical session attended by approximately 30 people was held to discuss the data captured on the CD-ROM in detail.

**B.2 Activity:** Customizing of the data layers to address local needs. This activity will include integrating and regrouping data layers, achieving a common scale among all the data layers, resolving conflicts among layers, and identifying the pedigree of the information for each data layer. Input from the local forum or a smaller work group will be key to customizing the data set.

**B.2.a. Context within the project:** Customizing data to address local needs is an important part of the overall project and a significant activity for the local forum.

**B.2.b. Methods:** Analysis of complex digital data will be performed by professional GIS staff at DNR based on input and direction from the local forum. The GIS professional staff from DNR will work with the forum through a series of meetings and workshops. It will be necessary that these workshops be interactive with appropriate computer hardware and software available at the meeting site. To be effective and efficient in the task of customizing the data, the forum must have ongoing access to a computer system with ARCVIEW2 software. ARCVIEW2 is an easy-to-use software that allows a personal computer user to visualize, explore, query, and analyze geographic information. The Project Manager and one or two members of the forum should receive ARCVIEW2 training. Products from this activity are: 1) customized digital data set by April 1997; and 2) final set of large format color maps by April 1997.

**B.2.c. Materials:** The budget for this activity will be used to pay for

supplies, purchase copies of ARCVIEW2 software and obtain ARCVIEW2 training, increased computer memory to accommodate large data files, print large format maps, pay for storage and backup of large data sets on cdrom, and duplicate large data files to be compatible with the Clay County computer system. Bringing the GIS expertise from St. Paul to work with the forum will require travel expense. This budget will also be used to purchase an appropriate computer system to be used by the local forum. The same hardware will later be used for demonstrations of the completed GIS. This equipment will continue to be used for natural resource management programs through its useful life. Cost estimates were obtained for the lease of an appropriate computer to be used by the forum for the next 18 months. The lease option exceeded purchase price by approximately \$2,000.

**B.2.d. Budget**  
**Total Biennial LCMR Budget:** \$15,000  
**LCMR Balance:** \$ 0

**B.2.e. Timeline:**

	7/95	1/96	6/96	1/97	6/97
Customized digital data		xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx			
Final map set			xxxxxxxxxxxxxxxxxxxxxxxx		

**B.2.f. Workprogram Update:**

**1/1/96 Progress Report:** Work under this activity was begun in 1995 with the majority of this effort to occur in 1996. Appropriate software (ARCVIEW2) has been purchased, training has been completed or is scheduled for early in 1996.

**7/1/96 Progress Report:** ARCVIEW training completed. Computer purchased. A substantial amount of technical GIS work was performed since January. The digital data set is complete but some work remains on integration. Progress has been slower than expected due in part to the

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condition of some of the existing data sets. The final digital data set along with the final map atlas will not be completed until the end of the project because the Steering Committee has an ongoing need to revise and rework the data to conduct their analysis.

**1/1/97 Progress Report:** The integration of the data sets is now complete, an effort that required far more time than expected due to the condition of the data sets. An upgrade from ARCVIEW 2.1 to ARCVIEW 3.0 was purchased and installed to extend the longevity of the geographic data system. The rapid pace of change in GIS technology has been challenging for this project.

**7/1/97 Final Results:** An important accomplishment of the Forum was to combine existing datasets into a computerized resource information system for the eastern 18 townships of Clay County. The Forum then conducted an analysis by querying the computerized resource information with a set of specific questions relating to prairie and gravel resources. The analysis conducted by the Forum is summarized in the final report. Many other analyses are now possible using the computerized resource information. The analysis conducted by the Forum helped to focus attention on the relationship between highly significant prairie and the areas with high aggregate potential.

The Forum also produced a set of three summary maps that portray a simplified view of prairie and gravel resources and illustrate the relationship between high quality prairie and existing gravel mining areas. These maps are on the CD-ROM. Hard copies of the maps were also distributed to all townships in the county, community centers, and other public locations. With completion of the datasets on CD-ROM, many interesting custom maps are now possible to produce.

**B.3 Activity:** Design an information delivery system tailored to the needs of local users. To be an effective tool for local users who may not have a technical GIS background, the GIS data set must be easy to use, it must be interactive and it must be accessible on a personal computer. The key to achieving these goals is to design a customized system to access the data set. The system will be menu-driven and accompanied by a user's guide. The user's

guide will describe the data and how to use the menu driven system. The forum or smaller work group will have an important role in designing the delivery system. Demonstrations of the completed GIS will be provided to the forum and to other interested parties (Clay County Board, LCMR staff, industry, and others).

**B.3.a. Context within the project:** An information delivery system will ensure that the GIS data set is accessible and easy to use.

**B.3.b. Methods:** At this point, the software package AVENUE is the macro language for ARCVIEW2. It is anticipated that Avenue or some similar product will be used to develop the delivery system for the data set, however, technology is changing rapidly in this field. AVENUE is a software program that allows custom fitting of ARCVIEW2 to the needs of the users. The customizing of the data and the user's guide is a critical part of the project. Staff training for AVENUE applications will be needed. Once the GIS is completed, there will be a need for numerous demonstrations of the data set and the information delivery system. Products from this activity are: 1) completed user's guide for the data set by April 1997, and 2) demonstrations of the completed GIS by April 1997.

**B.3.c. Materials:** The budget for this activity will be used to purchase supplies, computer software, and to obtain staff training. Other costs are associated with the duplicating of the digital GIS data set and hard copy map sets for use by forum members.

**B.3.d. Budget**  
**Total Biennial LCMR Budget:** \$10,000  
**LCMR Balance:** \$ 0

**B.3.e. Timeline:**

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	7/95	1/96	6/96	1/97	6/97
User guide completed				xxxxxxxxxxxxxx	
Demonstrations of GIS				xxxxxxxxxxxxxxxxxx	

**B.3.f. Workprogram Update:**

**1/1/96 Progress Report:** This activity was initiated in 1995 but most of the work will occur in 1996 and 1997. Training completed or scheduled and supplies purchased.

**7/1/96 Progress Report:** AVENUE training completed in June. User's guide for the data set is in the design phase. Constructing the user's guide will be a major technical focus for the next six months. Refinement of the user's guide and GIS will continue until the end of the project.

**1/1/97 Progress Report:** With the completion of the ownership work, the integration of the data sets, and the resource analysis by the Steering Committee, substantial progress was made in the design of the data delivery system. Much of the technical work behind this project has proven to be inter-related and dependent on the work of the Steering Committee.

At the end of the project, the resource data will be available on cdrom. A short demonstration of the data will be on the front end followed by the full data sets. In addition to the cdrom - a map atlas, a data catalogue and a user's manual are all in the design and layout phase. Discussions are underway as to how to best reproduce the numerous colored maps associated with the project.

**7/1/97 Final Results:** The CD-ROM prepared by DNR staff contains an interactive demonstration call the "Clay County Demo" that provides a means for a casual user to look at the datasets in various combinations and at different scales. A portion of the Demo covers the entire county and provides a user with information about location, physical setting, elevation and shaded relief. The focus of the Demo is the eastern 18 townships where the beach ridges lie. The Demo allows a

user to query the data layers for information about the relationship among natural communities, ownership and aggregate potential. "Clay County Demo Users' Guide" accompanies the Demo and is found in digital format on the CD-ROM or as a 30 page hard copy document. The Demo was featured at the technical session hosted by the Forum. It will also be the basis for two teachers workshops being planned for August 1997 (teachers workshop were a recommendation from the Forum). The Demo and Users' Guide are an important and innovative part of the digital data. The Demo allows an untrained user from the public to access the information in an efficient and meaningful way. The Demo is found on the "Exploring Clay County" CD-ROM which is available to the public in several locations

Note that a copy of the CD-ROM has been delivered to LMIC and that it meets data compatibility standards established by LMIC.

**C. Public outreach:** The final products for Objective C are a range of activities and tools to involve and inform the public.

**C.1 Activity:** This project will develop and implement a public outreach component to both involve and inform the public about the project and to provide information to the public at large about the economic and natural heritage value of the beach ridges.

**C.1.a. Context within the project:** Because most of the land on the beach ridges is in private ownership, public understanding, support, and participation in this project is critical to its overall success.

**C.1.b. Methods:** Activities like public meetings, open houses, presentations to local interest groups, and field trips will be used to involve and inform the public. Tools like fact sheets, slide shows, poster displays, and a newsletter will be developed and used throughout the duration of the project.

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The forum will develop strategies for delivering the information gained from the project. For example, the digital GIS data set with maps and a user's guide will be housed in the Clay County offices. Other sets will be made available to the public in a setting such as a public library or the Moorhead State University Regional Science Center. Knowledge of the final plan will be widely distributed and publicized through mailings, field trips, public meetings, GIS demonstrations, and working with the media. More information will be provided in a subsequent workprogram update as these strategies are developed.

Products that will result from this activity are: 1) tools to inform and involve the public by June 1996; and 2) development of strategies to deliver the information gained from the project by June 1997.

**C.1.c. Materials:** The budget for this activity will be used primarily for supplies, support for the Project Analyst, and expenses related to the distribution of the completed GIS (digital data set, applicable software, map set, user's guide, and plan) to appropriate locations.

**C.1.d. Budget**

**Total Biennial LCMR Budget:** \$15,000

**LCMR Balance:** \$ 0

**C.1.e. Timeline:**

	7/95	1/96	6/96	1/97	6/97
Tools developed	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx				
Information delivery	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx				

**C.1.f. Workprogram Update:**

**1/1/96 Progress Report:** Slide show and information flyer prepared, newsletter under development. Feature story about project to be published in the January 1996 issue of "The Minnesota Volunteer". Featured story on a statewide broadcast on Minnesota Public Radio in November. Media interviews with local television, radio, newspapers. Anticipate many activities in 1996.

**7/1/96 Progress Report:** Providing information about the beach ridges to landowners, gravel operators, land managers and the public was a goal adopted by the Steering Committee. Distribution of the quarterly newsletter to 250 interested parties continues. KAWE - Public Television is tentatively planning to do a short feature. A subcommittee has formed to work on a children's activity book about the beach ridges. A map display is also under development. This will be a major focus to the end of the project.

**1/1/97 Progress Report:** KAWE - Public Television filmed the field trip hosted by the Steering Committee in July and is putting together a 6 - 8 minute feature story for use in a new show focusing on resource management. The video is expected to be completed in April and will be submitted with the project.

The Steering Committee continues to distribute a quarterly newsletter. The mailing list for the newsletter has increased from about 250 to more than 450. Greater public awareness about the project has resulted in more people interested in serving on the Steering Committee.

Arrangements are underway for the digital data set on cdrom to be distributed for public use at the Clay County Courthouse, the Moorhead State University Regional Science Center (used heavily by school groups) and a public library in the area.

A children's coloring book about the prairie and gravel resources on the beach ridges is in production and will be distributed to all 4th graders in the area to coincide with Earth Day 1997.

Several maps displays are under development. A summary of the information collected by the

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project will be prepared for public distribution, perhaps as part of the final report.

**7/1/97 Final Results:** An important goal of the Forum was to be a source of balanced and accurate information about the beach ridges. The Forum wanted the information gathered through this project to be summarized in different ways for future use by a full range of the public. The informational products devised by the Forum range from computerized resource information on CD-ROM to a children's coloring book. The Forum provided the leadership and oversight on the development of these products while project staff from the DNR were responsible for their completion. The following list describes the information products developed by the Forum for use by the public. Specific products are in bold.

**Computerized resource information on CD-ROM.** Computerized resource information on CD-ROM was compiled for use by the Forum in this project and for future use by the public. It integrates existing and relevant digital resource datasets for the eastern half of Clay County. The system allows users to study prairie and gravel resources in combination and to create custom maps and applications. The information is available to the public at the Lake Agassiz Regional Library and to visitors at the Moorhead State University Regional Science Center. The information is also housed in the Clay County Courthouse for use by county staff. The CD-ROM contains the Clay County Demo, users' guide, numerous datasets, data documentation, and selected maps. **The CD-ROM is called "Exploring Clay County" (June 1997). The CD-ROM is supported by a users' guide entitled "Clay County Demo Users' Guide" (June 1997) and a data catalogue called "Documentation for the Computerized Resource Information of the Clay County Beach Ridges Forum" (June 1997).**

**Maps.** A series of three maps displaying gravel and prairie resources were distributed to all town halls and community centers in the county. Several large maps were prepared for display in public settings throughout Clay County. **The title of the maps are:**

- **Natural Communities and Biodiversity Significance in Eastern Clay County, Minnesota (June 1997)**

- **Aggregate Resources in Eastern Clay County, Minnesota (June 1997)**
- **Prairie and Gravel Pits in Eastern Clay County, Minnesota (June 1997).**

**Coloring Book.** This coloring book for children depicts the value of both the prairie and gravel resources. It was presented to all third grade classrooms in Clay County on Earth Day by a team from the Forum (about 23 presentations at 10 different schools). **The title of the coloring book is "Lake Agassiz Beach Ridges: A Coloring Book for Children" (April 1997).**

**Information Handbook.** This handbook is a series of one page fact sheets that provide information on key topics relating to gravel and prairie resources. **The title of the handbook is "The Beach Ridge Landscape in Clay County: An Information Handbook" (June 1997).**

**Final Report.** The final report of the Forum documents all aspects of the project and includes a summary of the process, resource information, analysis and recommendations. **The title of the final report is "Clay County Beach Ridges Forum for Gravel Mining and Prairie Protection: Final Report" (June 1997).**

**Video.** Minnesota public television station KAWB-TV (Bemidji/Brainerd) recently premiered a locally produced show called Beyond the Backyard that features natural resource management around the state. A recent program contained a segment about the Clay County Beach Ridges Forum. The segment aired in May 1997 as episode #105. It provides an overview of the project and people involved. The video submitted with this project is the complete 30 minute program. **The 10 minute segment about this project is called Clay County Beach Ridges Forum and is the last of three projects featured in that episode.**

**VI. Evaluation:** This project will be a success if: 1) the plan has value and relevance to the people of Clay County; 2) the relationships formed at the forum persist; 3) resource information about the beach ridges is put into local hands through a customized GIS; 4) the forum and the public add to their understanding of the remaining resources on the beach ridges; 5) there is a

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publicly-endorsed mining industry operating on the beach ridges that strives to protect native prairie.

**VII. Context within field:** Nationally, the concept of sustainable development upon which this project is based, is gaining momentum. In 1994, the Minnesota Sustainable Development Initiative defined sustainable development as "a means to meet the needs of the present without compromising the ability of future generations to meet their own needs". This project is an opportunity for a local group to apply the principles of sustainable development to an important land use question in Clay County using collaborative problem solving methods and geographically-based resource information. This concept for this project was recently endorsed by the Minerals Team of the Minnesota Sustainable Development Initiative, a group that toured Clay County beach ridges as part of its activities.

**VIII. Budget context:**

Related activities for the two year period ending June 30th, 1995:

- 1) A \$50,000 cooperative project between the DNR and Clay County is underway to restore two gravel pits in Buffalo River State Park using Minerals Environmental Cooperative Research money which was matched by the Clay County Board from funds collected through the Aggregate Material Tax;
- 2) DNR Aggregate Mapping Program underway in Clay County;
- 3) DNR Public Land Survey Project for Clay County was completed at a cost of \$100 per township;
- 4) Distribution of approximately 3,000 copies statewide of a DNR publication entitled "A Handbook for Reclaiming Gravel Pits in Minnesota".
- 5) DNR served as staff to Minerals Team of the EQB's 1994 Sustainable Development Initiative;
- 6) County Biological Survey map for Clay County under development.
- 7) A proposal was funded several years ago under the federal ISTEA program to link prairie remnants along the corridor of Clay County Road 34 between Ulen and Felton.

Related activities for the two year period beginning July 1, 1995:

- 1) Completion of DNR Aggregate Mapping Program in Clay County;
- 2) County Biological Map for Clay County.

**IX. Dissemination:** Public outreach is an important component of this project as noted in Objective C. Public meetings, mailings, presentations, field trips, and tours will be the means by which information will be shared. Copies of the final plan and data set will be distributed to Clay County. Other copies of the digital data, maps, and user guide will be made available to the public in a setting such as the public library or regional science center.

**X. Time:** The project is not expected to exceed two years.

**XI. Cooperation:**

- 1) Program Manager: As program manager, Cindy Buttleman will spend approximately 30% of her time on this project for two years.
- 2) Cooperator: Tim Magnusson, Clay County Zoning Administrator. Approximately 10% of his time will be spent on this project for two years.

**XII. Reporting Requirements:** Semiannual six-month workprogram update reports will be submitted not later than January 1, 1996, July 1, 1996, January 1, 1996, and a final six-month workprogram update and final report by June 30, 1997.

**XIII. REQUIRED ATTACHMENT:**

**1. Qualifications:** Resume of C. Buttleman previously submitted.

**2. Project Staffing Summary:** See previously submitted staffing form.