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WRI JOINS SOUTH BELTLINE STUDY TEAM

Citizens of the Grand Rapids area are already well aware of the effort put forth by the Grand Rapids and Environs Transportation Study (GRETS) regarding the proposed South Beltline Highway. The idea is to link I-96 to I-196 with a by-pass running south of Grand Rapids.

The Michigan Department of Transportation has determined that the concept is worth further investigation, and has decided to prepare an Environmental Impact Statement. With this in mind, MDOT has acquired the services of the engineering/consulting firm Deleuw Cather, Inc., based in Chicago, Illinois. The Deleuw Cather firm has in turn formed a Study Team, which includes the Ann Arbor based firm, Johnson, Johnson & Roy, Inc. The WRI has been ask to assist Johnson, Johnson & Roy in their preparation of a Draft Environmental Impact Statement.

The Draft Environmental Impact Statement is to include, among other things, an analysis of wetlands, farmlands, wildlife habitat, endangered species, aquatic resources,

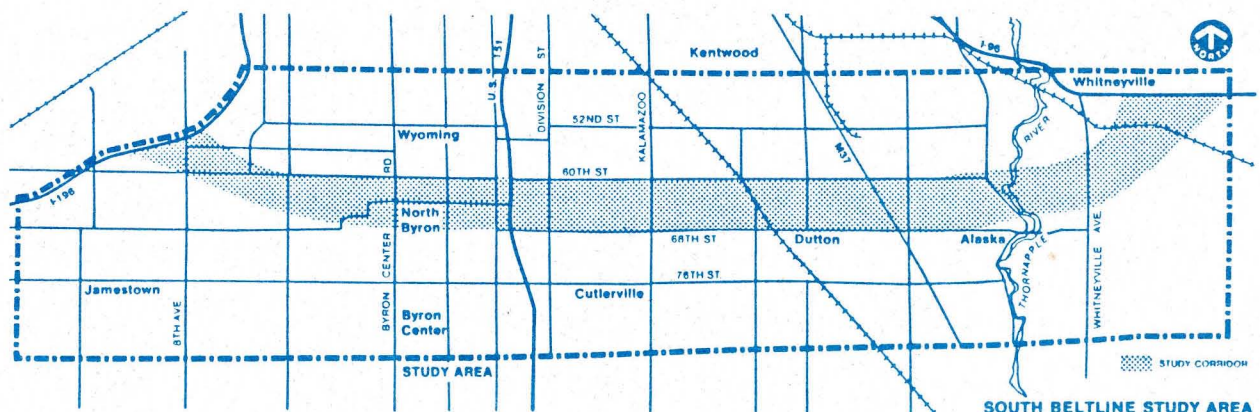
and groundwater. WRI will be working primarily to help evaluate the impact of this proposed road system on area groundwater resources. This will include the creation of a well-log-database for the entire study area.

The Study Team has already organized their first of several planned public information meetings. Other opportunities for public information and participation in the design and planning for this new road system include newsletters, a toll-free information line (1-800-255-4354), newspaper-radio-television announcements, and comment forms.

Alternatives to be considered include a limited access freeway and a controlled access boulevard. The study area itself has been defined to include the general area between I-196 near 8th Avenue on the west and I-96 near Whitneyville on the east. The alignment alternatives pass between 60th and 68th Streets.

A draft environmental impact statement is scheduled for distribution during the fall of 1990.

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FROM THE DIRECTOR

Historically, our waters have been used as waste treatment systems. We have built our cities and much of our industry on streams and coastlines not only because of transportation and water supply opportunities, but also because the availability of large volumes of water facilitated "dilution as a solution" to waste disposal.

More recently, we have realized that in order to protect our water resources, we must build treatment plants and process our wastewater before releasing it into the environment. To accomplish this we have spent billions of dollars over the past two decades.

One of the weaknesses of our treatment systems, namely the problem of combined sewer overflow (CSO), became very obvious during the past year. Public and media attention were focused on this problem when a series of heavy rainfalls resulted in untreated sewage entering the Grand River in Grand Rapids.

Many people were surprised by the CSO issue. Fortunately, technological solutions to this problem

are available, and a resolve to find the financing to fund those solutions has emerged in our community.

While CSO is only one of an array of problems associated with the Grand River, it has had the good effect of focusing public attention and creating a greater concern for the well-being of the Grand River and, indeed, all of our water resources. Evidence for this may be found in the recently announced Kent County Stream Monitoring Program, as well as the formation of an Ottawa County Sewer and Water Task Force. However, problems of any drainage basin are usually not limited to political boundaries, and require more comprehensive action for their solution.

Since CSO will not be the last of the problems to surface in the Grand River, we need to begin thinking about a comprehensive watershed management system which will involve all of the government, business, industry, and citizen interest groups. The time has come when we should begin to discuss the formation of a Grand River Watershed Council

which would see to the wise use of our Grand River waters while assuring their quality for future generations. Such a council could, through cooperative efforts, develop plans for the identification and solution of water quality and supply problems, as well as a long-term monitoring program. The efforts of the Council might be supported by action groups and the numerous academic institutions in the Grand River Basin.

The CSO problem has focused public attention and thus provides the opportunity to develop an infrastructure to attack the whole complex of problems related to our region's water resources. Current public interest and concern can provide the impetus for us to develop a Watershed Council which will guarantee the long-term quality, while maximizing economic gain, from our water resources. Hopefully, all concerned parties will take this opportunity to provide for our future.

Ron Ward

TRI-COUNTY GROUNDWATER CONFERENCE COMING IN JUNE

Grand Valley State University has again joined forces with Michigan State University, more specifically the Cooperative Extension Service, as cosponsors of a Groundwater Conference for Kent, Muskegon, and Ottawa Counties. WRI staff has been meeting regularly with the Extension Directors for each of the forementioned counties to plan this unique event. This partnership has resulted in an impressive list of speakers and group facilitators from all over the State.

The meeting is scheduled as a late afternoon conference on June 12, 1989, beginning at 1:00 p.m. and en-

ding at 8:30 p.m. GVSU will host the meeting at its new Grand Rapids Campus located at the L.V. Eberhard Center. The conference is intended to bring together people from all levels of government and areas of responsibility in each county.

Issues to be discussed include agricultural effects on groundwater quality, questions of liability, homeowner impacts, and state and local government responsibilities.

The Keynote Speaker will be the Honorable Vern Ehlers, State-Senator from Kent County, and Chairperson of the Natural-Resources and Environmental Af-

fairs Committee. Other guests include Timothy Wright, District Supervisor - Waste Management Division - Grand Rapids District Office - Michigan Department of Natural Resources, and other distinguished representatives from the West Michigan Environmental Action Council, Clinton River Watershed Council, Kellogg Biological station, and area Health Departments.

Registration Fee is \$15.00 which includes dinner. The meeting is open to elected officials, agency personnel, and concerned citizens from each of the three counties mentioned.

WELL-LOG DATABASE DELIVERED TO OTTAWA COUNTY

Dr. Norman W. Ten Brink, Geology Department - GVSU, has offered for distribution a Pre-Publication Draft Report titled: Results of the GVSU-Ottawa County Well-log Data Base Project: Groundwater Maps and Geologic Cross Sections. This document marks the culmination of more than two years of research conducted by Professor Ten Brink. It is one of the first projects undertaken by the Water Resources Institute, and in fact predates recent GEM activities.

The document itself is quite impressive in that it contains more than twenty maps and figures documenting the location and movement of groundwater in each of seventeen townships. The text that accompanies these results describes in laymen's terms the geologic features common in Ottawa County, including the aquifer systems identified.

In addition to the report described, WRI staff has delivered to the Ottawa County Department of Environmental Health the computer database developed by Ten Brink.

This database offers sort and search routines which may serve to assist the County in identifying the vulnerability of a given aquifer to known or suspected groundwater contamination. This same database could be used to identify alternative

aquifer systems should the need arise. In other words, when fully operational, this automated system should prove to be an extraordinary and useful tool for the Health Department and Ottawa County residents in general.

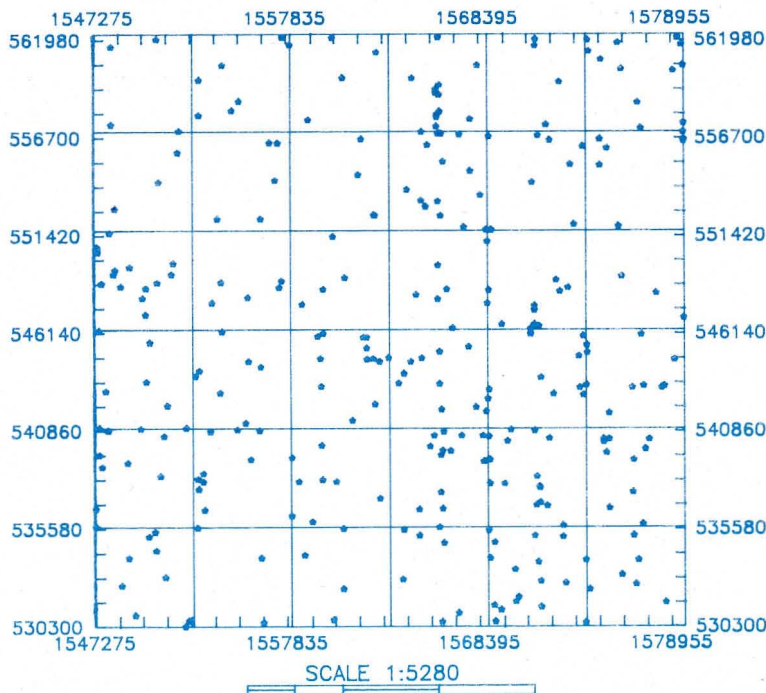
WRI-GEM PROJECT HIGHLIGHTED AT ANNUAL WORKSHOP FOR NORTHERN MICHIGAN HEALTH OFFICIALS

WRI staff member John Koches, Research Associate, was invited as the guest speaker to an all day workshop held April 19, 1989 at the Ralph A. Macmullan Conference Center on Higgins Lake. Ms. Michelle Parker, District Health Department Number 5, organized this year's annual event on behalf of the Northern Michigan Environmental Health Association. The Association represents more than twenty

counties in northern Michigan, and the meeting is used to help coordinate their activities throughout this area.

Mr. Koches presented an overview of the Groundwater Education in Michigan Program (GEM), and he spoke specifically about activities undertaken by the GVSU-WRI. Of particular interest to those in attendance was the Well-log Data Base for Ottawa County.

OTTAWA COUNTY GROUNDWATER SURVEY: ALLENDALE TOWNSHIP WATER WELLS 05-22-89



The figure to the left describes the location of each recorded well in Allendale Township, Ottawa County, Michigan. This map is one of twenty that has been created for each of seventeen townships in Ottawa. Together these maps provide the first detailed and comprehensive assessment of groundwater resources for this area. The WRI Well-Log Database Program has expanded to include Muskegon and Kent Counties.

WRI AND MDNR EXPLORE NEW OPPORTUNITIES FOR COOPERATION

The Michigan Department of Natural Resources has for several years been working with the Southwest Michigan Groundwater Survey and Monitoring Program (Science for Citizens Center, Western Michigan University), and the Center for Remote Sensing (Michigan State University), to develop a Statewide Groundwater Data Base. The Geological Survey Division of the MDNR is at present collecting information that will satisfy standards thus far established.

WRI has recently made a shift in its data gathering approach so as to capitalize on this previous work. WRI will follow MDNR standards in its work on Kent and Muskegon Counties.

The Data Base System developed by the State differs slightly from what has been used by GVSU for its analysis of Ottawa County. Even so, conversion routines have been developed which will allow the incorporation of the Ottawa County Data Base in the State's system. The Ottawa County Well-log Data Base, and accompanying documentation, has thus been delivered to Mr. Michael

Beaulac, Land and Water Management Division - MDNR, who has been coordinating such efforts for the State.

There are some obvious advantages in compiling future information using the MDNR strategy and methodology. Not the least of these advantages is the linkage made between the Groundwater Data Base and the Michigan Resource Inventory System (MIRIS). Using the system developed by the Center for Remote Sensing for the MDNR, we can now overlay such things as the road network, land use data, land cover data, and soils on a map of well locations and water table elevations. This then becomes an invaluable planning tool for the protection of groundwater resources by highlighting where problems currently exist, or where they are likely to occur in the future.

For more information about the Statewide Groundwater Data Base, you may contact either Michael Beaulac - Land and Water Management Division (517-373-1170), or David Forstat - Geological Survey Division (517-334-6943).

RURAL GROUNDWATER STUDY UNDERWAY IN OTTAWA COUNTY

Efforts by GVSU faculty to document and characterize groundwater location, movement, and chemical composition in Ottawa County has lead to new research opportunities. Dr. Edward Baum, Professor of Chemistry, was recently awarded a Faculty Research Grant-in-Aid from GVSU's own Research and Development Center to conduct a "Rural Groundwater Investigation".

Dr. Baum shall now focus his attention on the nature and extent of contamination in rural drinking water supplies. This new research involves the collection and analysis of approximately forty well-water samples.

Well-water samples will be analyzed for nitrate and one pesticide to be used as an indicator. The selection of this indicator will be based upon pesticide application practices common to a given geographic area. Areas to be studied will be decided based on aquifer vulnerability to on-land pollution sources. Shallow wells with a history of nitrate contamination will be given particular attention as Dr. Baum is interested in identifying a relationship between nitrate and other groundwater contamination problems.

Analysis of well-water samples will be conducted by the Michigan Department of Public Health, and the Michigan State University Pesticide Research Laboratory. Samples will also be screened for a host of pesticides at GVSU's own laboratory facilities.

Results from this research effort will be used to develop similar programs throughout the GVSU-GEM service area. Depending upon the problems identified, this study might also lead logically to the implementation of appropriate control measure options, thus eliminating pollution sources and future groundwater contamination problems.

GVSU/WRI RECEIVES AT&T GRANT

Grand Valley State University - Department of Academic Computing and Instructional Technology has recently negotiated a matching grant for a number of AT&T's newest micro-computers. Under terms of the agreement, GVSU will purchase 35 of the new machines, each equipped with a 20Mhz 80386 microprocessor. AT&T will in return furnish a like number as a matching grant. While the new machines will be distributed throughout campus, the Water Resources Institute will receive at least two.

The two machines ordered specifically for WRI will provide

tremendous capability. The AT&T system comes equipped with both DOS and AT&T's UNIX Version 5. They have multi-tasking capability, and will be able to facilitate data storage and transfer in a variety of media. The new machines will find immediate use in the GEM program as they are especially adept at handling large databases and complex mathematical models. One machine has already been targeted as the host for the WRI HUNRIS (Human and Natural Resources Information System).

Delivery of the new 386 machines is expected by the end of June, 1989.

WRI RECEIVES \$25,000 FROM MOTT FOUNDATION

The WRI was awarded another grant from the Mott Foundation to continue its programs in Aquatic Resources Education. A principle tool in this effort is the GVSU Research Vessel, D. J. ANGUS.

For those readers who are not familiar with the Angus, she is a 45 foot research vessel commissioned by GVSU in 1986. She was built to replace a much older vessel donated by the Grand Rapids entrepreneur Donald James Angus. Hence, the new boat was named in his honor.

The vessel is equipped with considerable instrumentation for the measure and analysis of water quality. She can handle up to twenty passengers at a time, and travels with a four man crew; including a Captain, deck hands, and On-Board Instructor. Professor Donald Hall, GVSU Physics Department, has served as the On-Board Instructor and team coordinator for the last several years, and continues to do so for this season.

The D. J. ANGUS kicked off the 1989 season with a northerly trip. A two-day workshop for forty Oceana County Teachers was conducted in Pentwater, Michigan on May 1 and 2. From Pentwater the Angus made her way even further north to Ludington, Michigan. In Ludington, the GVSU "Floating Classroom" was involved in a three-day program including demonstrations, cruises, and a public open house. The vessel returned to her home port of Grand Haven, Michigan on May 8, where she will carry out a variety of public education programs through the end of May.

The D. J. ANGUS shall continue her operations throughout the summer months, with service in Muskegon, Ludington, and South Haven yet to come.

For those readers that have never seen the Angus, you are invited to call our offices for more information. If you are interested in booking the Angus for aquatic education use, you must make reservations now for next year's cruises.



MAEOE ANNUAL CONFERENCE HIGHLIGHTS GROUNDWATER ISSUES

The Michigan Alliance for Environmental and Outdoor Education (MAEOE) held their Annual Conference on May 5-7, 1989 at Evart, Michigan. Of the workshop and activity sessions organized for the two-day meeting, no less than ten dealt with groundwater issues. Two of these sessions were led by Elma Tuomisalo of SEE-North and were specifically designed to assist in the furtherance of the Classroom GEMS Project.

For those readers who are unaware, SEE-North (Science and Environmental Education - North, University of Michigan Biological Station, Pellston, Michigan) is working with the Tip of the Mitt Watershed Council which has received its own Groundwater Education in Michigan Grant from the W.K. Kellogg Foundation. Together, these two agencies have spearheaded ef-

forts to develop a groundwater education curriculum for students and teachers in Michigan's schools. The project they have developed is called "Classroom GEMS". A work group has been formed with representatives from educational interests throughout the State.

The MAEOE Conference offered an opportunity for the Classroom GEMS Work Group to meet. The group has met three times since its inception late last year. Dr. Richard Lefebvre, Geology Department - GVSU, has served as WRI's representative from the beginning.

Professor Lefebvre reports that the Classroom GEMS project is on schedule. Curriculum has been prepared in draft form and is currently under review. Pilot testing of this curriculum is expected to begin in January, 1990.

SAILBOAT DONATED TO AQUATIC SCIENCES ENDOWMENT

A tip-of-the hat to Mr. and Mrs. Steve Galbraith who recently made a gift of a HURLEY 22-foot class ocean cruising sloop to the Water Resources Institute. The vessel, in good condition and equipped with

multiple sails, electronics, and new motor, was given to support the Institute's public outreach Aquatic Resources Education Program.

As with previous gifts of pleasure vessels to the Institute, the boat will

be sold and proceeds will be added to the Aquatic Sciences Endowment. Anyone interested in considering purchase of the vessel should call Ron Ward at (616) 895-3749.

WRI RECEIVES CRIES AND C-MAP TRAINING

The term Geographic Information System, or GIS, has been given much exposure in recent years, especially with the advent of microcomputer technology. Well, Michigan State University has two software products which relate directly to GIS applications. The first is CRIES, The Comprehensive Resource Inventory and Evaluation System developed by the MSU - Department of Resource Development; and the second is C-MAP which originates from the MSU - Center for Remote Sensing. Both have significant worth in the management of geographic data.

Having expressed an interest in both software products, the WRI staff met with Michael Badar, MSU - Computer Information System Coordinator, early last March. Mr. Badar put together a team of graduate students to demonstrate the practical application of both systems. The WRI staff was so impressed by this demonstration that we have since acquired both software packages with the intention of using these tools in the development of continued groundwater research and expanded HUNRIS activities. (HUNRIS - Human and Natural Resources Information System, a computer enhanced information system under development by the Water Resources Institute.)

A special thanks to Mr. Badar and Dr. Kyle Kittleson, GEM Manager - MSU's Institute of Water Research, for their efforts in making this training possible.

GEMNET ON-LINE

GEMNET is a groundwater information system which is accessed by a personal computer via a common modem. "Its purpose is to provide a support system for GEM Regional Centers and to facilitate information exchange between policy makers, community leaders, environmental groups and others interested in current groundwater information."

GEMNET has been developed by Michigan State University and is housed on its mainframe computer in Lansing, Michigan. It is accessible through a number of network systems including MERIT, TELENET, BITNET, AUTONET, TYMNET, and others. The GEMNET system will include information about Groundwater Legislation, an Expert Directory, Electronic Conferencing,

a Gateway to National Information Networks, and more.

WRI staff has been working directly with Michael Badar, MSU-Computer Information System Coordinator to establish the GEMNET System at GVSU. Installation is now complete, and the system is up and running.

What does this mean to you? Give us a call and let us introduce you to GEMNET. See for yourself how this powerful information tool can help in the management of groundwater resources. 616-895-3749.

(Portions of this article were taken from the November/December 1988 issue of GEM NOTES, published by the Institute of Water Resources, MSU.)

WANT YOUR WELL WATER TESTED?

We will be testing a limited number of wells in the Ottawa County area to check drinking water quality and to learn how contaminants move in the groundwater. If you are selected to participate in the project, the tests will be performed absolutely free at no cost to you. If you want to participate, please call us at (616) 895-3749. We will be glad to answer your questions and discuss sampling your well.

NSF GRANT AWARDED WRI FOR DEVELOPMENT OF A MODEL ELEMENTARY TEACHER PREPARATION PROGRAM

The National Science Foundation has awarded a \$361,319 grant to the GVSU Water Resources Institute for development of an elementary teacher preparation program with a water resources focus. Dr. Ron Ward, WRI Director, will serve as Project Director and, along with Dr. Loretta Konecki, Director of GVSU's School of Education, as principal investigator for PRISE (Project to Improve Science Education).

Numerous studies have shown that the education of elementary teachers often includes a minimum of science. Further, those science courses which are completed are frequently an unrelated collection of "Introduction to" courses with limited relevance to the elementary classroom. Such courses also lack much of the excitement and application to everyday life which is characteristic of upper level science courses. Thus, preservice elementary teachers are seldom motivated and encouraged to strengthen their science background by enrolling in more than a minimum of science classes or to elect a science minor or major.

Over a three-year period, PRISE will coordinate the efforts of a team of scientists and educators in the design and implementation of a model program of water resources, hands-on science education for preservice elementary teachers. Faculty experienced in acquainting K-12 students and teachers with our region's water resources, including numerous demonstration cruises and workshops aboard GVSU's research vessel D. J. ANGUS, will be put to use in the design of new courses and modification of existing courses for the PRISE curriculum. Information on all of our water resources, including lakes, streams, and groundwater, will be used to accomplish the goals of PRISE, which include:

- increasing interest in, knowledge of, and confidence with science;
- increasing understanding of the relationships between science, technology, and society;
- teaching science content appropriate to the elementary classroom;

- combining the teaching of science content with the process approach; and
- motivating and encouraging preservice elementary teachers to elect a minor or major in science.

PRISE will use an investigative approach in which preservice elementary teachers will act as scientists in collecting and evaluating water resources data in an introductory OUR WATER RESOURCES course. Subsequent courses in biology, chemistry, geology, and physics will make reference to the student's experiences in the OWR course and, where possible, use aquatic examples to illustrate scientific principles.

PRISE is intended to serve as a model which may be readily transferred to other regions of the nation where locally prominent resources may be substituted as the program focus. Transfer will be facilitated by special written and video materials.

Additional details of PRISE will be provided in future issues of WRR. Meanwhile, if you would like more information about the project, please call Ron Ward at (616) 895-3749.

NEW HYDROGEOLOGIST JOINS GEM TEAM

WRI has hired a new hydrogeologist who will join the GEM TEAM staff beginning with Fall Semester, 1989. He is Kevin C. Cole, Ph.D. He is a recent graduate in geophysics/geohydrology at the University of Arizona.

Dr. Cole's recent research efforts have involved him in the development of innovative techniques for the monitoring of groundwater distribution and bulk aquifer properties within the Tucson Basin of southern Arizona. Through this research he was able to successfully test the use of the Global Positioning System in con-

junction with microgravity to detect changes in groundwater distribution. Dr. Cole's other research activities have included the investigation of complex biological and chemical interactions within forest soils.

Dr. Cole offers GVSU considerable professional experience. He has worked for several years as a Research Associate in the Geohydrology Unit, University of Arizona. His experience also includes time spent with the Laboratory of Advanced Subsurface Imaging, where he was involved in the development of a site characteriza-

tion study for the Arizona-Superconducting Super Collider (SSC) proposal. His work with the Battelle Memorial Institute, Office of Nuclear Waste Isolation, included geochemical modeling and data processing for nuclear waste isolation site evaluation studies.

Dr. Cole is a welcomed and valued addition to the WRI staff. His unique experience makes him an important resource for west Michigan as well as GVSU. In addition to his GEM activities, Dr. Cole will be teaching half-time for the GVSU Geology Department.