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Central Wetland Unit Assimilation Projects

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Introduction

It has been well established for some time that coastal Louisiana is losing valuable and productive wetlands at an alarming rate. Up to now funding limitations have mostly kept the state from embarking on large restoration projects which would offer hope that the trend can be reversed or even slowed significantly. Our firm has been involved with wetland restoration projects in Louisiana for the last decade. Many of those projects have utilized a restoration method known as wetlands assimilation. This process beneficially utilizes properly treated and disinfected municipal wastewater to serve as a source of nutrients and fresh water to deteriorated wetland areas. This concept is gaining in popularity in the United States for many reasons, the most significant including:

- Utilizing those resources beneficially rather than discharging to area waterways which, if not of proper assimilative capacity, can be negatively impacted by the discharge.
- Reduction in the cost of municipal wastewater treatment by eliminating the need to remove nutrients from the wastewater.
- There is ample opportunity to employ this practice throughout coastal Louisiana as there are many communities with municipal wastewater treatment plants that can be used to provide fresh water and nutrients to wetlands at typically lower costs than other types of restoration methodologies.

Thus there is really a dual benefit to using this approach. It provides for an economical way to restore wetlands while reducing the costs to those municipalities subject to future restrictions on nutrient discharges to their traditional receiving waters. There are currently over ten such programs that have been implemented in Louisiana. With one possible exception these have been very successful, and many wetland areas have benefitted from this technology. Our State needs to use all types of restoration strategies available to it to attempt to reverse the staggering loss of wetlands in the coastal region.

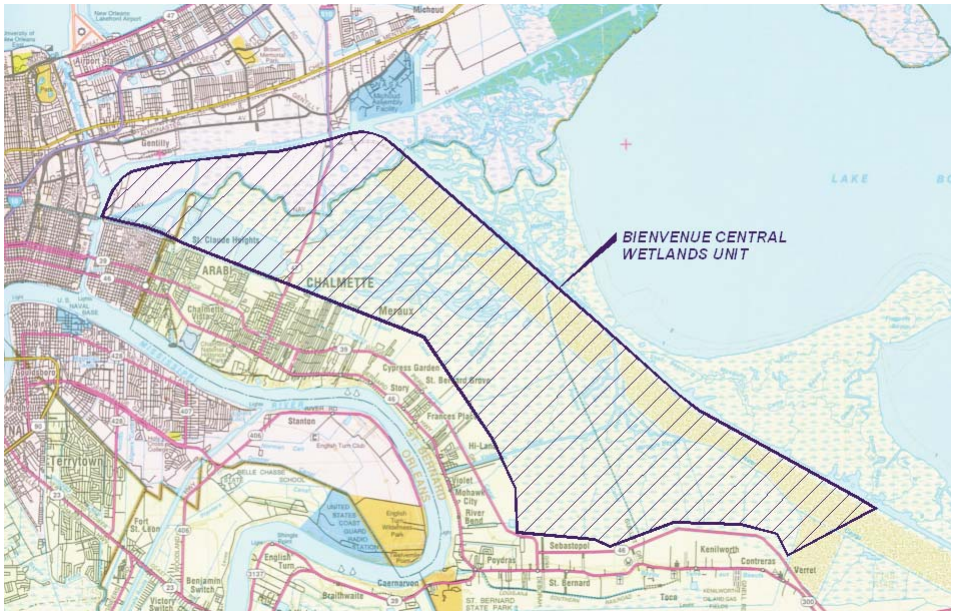

Figure 1 - Map

The Louisiana Department of Environmental Quality (LDEQ) has developed a separate type of permitting action for these assimilation projects. The permitting process requires a thorough assessment of the specific wastewater and the targeted receiving wetlands. The flow to the wetland is carefully monitored both for volume and constituents to ensure that the assimilative capacity of the wetland is not exceeded.

This article will describe an on-going program that the company is currently managing for the Sewerage and Water Board of New Orleans and St. Bernard Parish Government. The program will provide benefit to deteriorated wetlands within the Central Wetland Unit (CWU), a large, approximately 30,000 acre urban wetland within Orleans and St. Bernard Parishes. The majority of this wetland lies within St. Bernard Parish. (See Fig. 1 map). Our involvement in this program

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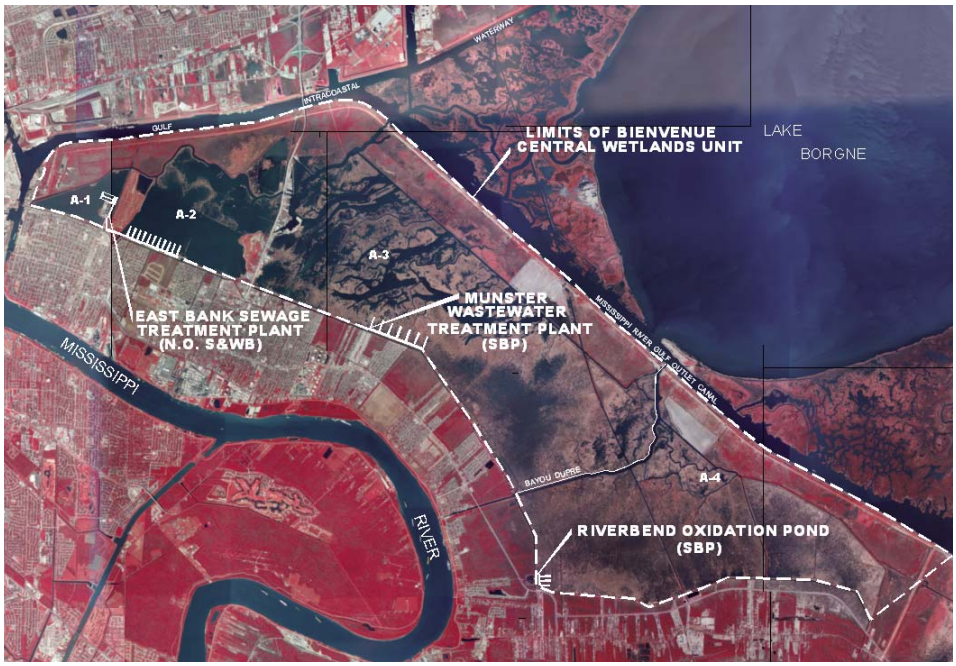


Figure 2 Aerial View

started in 2007 and is expected to continue for another few years as a minimum. The effort began when a highly specialized team of biologists, engineers, and risk managers undertook a pre-design, feasibility assessment of using this technology for restoring portions of this deteriorated urban wetland.

Pre-Design Phase

The first step in the implementation of this program was to study the feasibility of restoring this formerly productive cypress – water tupelo swamp using a wetlands assimilation approach. This pre-design phase was funded through a $400,000 grant given to the SWBNO and SBPG from the Delta Regional Authority. Most believe that the principal reason for the deterioration of the CWU was the construction of the Mississippi River Gulf Outlet through this area. This channel, constructed in the 1950's for navigation, provided a direct hydraulic connection to the high salinity waters of the Mississippi Sound into the wetlands which caused massive die off and deterioration of the swamp. This wetland unit now is significantly degraded due to this salt water intrusion, but if restored to its former cypress – water tupelo swamp status could become again a productive area. It would also serve to significantly buffer storm surges approaching the metropolitan area from the south and east should the outer protection levees be breached or overtopped. There is much interest in this project, from a purely environmental restoration perspective in addition to its flood protection potential.

A large, multidisciplined environmental and engineering project team, working closely with public works personnel of the two parishes (Orleans and St. Bernard) completed this pre-design effort. A number of individual assessments were necessary in order to properly determine the overall feasibility of the project. These are listed in summary fashion below:

- Assessment of the current and design conditions of the wastewater treatment plants and their capability of providing a properly treated effluent to the target wetlands.
- Assessment of the wetlands within the CWU paying particular attention to current environmental conditions. This task included projections of the design loading rates suitable for assimilation of nutrients into the various hydrological units of the CWU.
- Assessment of the alternatives open to the two parish utility departments to manage the residuals (biosolids) produced at their treatment works.
- Assessment of the potential ecological and human health risks associated with a program of this type.
- Assessment of the land rights issues associated with the implementation of this program.
- Preparation of a conceptual engineering design in sufficient detail to allow reasonable estimates of the costs associated with the program.
- Assessment of the federal and state regulatory programs and policies affecting the implementation of the program, and
- Conductance of a local public outreach program aimed at presenting the proposed program to interested citizens and stakeholders.

The first significant effort involved an assessment of the current and projected future condition of those plants expected to potentially provide treated effluent to the wetland units. These inspections were performed approximately two years after Hurricane Katrina had done extensive damage to these facilities. The treatment facility in Orleans Parish, the large East Bank Sewage Treatment Plant, was in reasonably good condition considering the hurricane damage and was already producing a quality effluent which could be used in wetland restoration. The primary candidate plant in St. Bernard Parish, the Munster facility, had a then greater degree of inoperable units but was expected to return to full operating condition due to repair monies provided by FEMA. This particular treatment facility in St. Bernard was also due to be expanded in order for it

to treat most of the municipal wastewater generated in St. Bernard Parish. Another treatment unit in St. Bernard Parish, the Riverbend Oxidation Pond, was also found to be a good candidate to provide freshwater and nutrients into the extreme southwest corner of the CWU.

An assessment of the potential target wetlands within the Central Wetlands Unit revealed significant deterioration from its former condition known to exist decades previously. The two hydrological units on the western side of the CWU were mostly

Photo 1 - Deteriorated wetlands area showing relic cypress stumps

open water with depths of approximately one meter. Restoration back to its former status as a cypress – water tupelo swamp would require incorporation of fill material to raise the level to a point capable of supporting tree species. The first photo shows a typical deteriorated area in the northwestern part of the CWU. The two eastern hydrological units evaluated were marshy areas with no forest species other than in the extreme southern end that has historically received treated effluent from the Riverbend oxidation pond and a drainage pump station. The second photo shows a relatively healthy cypress swamp area in A4.

The attached aerial image (See Fig. 2) shows the hydrological units mentioned and numbered as A1 through A4 starting at the western end of the CWU. Our team's assessment of these wetlands concluded with the derivation of loading rates into each hydrological unit which were designed to optimize retention of nutrient input within the specific unit.

Although not a typical component of a wetlands assimilation restoration project, the team also identified and evaluated alternative means of handling the biosolids produced at the plants. At most wastewater treatment units throughout the US these residuals have been disposed of by various means. It is interesting to note that one of the planned projects will utilize the incorporation of treated biosolids into a wetland cell as part of a research and development program.

Typically in projects such as proposed there is some concern about the impact to the environment and potential human health risks associated with discharge of a treated municipal wastewater effluent into a wetland system. As part of this project our team performed screening level ecological and human health risk assessments to identify potential risks. It was determined that the more conventional, common contaminants in treated effluent were very unlikely to pose unacceptable risks. One of the key focuses of the R and D program referred to previously is the testing for the presence of certain classes of compounds that have recently been identified as potential problem causing contaminants in some wastewater effluents in the U. S. These compounds, namely pharmaceuticals and personal care products (PPCPs) and endocrine disrupting chemicals (EDCs), while not expected to be of concern, will be assessed in more detail and carefully monitored during the program.

The conductance of a public outreach program and the investigation into the acquisition of the necessary land rights to implement these projects were also undertaken. The team conducted two public outreach meetings with stakeholders in the area. While there are some areas within the CWU which are publically owned most of the target receiving wetlands are not. Our team has and is continuing to reach out to these private landowners to discuss the program and determine what their concerns are.

Another scope item in the pre-design project was the evaluation of the costs of the program. This was done by developing a number of different scenarios involving different contributions of flow of treated effluent into different hydrological units within the CWU. There were eventually twelve different main scenarios evaluated with most having multiple subsets. Cost estimates were made for each scenario and included the costs associated with plant modification (principally disinfection scheme), providing fill if necessary into certain units, planting of cypress seedlings, and installation of the distribution system carrying the flow into the respective units. The available funding level for design and construction of the systems was a key component in developing the scenarios.

Development of Fundable Program Components

The pre-design feasibility study focused on those projects which could be implemented within existing funding levels. Early in the process the SWBNO and St. Bernard Parish had requested funding for these projects through the Coastal Impact Assistance Program (CIAP). The CIAP was established by Section 384 of the Energy Policy Act of 2005 (Act) to assist producing states and their coastal political subdivisions in mitigating the impacts from Outer Continental Shelf (OCS) oil and gas production. The CIAP legislation appropriated $250 million per year for Fiscal Years 2007 through 2010 to be distributed among eligible producing states and their coastal political subdivisions. The State of Louisiana through the Coastal Protection and Restoration Authority allocated $10,000,000 of State CIAP funds for the Central Wetlands Assimilation Project. Those monies are the current funding stream which will be used to implement the planned projects within the CWU.

Based upon this available funding there

Photo 2 - Healthy cypress area

are three separate projects which could be constructed within the CWU. These include:

• A demonstration project in Unit A-1 utilizing a small stream of treated effluent from the large East Bank Sewage Treatment Plant operated by the SWBNO. While the major design components of a typical project have been developed over years of practice, there are two key components of our proposed demonstration project that have the potential to significantly advance the science associated with wetlands assimilation. The first is the use of a relatively new disinfection technology which uses a charged ferrate ion as the oxidizing (disinfection) agent. Traditionally municipal plants have used chlorine in various forms to provide disinfection prior to discharge. This is a proven technology, however with the recent focus on detecting and determining the health implications of the aforementioned pharmaceutical and personal care products (PCCP's) and endocrine disruption compounds (EDC's), it is important to investigate new technologies to neutralize these compounds prior to introduction to the environment. Our demonstration project will have a significant component dedicated to the study of these compounds and the potential of the ferrate disinfection process to neutralize them. The other R and D component of the demonstration project is the incorporation of properly treated and disinfected biosolids into one of the cells of that project. As stated previously these materials have traditionally been disposed of in landfarms or landfills with no beneficial use of them. They have the potential to significantly increase the restoration potential of assimilation projects as they typically contain a significant organic component as well as nutrients which can promote plant growth. Our budget will allow the team to study the effects of using both ferrate disinfect treatment and biosolids addition to the constructed wetland cell for a period of one year.

• Another proposed project fundable under the current CIAP budget is the introduction of treated effluent from the Riverbend Oxidation Pond operated by the St. Bernard Parish Government to the southwestern corner of the CWU. This will be an approximate two million gallons per day (MGD) discharge into that area. This particular portion of the CWU is today the only remaining section of the entire unit that still has a relatively healthy stand of cypress trees. This area has been somewhat isolated from the effects of salt water intrusion as it receives an intermittent supply of fresh water from the Gore Drainage Pump Station during periods of rainfall. Currently the Riverbend Oxidation Pond is discharging into the canal which transports these stormwaters to the intake of the Gore pump station. Therefore this southwestern corner of the CWU is also receiving the benefits of nutrient addition as well as the fresh drainage water.

• The last project that is fundable under the current CIAP authorization is a larger project that will discharge into an open water area designated as hydrological unit A-2. The treated and disinfected effluent will originate with the East Bank Sewage Treatment Plant and will have a flow rate between the ranges of 3 to 6 million gallons per day. It will require placement of fill along the eastern side of the back levee along the 40 Arpent Canal in order to bring the elevation up to a level capable of supporting cypress tree growth.

The above three projects are fundable under the current CIAP budget. Members of our team have also been active in investigating other sources of funding to enable larger projects, and therefore more wetland benefit, within the Central Wetland Unit. We believe that there is a real potential to significantly increase this budget. We have additional projects "on the drawing boards" that will be designed to beneficially use up to 32 million gallons of treated wastewater per day. This program has been endorsed by a number of groups including environmental organizations, neighborhood groups, regulatory agencies, and others. The support has been amazing from a number of diverse interests that traditionally have not necessarily supported the same type of program. Our team believes that this restoration technology should be actively advanced in other portions of coastal Louisiana.

Degraded marsh in CWU likely due to Hurricane Katrina

Tom Ehrlicher Retires

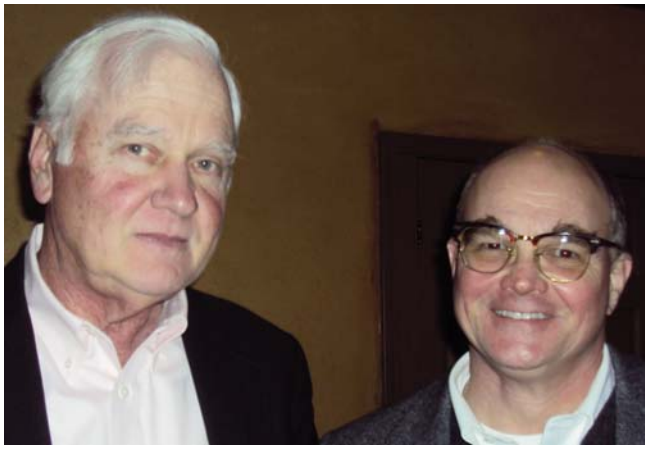
Tom and Kathy Ehrlicher

Tom Ehrlicher, Executive Vice President of the firm from January 1, 2009 through the end of 2010, retired from full time service on February 28th, 2011. Tom graduated first in his class in the College of Engineering from Louisiana State University, receiving a Cum Laude Bachelor of Science degree in Mechanical Engineering in 1969. He spent summers working at Algiers Naval Station, Shell Oil Company's Southeastern Division, and Shell's Offshore Division. After his initial graduation, Tom's career began at the U.S. Army Corps of Engineers where he worked for approximately six months before resuming his education at L.S.U. He received a Masters in Mechanical Engineering in 1971. On September 1st, 1972, Tom joined NELSON embarking on a dedicated and loyal career spanning nearly forty years.

On November 15, 1978, in recognition of his talent and excellent abilities, Tom was promoted to Assistant Vice President. He became Manager of Mechanical Engineering in 1981 and was promoted to Vice President in 1983. On February 15, 1991, Tom was promoted to both Senior Vice President and Corporate Secretary – a position he ably held for nearly two decades. While he worked on many different projects, his co-management of the Main Pass Mine project with Charles Nelson earned worldwide recognition in the early 90's. In 1995, Tom began working offsite at One Shell Square, chairing the engineering support role downtown. His attention to detail and thorough commitment to excellence helped immensely to keep up with a robust and diverse workload for our clients.

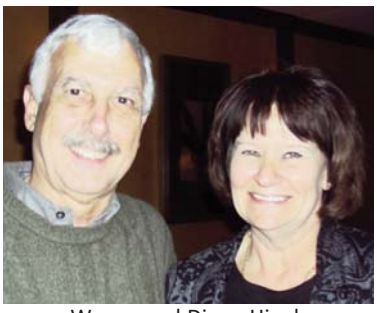
On January 1, 2009, Tom was promoted to Executive Vice President and also a Director of the firm. His oversight interpreting contract language and handling detailed negotiations have been invaluable. While we may see him on an occasional basis for special needs, Tom will be enjoying more time with his family and spending some time on the golf course. We extend our deep and sincere gratitude to Tom for his service and wish him and Kathy the very best in retirement.

Below are some pictures from Tom's retirement party, at which his co-workers shared many fond remembrances of his tenure at the company.



Tom Ehrlicher and Ken Nelson

Bob and Lynda Leaber



Wayne and Diane Hingle

2011 ENR 500 Ranking

Waldemar S. Nelson and Company has consistently ranked in the Engineering News Record top 500 Design Firms list for the last 20 years. This list is based on billings derived from design activity, and it speaks well of our staff that we appear among such prestigious competitors from all over the globe. Our rankings for the past twenty years are listed below. Congratulations to all who have helped make this achievement possible.

1992	168
1993	246
1994	186
1995	157
1996	199
1997	182
1998	151
1999	178
2000	256
2001	343
2002	275
2003	236
2004	284
2005	358
2006	281
2007	216
2008	187
2009	201
2010	176
2011	170

William E. Rushing, Jr., P.E. Receives the Henry L. Kennedy Award

Mr. Kenneth Hover, P.E., President of the American Concrete Institute, presented Bill of our New Orleans Civil Department with the Henry L. Kennedy Award at the recent ACI Convention in Tampa, Florida. Bill received this award in "recognition of his outstanding service to the institute and his leadership of many educational and administrative committees, including his commitment to the Institute when facing great challenges after Hurricane Katrina."

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