

SUCCESSFUL LANDSCAPE MANIPULATION IN THE URBAN FRINGE -  
FROM A GRAVEL PIT TO A LAKE

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INTRODUCTION

Reclamation in the 1990s is contingent upon whatever we, as professionals, learn from our reclamation experience in the 1970s and 1980s and our abilities to improve on future reclamation efforts. We have progressed from a mining free-for-all, 25 years ago, with no reclamation strategies, to a post-mine "fix-up" attitude, to the pre-mine progressive reclamation planning approach that now exists.

We have already learned from our mistakes over the past two decades and are now in the process of cleaning up some of the damage incurred as a result of those errors. This paper focusses on two of the many reclamation efforts directed at cleaning up the landscape scars left from our development free-for-all days of the 1950 to 1960s and even into the 1970s. The two reclamation examples that will be discussed relate to gravel pit reclamation in an urban context. Before discussing any of the specifics of the projects, I feel it is necessary to provide background information regarding present government legislation concerning gravel pit mining and the reclamation program within Alberta Environment that was established to deal with abandoned surface disturbances.

The Land Surface Conservation and Reclamation Act (1973) was the first major step that expanded and improved government legislation and regulations concerning reclamation of surface disturbances. It was not until 1978, however, that various regulations were put in place that designated sand and gravel developments as regulated surface operations and brought them under the control of the Sand and Gravel Section, Regulated Operations Branch, Land Reclamation Division of Alberta Environment. Prior to 1978, sand and gravel operators virtually had carte blanche.

To provide some idea of the extent of unreclaimed land due to sand and gravel operations in Alberta, there presently exists nearly 10 000 hectares of disturbed land attributed to developments that occurred prior to existing legislation. Abandoned sites that occurred prior to the present legislation (1978) have been the subject of attention for Alberta Environment through their Land Surface Reclamation Program.

This program, through money made available from the Alberta Heritage Savings Trust Fund, was originally initiated in 1973 but did not gain full

momentum until 1977 when the Capital Projects Division of the Alberta Heritage Savings Trust Fund took over the funding as part of the commitment to finance projects offering long-term economic or social benefits to Albertans. The program's primary goal was one of the recovering, for useful purposes, abandoned and derelict Crown and municipal land in the Province. Under the program, there are several project categories that may qualify for financial assistance, such as coal mines, gravel pits, garbage dumps, sewage lagoons, industrial or refinery sites or other mineral processing locations. Of the six major categories, sand and gravel pit reclamation ranks fifth in terms of money spent on reclaiming abandoned sites.

To qualify under the Reclamation Program sand and gravel pits must be inactive and have been abandoned prior to 1978 when regulations specifying procedures and requirements of gravel operations and reclamation were enacted. If the abandoned pit is deemed eligible for program funding a full scale reclamation effort is initiated.

It was through the impetus of this program that the two projects described in this paper were able to be completed.

### THE PROJECT

As a group of practicing landscape architects, our company was retained to provide park planning and design expertise on two large tracts of land within the city boundaries of Red Deer and Lethbridge. They were:

1. HERITAGE RANCH - 1985 acre project site in the City of Red Deer along the Red Deer River that was completed in the Fall of 1985
2. PAVAN PARK - 250 acre project site in the City of Lethbridge adjacent to the Oldman River that was completed in the Spring of 1987

A unique and common feature of both sites was the existence of an abandoned gravel pit that had to be incorporated into the overall park design. Both projects were very similar in nature and will be discussed jointly rather than individually to avoid repetition.

### PLANNING PROCESS

The planning process referred to here is not what would be expected for a "reclamation plan." There was no progressive reclamation approach when these pits were mined, there was no coordination between excavation and reclamation, in fact, there was no intention of ever reclaiming to any end land use. Once the gravel was gone the gravel company was gone, and only a pit remained.

The planning process that we followed, therefore, relates to "fix-up" reclamation rather than pre-planned, progressive reclamation. The abandoned pits were only part of an overall recreation plan for the properties. It was safe, therefore, to assume that a "recreation end-use" was most likely.

An URBAN PARKS MASTERPLAN was already in place for both Red Deer and Lethbridge that put forth a program of uses for each of the various parks planned within the Urban Parks System of each city. The program of uses for the two subject properties were oddly enough very similar and included components such as:

1. major equestrian centre;
2. extensive network of trails (bicycle, hiking, equestrian);
3. day-use picnic area;
4. playgrounds;
5. group use picnic shelters; and
6. interpretive emphasis.

The reclamation component of the project offered an opportunity to provide a complimentary recreational feature to further enhance the recreational potential of the site and compliment other recreational activities and facilities already planned. It was inevitable from the outset that some kind of water feature would be incorporated into the reclamation plan. A major problem and expense when reclaiming most sand and gravel pits to their previous land use or an agriculture land use, is the shortage of fill and topsoil. We made the decision early that we would not try to fill in the hole but rather we would plan for further excavation and deepening of the pit to create an excess of material rather than a shortage. The idea of a waterbody then became one of the uses listed on the overall design program. It was our job to prepare a final park design based on this pre-determined list of uses and activities, tender the project for construction, and coordinate the final implementation.

#### SITE RECLAMATION

The initial step in any reclamation plan or program is to determine the purpose or desired goals to be set out in the plan. In this instance, recreational development was decided on as being the key goal of the reclamation strategy. Inherent in achieving that goal are three other objectives that also must be attained:

1. erosion control (i.e., restore surface stability);
2. improve aesthetic quality; and
3. maintain a functioning ecosystem in a certain state.

In a severely disturbed area, such as the two sites we were dealing with, these objectives were particularly important. The primary means of achieving these objectives is the successful establishment of a plant cover (grass and trees).

The integration of a man-made lake in the main pit area was valuable in helping to alleviate three major problem areas associated with gravel pit revegetation:

1. hard, compacted surface of the pit floor;
2. submerged areas of the pit floor below the water table; and
3. steep, often unstable, slopes of the pit walls.

The lakes themselves generally follow the contours of the extraction site with some modifications for aesthetics and cost effectiveness. The main pit areas, however, were deepened considerably to create fishing potential. In the Red Deer example a bedrock pit floor was dynamited in several locations to create deep holes. In the Lethbridge example, deep holes in the pit floor were more easily created using a large back-hoe. Excess fill material was used to creatively shape the land form surrounding the lakes.

Revegetation and shoreline stabilization of the lake areas occurred as part of the overall park construction.

### DESIGN AND CONSTRUCTION CONSTRAINTS

Major design constraints related to the actual feasibility of maintaining a water body in a pit with an extremely porous base and also budgetary concerns relating to the construction costs associated with moving the vast amounts of earth anticipated (i.e., in excess of 200 000 m<sup>3</sup>) and also the cost implications of having to provide some type of vinyl or clay liner should it be necessary to maintain sufficient water levels for recreational use.

Both gravel pits were located in river valley bottoms. Detailed geotechnical investigations indicated that the water levels in both lakes could be maintained through natural groundwater inflow and the natural tie to the adjacent river water level. In the Red Deer example, the lake water level was in fact maintained several feet above the neighbouring river water level. This fact eliminated the need for a lake liner and solved one major cost concern. The second major cost consideration, dealing with massive amounts of earth moving, was resolved through Alberta Environment's Land Reclamation Program. Our proposal to Alberta Environment outlined the recreation potential exhibited at these sites and the potential for lake development to further enhance that potential.

Site meetings were held with Alberta Environment and the plans were further explained as to the design intent. Although Alberta Environment had not previously participated in such an ambitious gravel pit reclamation plan, they accepted the proposal enthusiastically. Their department coordinated all contractors and construction of the actual pit area reclamation and were responsible for excavation, rough grading, topsoil placement, fine grading and seeding. Alberta Environment's assistance in these areas allowed the original park funding to remain intact to be used for other park elements and aesthetic improvements (e.g., rip-rap shoreline, additional tree planting, etc.).

Construction constraints related to problems that were anticipated but were not expected to be as serious as they turned out to be. In Red Deer, the geotechnical investigations had indicated a hard sandstone subsurface at a depth not sufficient to support a fish population. This sandstone substrata



was in fact hard enough to prevent excavation through conventional means and necessitated blasting with dynamite to create sufficient depth at strategic points along the lake bottom. On the contrary, in Lethbridge, excavation with earth movers progressed extremely well, however groundwater inflow was much more rapid than anticipated, requiring a major pumping effort to allow the earthmoving equipment to operate. The water was finally too much to handle and the final depths had to be reached with a large backhoe.

The design and construction constraints were by no means insurmountable. Through some innovations and keen cooperation by Alberta Environment, the design intent for both projects was maintained.

### PUBLIC ACCEPTANCE

The success of any project is often based on public reaction. If that applies in this instance, then the reclamation has been an enormous success. Without question, the major design component in either park, was the gravel pit transformation into a stocked recreational fishing lake. When the original concept plans for the overall park design were presented to the public and were shown to include a man-made lake, they received unanimous support. That support has followed to the finished product, as the lakes are now experiencing phenomenal use. That use, in turn, spills over to the remainder of the site and the recreational facilities. The Lethbridge Park has not experienced a full season of use but was plagued by the problem of keeping park users away from the lake during construction. Once construction was complete, the lake was stocked with 2000 trout (8-10"). The remainder of the season has seen constant public activity around the lake. It seems obvious that the lakes are responsible for the popularity of the parks given the proximity to a large urban user group that enjoys the convenient opportunity of a fishing resource or just an aesthetic water body to enjoy.

### CONCLUSIONS

Sources of sand and gravel are searched for nearest to where they are needed most. By that fact alone, gravel pits are generally located on the fringe of the more urbanized areas of the Province. The two examples that have been cited in this paper show a successful landscape reclamation plan to a recreation end use. The circumstances surrounding these projects, however, are unique, in that what started out over a decade ago as a blatant disregard of the landscape turned out to be a highly used and attractive lake and park, made possible only through an ambitious undertaking by the Alberta Government with funds made available from the Alberta Heritage Savings Trust Fund.

Unfortunately, all projects do not have that same opportunity. The progress we have made in reclamation, however, will not require the vast amounts of money that "fix-up" reclamation demands. The progressive reclamation approach that plans for a pre-determined end use and implements conscientious materials handling procedures will achieve the same results at a fraction of the cost.

The kinds of projects described in this paper set the stage for urban reclamation in the 1990s. It does not mean that we will see improved recreational developments (e.g., lakes, golf courses, etc.) but rather we will see extractive sites that are very quickly returned to an after use compatible with the surrounding landscape. Operators are becoming more aware, and will continue in the 1990s to become more aware of the benefits of progressive reclamation (i.e., that it is less costly in the long run).

It may seem obvious when dealing with urban fringe lands that are a premium, that it is in the operators best economic interest to return that property to an attractive, compatible land use. However, this has not been the case in the past. As the urbanization of Alberta continues and the high demand and potential of urban fringe lands for other uses increases, there will be pressures applied to operators, both self-imposed and regulatory, that will make reclamation highly desirable. Ontario (Metropolitan Toronto) offers excellent examples of urban fringe reclamation to recreation and residential end uses accomplished through operator initiatives.

It should not be necessary to advocate the reclamation of disturbed landscapes. The need for it has become pressing and the benefits are so manifest. These benefits will become increasingly clear in the 1990s and the ensuing reclamation efforts will reflect that.

# Proceedings of a Symposium

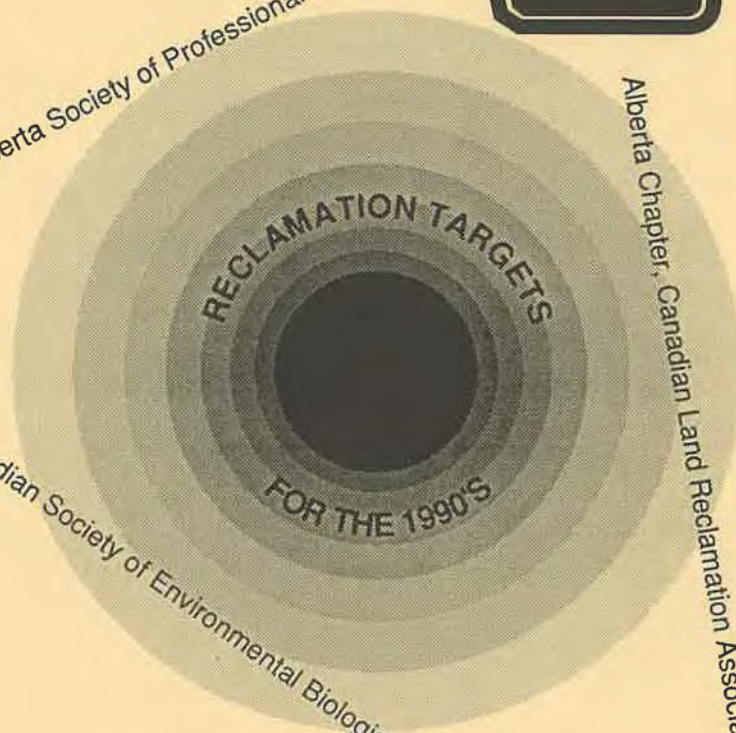


The Alberta Society of Professional Biologists



The Canadian Society of Environmental Biologists, Alberta Chapter

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The Organizing Committee would like to thank:

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Norwest Soil Research Ltd.  
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PROCEEDINGS

Alberta Environment, Research Management Division

And a special thank you to our two guest speakers:

Dr. David Samuel, University of West Virginia who spoke on Reclamation to Wildlife Habitat in the United States

Dr. Larry Holbrook, Biotechnica International of Canada, Calgary, Alberta who spoke on Biotechnology and Biologists

- and -

to the Hon. Ken Kowalski, Minister of Environment, for delivering the opening address.

## MESSAGE FROM THE ORGANIZING COMMITTEE

Reclamation practitioners and researchers have gone a long way to solving the problems posed by such disturbances as mining, drilling and pipeline construction. The future challenge for reclamation lies in applying our expertise in other areas such as industrial site decommissioning, habitat creation and restoration, and urban design.

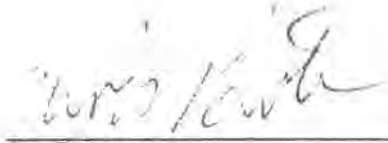
The Symposium was designed to expose participants to a wide variety of "new" areas where reclamation science could be applied. These were the "targets" referred to in the Symposium title. The speakers did an excellent job in meeting this goal. Some of the participants felt the Symposium had not provided enough information on new methods to be employed in reclaiming these new disturbance types. While this was not the goal of the Symposium it remains a valid concern that should be addressed in a future symposium.

Finally, the Hon. Ken Kowalski, Minister of Environment, encouraged all participants to get out and preach the need for, and successes of, reclamation, and indeed all environmental programs. Telling ourselves in conferences how wonderful we are is preaching to the converted. We need to let those who benefit from our labours, that amorphous group known as the public, know what we have done for them. This, too, should be the topic of a future symposium.


The papers in this proceedings have been edited and retyped into a common format. The contents of the papers are essentially unchanged from the submitted manuscripts of the authors.



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