



The term “land reclamation” means just what it says. It is a method used to return disturbed land to a state where it is useful once again. We use the land in many ways in order to provide us with the materials we need in our everyday lives. Industries use land to extract natural resources, to build processing plants and manufacture things that people consume. Farmers and ranchers clear, plow, seed and fertilize the land to grow food and raise animals. Foresters harvest trees and plant new ones. We use the land for building homes and businesses and for recreational purposes. Without reclamation, the land would be left damaged and incapable of supporting other uses such as agriculture, forestry, recreation and wildlife habitat.

Land reclamation helps us to return the land to a state where, at a minimum it is at least as capable of supporting the same kinds of land uses as before the disturbance. To reclaim land we must know what it was originally like - its soil and vegetation types and characteristics, what changes have been made to it and then consider whether it should be reclaimed to its original purpose or used for something else.

Alberta Land and Land Reclamation

There are many different types of land in Alberta. In the west, the Rocky Mountains and the foothills are covered by alpine (mountain) and subalpine vegetation. In southern Alberta there are areas of fairly flat grasslands. Moving through central Alberta the land is flat to rolling and there are more trees and bushes. Most of Alberta’s forests can be found in the northern and northwestern areas of the province.

These areas took millions of years to become what we see today. The effects of people's activities across the province can also be seen today. The environmental effects are different in each situation and without conservation and reclamation, problems can worsen.



Activities Which Disturb the Land

A few examples of the major land disturbances are described here.

Surface Mining of Coal - Coal is mined in Alberta, with most being used to generate electricity. The rest is metallurgical coal used for the manufacture of steel. Most coal in Alberta is surface mined. Vegetation is cleared and the topsoil is removed and stored for later replacement. **Subsoil** and **overburden** are also removed and stored separately and then the coal is mined. To reclaim the land, the overburden and subsoil are replaced in their correct order and **contoured**. The topsoil is replaced and the land is seeded with the right kind of vegetation for the intended land use. Establishing vegetation also helps to prevent erosion.

Without reclamation, the effects of surface mining can be seen for years. The unstable land around the coal pits and the coal spoil piles would be unsuitable for agriculture and would present safety hazards. Wildlife would continue to be affected by the loss of vegetation and habitat like they are during the mining process. Therefore, reclamation is critical.

Surface Mining and Extraction of Oil Sands - Another major resource in Alberta is the oilsands. This tar-like form of oil known as bitumen, is removed from a mixture of sand and clay. Shallow deposits of bitumen are mined from the surface and deeper deposits are recovered through wells. Once the bitumen is extracted, tailings are left behind. The tailings are a slurry - a mixture of water and solids, containing sand, silt, clay and unextracted bitumen. The slurry is discharged into tailings ponds. The sand rapidly settles out and is used to build dykes around the ponds. Some of the clay particles remain suspended in the water and form what is called **fine tailings**. The solids in the fine tailings do not settle out for many years. Research into the reclamation of these fine tailings continues today.

Waste Disposal Sites - In the past, household wastes were often left to rot in the open, whether in a centralized dump or on the landowner's property. Today, garbage is disposed of in regional or municipal sanitary landfills. These landfills are lined with clay or a strong polyethylene liner to prevent any materials from **leaching** into the **groundwater**. Leachates create the potential for soil and groundwater contamination. At the end of each day new compacted garbage is covered with a layer of soil. When the landfill is full, it is capped with clay to make it air and water-tight. Materials do not decompose very quickly in the absence of air and water. This process minimizes the amount of material that could decompose and perhaps contaminate groundwater or the surrounding land. The clay is covered with fill (poor grade soil) and topsoil to provide a medium for the growth of vegetation or other uses. Contouring the site creates proper drainage and prepares it for seeding. Today, sites for sanitary landfills are chosen after soil and water studies are carried out and impacts on the environment, including people, have been considered.

subsoil: a collective and general term for the layers of soil below the uppermost layer (topsoil). It can consist of sand, silt and clay but has little, if any, humus or other organic matter. Subsoil provides structure, holds moisture, and is a good foothold for rooting plants.

overburden: Rock and other material found beneath the subsoil and on top of coal or other material being mined. Overburden is not developed enough to be defined as soil.

contoured: shaped to fit a particular area, often depending on what the end use of the area will be after reclamation, e.g., if it is intended to be used for a park that will allow for tobogganing in winter, hills will be made an appropriate size and steepness.

fine tailings: solid particles in the oil sand tailings that remain suspended in water, rather than settling to the bottom. It is usually the clay and silt that forms the fine tailings. It forms a gel-like material that releases water very slowly. It is fairly stable, but not solid enough to be handled like a solid.

leaching: the movement of liquid into another material. It usually refers to liquids that leak out of waste disposal sites and contaminate soil and

Forestry, Pipelines and Transportation - Clearing timber for forestry, pipelines and transportation can contribute to soil erosion. The land is reclaimed by saving soil during construction. This soil is then replaced and contoured and finally fertilized and seeded. By law, logged areas must be replanted through reforestation projects or allowed to regrow naturally. Industries, municipalities and the provincial Department of Transportation and Utilities are required to ensure that road construction meets specific criteria and standards which consider the soils and waterways they affect.

Of What Use is Reclaimed Land? - Lands reclaimed after the above uses have become wildlife habitat, parks, forests, golf courses, agricultural lands and more, depending on where they are situated and what they were used for prior to development or disturbance.

For example:

- In Calgary, a large gravel operation was reclaimed into Carburn Park,
- In Red Deer, part of the Waskasoo Urban Park is formed from reclaimed gravel pits,
- Terwillegar Park and parts of Rundle Park in Edmonton are reclaimed garbage dumps and gravel pits,
- A park in Legal is constructed from a reclaimed water reservoir, and
- Parts of the Nordic Centre in Canmore, a world-class cross-country ski facility, are on a reclaimed coal mine.

Large areas of surface coal mines in the plains have been returned to agricultural land and wildlife habitat. The mountain coal mines have been returned to forestry uses and wildlife habitat. A number of lakes have been created in the plains and mountains coal mine areas that provide recreational opportunities for many Albertans.

Finally, over 40 000 wellsites have been reclaimed in Alberta with the majority being returned to productive agricultural land.

Land Reclamation Legislation in Alberta

Alberta was the first province in Canada to legislate land reclamation. Through the mid 1950s and early 1960s, Alberta's landscape was dotted with unreclaimed, abandoned oil and gas well sites and coal mines. If action had not been taken, the number of these sites would have increased. In 1963, the provincial government passed the Surface Reclamation Act to ensure that reasonable reclamation standards were maintained throughout the province. At that time, pipelines and well sites were the main concern. The Land Conservation and Reclamation Council (LCRC) were the group responsible for enforcing the department standards were . In 1973, the concept of conservation was introduced, bringing about new legislation in the form of the Land Surface Conservation and Reclamation Act. With this new Act, large operations such as coal mines, oil

groundwater: water that moves through the layer of soil. Some remains in the soil, while some moves downward and collects in a zone of saturation, where all the spaces in the soil are completely filled with water. The upper surface of this zone is called the water table.

sands sites, pipelines and sand and gravel pits were regulated. The Act required operators to submit their plans for conservation and reclamation and obtain approval from the LCRC prior to the development of a project.

In 1978, the Act was further **amended** to legally require operators to use conservation methods such as stripping topsoil and storing it separately for later replacement.

In 1993, the Environmental Protection and Enhancement Act and the Conservation and Reclamation Regulation were enacted to replace the Land Surface Conservation and Reclamation Act. The Departments of Environment and Agriculture, Food and Rural Development monitor project development, construction, operations, changes to plans and abandonment. Before a company is free from responsibility for a land disturbance, their conservation and reclamation efforts are given a final inspection. Those who 'pass' are issued a certificate indicating that their site meets or exceeds standards. Those who do not qualify for this certificate must modify their work and efforts until approved standards are met.

A program was in place from 1978 to 1994 to clean up sites on municipal and crown lands that were disturbed and abandoned prior to the legislation. The Land Reclamation Division of Alberta Environment managed the program, which included research so that companies had the best means to return the land to a useful state. Support for this work was provided through the Heritage Savings Trust Fund.

Who Decides the End Use of Reclaimed Lands? - How the land will be used when the project is finished and how it will be reclaimed must be decided before plans are approved. For smaller sites such as a wellsite, pipeline or sand and gravel pits, the landowner usually determines the end land use. For larger disturbances, such as coal and oil sands mines, a number of stakeholders, including the landowners, land managers, municipal and provincial agencies and traditional land users may be involved in the final decision.

The Standards - There are conservation and reclamation standards in place which must be met by operators. Meeting these standards forms part of the overall cost of a project.

Future Direction of Land Reclamation - We must consider the environmental impact and ways of reducing land disturbances if we are to continue using the land. Cooperation among governments, industry and landowners, and ongoing research are making it possible to create reclamation programs that are healthy for the environment, society and the economy. Planning for reclamation before the land is disturbed is crucial for land conservation. It is also much more cost-effective to plan for reclamation rather than having to undo damage after a project is completed.

amend: make changes for the better; improve. The Act was changed to ensure that land in Alberta is better protected and that people who disturb the land ensure its conservation and reclamation.

What Can You Do?

People place great demands on resources and the land. Most reclamation projects are carried out by industry and governments but each and every person can still make a big difference. How? By becoming more aware of what you are buying, using and wasting.

In the Home - The informed consumer can purchase fewer household goods which might harm the environment. Your local library is a good place to start learning about such things as natural pest control. Learn how to plant onions, marigolds, garlic, basil or thyme, and weed regularly to ward off pests. Start a compost heap with vegetable scraps which are full of rich nutrients for your garden. Weed gardens and lawns by hand rather than using pesticides.

Used motor oil can be dropped off at a collection depot to be re-refined (recycled). By reducing, reusing and recycling your household wastes you can cut back on the amount of material going to landfills. This is important when you consider much of our waste is derived from non-renewable resources.

Practice Good Land Use Ethics - That may sound grand but practicing good land use ethics can be as simple as remembering not to litter or disturb things when you are walking, biking, hiking or just enjoying the natural world.

Good land use practices to follow include:

- stay on trails,
- clean up your camp or picnic sites,
- pack out what you pack in, and
- use **OHVs** only in designated areas.

Also, reducing our use of non-renewable resources like coal, oil and sand and gravel can help conserve both the resource and the land. Using common sense is the best protection and sets an example which others can follow.

Practice Land Management - Soil conservation is the basis of good land management and is very important in agriculture. A healthy supply of nutrients in the soil can be maintained by leaving stubble and other organic matter on the fields so that these nutrients can be recycled into the soil.

Farmers can rotate crops, keep stubble on fields after harvest, plant crops perpendicular to prevailing winds and erect shelterbelts to protect the soil from erosion. Farmers are encouraged to prevent overgrazing, not to burn, and practice **zero and minimum till farming**. Local agricultural offices can provide information on new and existing techniques which can save time and money and contribute to land conservation.

You can also manage your own urban land. You can use fewer herbicides and pesticides, compost your yard and food wastes, and water the lawn efficiently. If you wish to be even more creative, plant native species or replace your traditional lawn with other forms of groundcover.

OHV – Off Highway Vehicle. Sometimes referred to as ATVs (all-terrain vehicles). An OHV is designed for off-highway use.

zero/minimum till farming: forms of conservation tillage to help reduce soil erosion. The number of times the land is tilled is reduced, and can be reduced to the extreme in which zero or no tilling is done. Tilling exposes soil to wind and water.

What Does it all Mean to You?

All the planning, effort, time and money that is required for land reclamation produces results we can all enjoy. What were once garbage dumps and gravel pits are now golf courses and recreational parks. There are projects throughout Alberta which have become wildlife habitat, recreational areas with stocked fish ponds, productive forests and agricultural land. Mining sites and pits are now areas we can appreciate. Piles of soil and barren land are green again and full of wildlife.

Land and soil conservation is attainable if we modify our habits accordingly and care more for the land. Our efforts may not be noticeable overnight, but we will all benefit in the long run: government, industry, business, individuals and future generations. We know what we have to do to conserve the land. Alberta has numerous examples of how this knowledge is put into practice.

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Additional information on Land Reclamation is available from the Alberta Environment & Sustainable Resource Development website at www.ESRD.Alberta.ca