

# Land Reclamation

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## Réhabilitation des sols



# Annual Report 2004

**ENVIRONMENTAL INITIATIVES**  
**- LAND RECLAMATION PROGRAM -**  
**Economic Development and Planning Services**

*December 2004*

# Our work

Number of tree seedlings planted  
since 1978: 8 million  
in 2004: 269,096

# Our workers

Number of hectares treated with crushed limestone  
since 1978: 3346  
in 2004: 17.4

# Our outreach

Ontario Works Participants: 44  
HRDC - JCP Participants 10  
CGS Temporary Staff 5  
CGS Summer Students 4  
Volunteer Groups and Students 1,464

# Our partnerships

Towards a Greener Sudbury Show  
Regional Heritage Historica Fair  
Facilitate Group Planting Activities  
Provided Guided tour to the Ambassador of the United States  
Sudbury Star Articles  
Featured in the EARTHCARE Supplement of the Northern Life  
Participated in several phone interviews



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The Land Reclamation Program has been very active this year in continuing to improve the City's environment and image. This year the Land Reclamation Program met its goal of liming almost 20 hectares of barren land and planting over 250,000 tree seedlings.

Last year, the Land Reclamation Program committed to adopting two approaches to its planning and operations: 1) watershed improvement and 2) increasing diversity of the plantings. Several initiatives were carried out this year to accomplish these goals.

## Watershed Improvement

A watershed is the land area that drains to a specific body of water, such as a lake, river, stream or wetland. Improving the conditions of the land in a watershed, such as increasing vegetation cover, will improve the quality of the receiving water body. In fulfilment of its commitment to improve watersheds, the Land Reclamation Program this year focussed on three objectives: 1) completing the reclamation of the watershed of Silver Lake, a highly acidic and degraded lake, 2) reclaiming the watershed of an important tributary of Junction Creek on City-owned land around the snow dump, and 3) improving tree canopy cover in several watersheds.

### *Silver Lake Watershed*

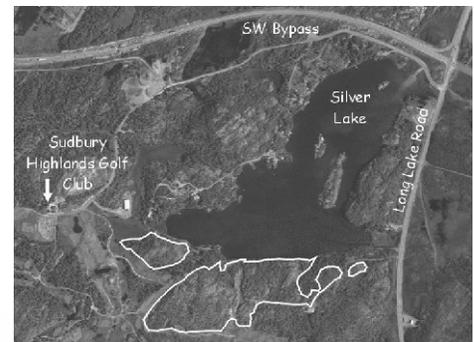
In 1995, Dr. John Gunn of Laurentian University referred to Silver Lake as one of the most metal-contaminated lakes in the world, considering lakes affected only by atmospheric deposition. In 1990, copper and nickel levels were 60 times and almost 24 times the Ontario Water Quality objective respectively. The pH, a measure of acidity, was at 4.32 during the same time, and it is known that lethal effects of acidity on aquatic life occurs at a pH level below 4.5.

Treatment of the Silver Lake watershed with lime, fertilizer and a grass/legume seed mixture was completed this year, following previous efforts in 1983, 1985, and 2000. This year, 11.8 ha of the watershed were treated for a total of 22.7 ha since 1983. In addition, a total of 8000 tree seedlings were planted in the watershed this year.

Treatment of the land in the watershed appears to have had dramatic effect on the quality of Silver Lake. A fish survey conducted this summer by the Cooperative Freshwater Ecology Unit found several fish species present in the lake whereas no fish were present in 1990. Likewise, acidity has also improved drastically from a pH of 4.32 in 1990 to over 6.35 in 2004.

Right: Liming and tree planting activities in the Silver Lake watershed.

Below: View of the barren rock outcrops in the Silver Lake watershed.



## Junction Creek Watershed

The Land Reclamation crew also applied lime, fertilizer and seed to 5.6 hectares on the barren slopes near the City's snow dump off the Lasalle Blvd. Extension. The slopes drain into the Nolin Creek system that empties into Junction Creek. The slopes are partly covered with dwarf birch, an indicator species of elevated metals and low pH in soils. Our crews will plant trees on these slopes next spring.



Left: Lime site near the City snow dump off the Lasalle Blvd. Extension.

Below: View of barren rock outcrops near the City snow dump. Note the lime bags placed on the ground ready to be spread.



## Tree Planting and Watershed Improvement

The spring planting season ran from May 3<sup>rd</sup> to June 22<sup>nd</sup>, with 164,620 trees planted. Keeping with the watershed approach to reclamation activities, sites selected for tree planting included the watershed areas of McFarlane Lake, Richard Lake and Crooked Lake. Sites aerial limed by INCO Ltd. in the fall of 2003 were also planted. As part of an ongoing commitment the crew planted 29,280 red pine seedlings for the Vermilion Forest Management Co. in the Falconbridge area.

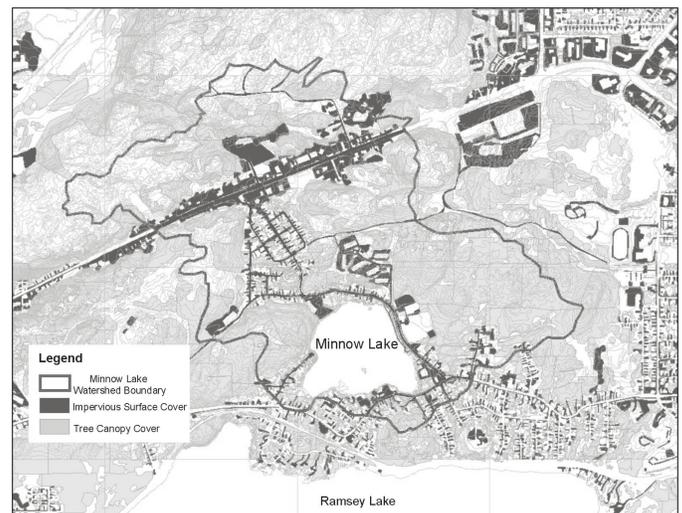
The fall plant saw the planting of 104,476 trees between August 31<sup>st</sup> and October 13<sup>th</sup>. Sites included the continuation of the spring sites, as well as the planting of the Silver Lake watershed area, and the site aerial limed by INCO Ltd. in 2002.

A total of 269,096 trees were planted at 30 strategic locations within the City of Greater Sudbury.



## Mapping

Another important watershed project completed this year was the mapping of tree canopy cover and impervious surface cover for all urban areas within CGS. These covers serve as important indicators of watershed health and will serve, among other things, to direct future Land Reclamation activities on improving the most critically damaged watersheds. Detailed mapping of the watersheds and subwatersheds of Lake Ramsey and Lake Nepahwin have been prepared.



Above: Tree canopy and impervious surface cover of the Minnow Lake watershed.

# Biodiversity

The Land Reclamation Program has effected profound and lasting change to our community's image and environment by establishing vegetation on barren, blackened hills. Yet, the vegetation growing on the hills is made up of very few species. Low plant diversity means less habitat diversity for wildlife and also makes the entire system more susceptible to major disruptions from pest and disease infestations and climate change. Greater plant and wildlife diversity is required to allow regionally representative, self-sustaining forests to develop. The Land Reclamation Program this year has undertaken a number of steps to achieve greater plant diversity.



## *Planting a Diversity of Tree Species*

In an effort to increase the diversity of species planted through the Land Reclamation Program, four additional species were planted in 2004: sugar maple, American beech, green ash and bur oak. Test plots were set up at four different locations: the Frood Road trail, the Ramsey Lake Boat Launch, a site off Hwy 17E and the Jane Goodall Reclamation Trail. The success of these plantings will be monitored over the next few years to assess whether these species can be incorporated into the general mix of tree planting activities for the future.

## *Forest Floor Transplants*

In fulfillment of the commitment made to increasing biodiversity, this year the Land Reclamation Program worked in partnership with FNX Mining to salvage plants from an area destined for site stripping prior to mineral exploration activities. Sections of forest floor were cut from an existing forest site north of Capreol and moved to biologically impoverished reclamation sites at the Frood Road trail and the Jane Goodall Reclamation Trail. Species included in the transplanted forest floor sections include star flower, wintergreen, bunchberry, goldthread, pipsissewa, bluebead lily and several others.

These small plots of relocated forest floor should serve as biologically diverse nodes from which

native species will eventually colonize surrounding areas. Monitoring of these transplants will continue over the next few years to assess survival and spread.



Above: Notice the dramatic difference between the existing forest floor (left) and the forest floor transplants (right).

## *Compost Plot*

One of the limiting factors of diverse forest floor cover may be the lack of organic matter in which to grow. A small plot of municipal compost was established at the snow dump area and seeded with native seeds including; blueberry, choke cherry and mountain maple. It is known from past experimental plots that compost has a neutral pH and is sufficient in nutrients which eliminates the need for lime and fertilizer application. This site will be monitored for any growth of the species seeded.

# Longterm Monitoring

The City, through the Land Reclamation Program, established a partnership with the Canada Centre for Remote Sensing (CCRS) to develop tools for assessing changes in the forest canopy in the CGS impacted by mining activities and monitoring the progress of vegetation cover using satellite imagery. This research is supported by the Sustainable Development through Knowledge Integration program in Natural Resources Canada's Earth Sciences Sector. These investigations have led to two preliminary findings: 1) thousands of hectares of land in CGS are still largely bare of vegetation and 2) forest canopies growing naturally in the zone impacted by past mining activities are not as healthy as those growing outside of that zone. Unhealthy forests are more susceptible to insect and disease infestations.

Based on these preliminary findings, it will be important for the Land Reclamation Program to continue reclaiming the thousands of hectares of damaged land to create productive forests that will in turn help improve the quality of our rivers and lakes and increase the biological diversity of our ecosystems.

The vegetation cover monitoring techniques being developed in collaboration with CCRS will be supplemented by monitoring techniques for determining changes in the plant species composition of the vegetation. This will allow the Land Reclamation Program to track changes in plant species and vegetation structure to determine the need for further intervention.

\*Top, right: Classified image of vegetation liquid water content (LW) derived from Hyperion data (with Landsat false-colour image in background). LW values are in  $\text{g}\cdot\text{cm}^{-2}$ .

\*Bottom, right: Average values of vegetation liquid water (LW) and vegetation percent cover within impact zones around the Copper Cliff smelter.

\*Both figures from the article: *Champagne et al. 2004. Ecological Restoration from Space: The use of Remote Sensing for Monitoring Land Reclamation in Sudbury 16th Int'l Conference, Society for Ecological Restoration, August 24 – 26, 2004, Victoria, Canada.*

