# Project of establishment of a technical landfill site in Danford Lake, in the municipality of Alleyn-et-Cawood

Impact study on the environment deposited to the ministry for the durable Development, the Environment and of the Parks of Quebec

Summary

Presented by:

LDC – Gestion et services environnementaux

**February 28, 2007**

## 1.0 Introduction

This document was prepared starting from the French summary entitled « Projet d'établissement d'un lieu d'enfouissement technique à Danford lake, dans la municipalité d'Alleyn-et-Cawood «, Étude d'impact sur l'environnement deposée au ministère du Développement durable, de l'Environnement et des parcs du Québec, Résumé, présenté par LDC – Gestion et services environnementaux, janvier 2007.

This document has been prepared for the public information meeting that is scheduled February 28, 2007 in order to make it possible to the anglophone unilingual citizens to better understand the project.

As suggested by the BAPE, only chapters 5 and 6 of the French summary were translated into English. These two chapters present the technical description of the project and the analysis of the impacts of the project on the environment.

The design of the technical landfill site (TLS) of Alleyn-et-Cawood was made according to all requirements of the new Québec regulation entitled Règlement sur l'enfouissement et l'incinération des matières résiduelles (indicated by acronym REIMR), which came into effect officially on January 19, 2006.

The project developed by LDC is not limited to the TLS establishment but also comprises various infrastructures of recovery and valorization which will allow an integrated management of the residual matters according to the principle of the 3R-V: Recovery - Re-employment - Recycling and Valorization. Indeed, the project of LDC envisages the installation of the following installations:

- a technical landfill site for the disposal of residual matters;
- a composting platform for the putrescible matters and green residues;
- a recovery and cogeneration station using biogas for wood drying;

- a center of transshipment of the matters recovered during the selective collection door-to-door;
- a park with containers and a dechettery;
- an information center for the population in order to sensitize the users and citizens with the principles of the 3R-V.
- a specially designed storage building for the reception and temporary storage of the hazardous household residues.

The project of LDC is a project with regional vocation which aims at filling the lack of infrastructures in residual waste management and to provide the area with an autonomy in terms of capacity of landfilling for their own residual wastes.

# 5 THE PROJECT

The TLS's landfill area is approximately 520 meters large, by 750 meters long, totalling 38.5 hectares in surface. Residual waste could reach an approximate height of 60 meters above the natural soil. Filling of the landfill area is scheduled to take place in several steps. Therefore, throughout operations, an intermediate impervious cover will be installed on surfaces that have not reached the filling profile or in areas where exploitation is momentarily interrupted. This will facilitate the collection of biogas as well as substantially limit rain water infiltration throughout the exploitation of the TLS thus reducing the quantity of leach ate generated.

***The TLS' residual waste capacity is 8 000 000 metric tons. The TLS' life span will depend on the actual quantity of residual waste received, but the foreseen capacity meets the territory's disposal needs over a period of at least 30 years.***

## 5.1 General site layout

A 150 meter wide buffer zone surrounding the landfill is anticipated. It exceeds the 50 meter required as per the REIMR. Aside from the technical landfill site and work required for its operation, such as a water treatment system, the installation of the following infrastructures is foreseen

- **Barrier**

A barrier preventing access to the site outside its operating hours will be installed near the intersection of Route 301. In this location, a signs will also be put up, displaying hours of operations as well as all information pertaining to the premises and services offered.

- **Control station**

All visitors to the site must stop by the control station, for identification and control purposes and in order to weigh residual waste. Aside from weighins, residual waste will be subjected to radiological screening in order to uncover the presence of radioactive matter.

- **Administration building**

The administration building will house all administrative personnel as well as an information center designed to raise awareness amongst the population concerning the 4Rs principles and to inform citizens on the site's activities and general residual waste management. This building will house all staff services and will be facing the control station and scale.

- **Container park and drop off center**

The container park, which will be part of the drop off center, will be located near the control station. The containers, six in total, will be used to recover materials such as wood, aggregates, metal, tires and more. A small building will allow for temporary storage of reusable items. The latter may then be shipped to a regional recycling center.

- **Residual waste inspection area**

In the event of a questionable delivery, the carrier will have to head to the residual waste inspection area to unload. That area will be made of reinforced concrete and built in such a way to retain any liquids leaking form the residual waste. Once the inspection is completed, the load may be either shipped to the landfill area or turned down.

- **Equipment storage building**

The building destined for equipment storage (garage) will be located near the TLS's landfill area. Heavy duty and rotary equipment maintenance will take place in this garage, which will also serve as storage for parts, accessories and materials required for the TLS's exploitation.

- **Reception and temporary storage of household hazardous waste (HHW)**

This building, operated in collaboration with the RCM of Pontiac, will be located near the control station and drop off center. HHW that may be received from Danford Lake and surrounding municipalities' residents are solvents, paints, used oils, aerosols as well as other hazardous household waste. All stored waste will be regularly shipped by professionals towards an authorized treatment or disposal center.

- **Wood dryer**

The wood dryer will serve as storage for lumber and will house a conventional system, fed through hot air ventilation ducts connected to heat exchangers. These will also be

connected to a biogas incineration system that will be installed onsite. The wood dryer will not only allow for the utilization of a portion of collected biogas, but also for the marketing of green lumber freshly cut by the region's sawmills, at a very economical price.

- **Green residue and putrescible matter composting platform**

A putrescible matter and green residue composting platform will be installed in order to produce a potting soil mix that will be offered to Danford Lake residents and that may also be used as top soil for the TLS's final cover. This platform, for which the foreseen surface approximates 5 000 $m^2$, will be impermeabilized and all collected water will be directed to the water treatment system. The composting platform may receive green residue as well as a certain quantity of municipal wastewater plant sludge.

- **Transhipment center for recyclable matter recovered during separate collection**

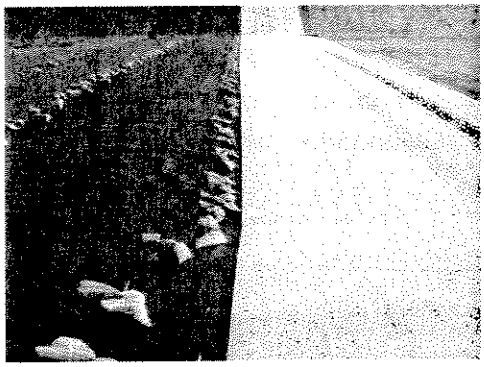
The project plans for the installation of a transhipment center for recyclable matter recovered during separate collection. This transhipment center will enable collection trucks to unload their recyclable matter into larger containers in order to ensure lower cost transport to a regional sorting and recycling center.

- **Temporary storage area for dry bulk and other disposed household appliances**

LDC would provide this area to a non-profit organization (NPO) for the dismantling of these articles, metal recuperation, engine recycling, etc.

## 5.2 Water and soil protection works

- **TLS waterproofing system**



The technical landfill site will be equipped with a double liner impermeabilization system , which means that the impermeabilization will be ensured by two high-density polyethylene membranes laid out so as to have a slope to allow the flow of leachates by gravity, towards the drains, then towards the water treatment system. The installation of a synthetic water tightness membrane known as geosynthetic clay liner is also foreseen. The double liner impermeabilization system meets design guidelines as per the Regulation respecting landfilling and incineration of residual materials.

- **Soils management**

The soils to be excavated, right of the landfill area and water treatment system, are comprised of sand and a thin layer of top soil. A portion of the excavated sand will be used in the construction of the impermeabilization system's drainage layers and of the final cell cover. The remainder may be used for the daily cover of residual waste as well as for the construction of access roads and other site infrastructures. The top soil will be reserved and reused for the revegetalisation of the site following its exploitation.

- **Leachate collection system**

A leachate collection system will be installed on the TLS's landfill area bottom and sidewalls. It will allow for the collection of precipitation water following seepage through residual waste (leachates). This leachate collection system is made up of primary and secondary systems. The primary system rests on the superior protection membrane, while the secondary is placed between the superior and inferior protection membranes. The primary and secondary collection system's drainage layers will be made up of sand displaying a minimal permeability of 0.05 centimetre/second.

Two pumping wells will be installed at the TLS's lowest extremity, on its western side, in order to collect waters seeped towards each of the primary and secondary drainage

networks. Each well will evacuate the water towards a main pumping station, from which they will be evacuated to the treatment system.

- **Rain water collection network**

In order to minimize rain water run off to the TLS's landfill area, various control installation will be put in place, including ditches dug on the cell's edges to redirect rain water run off from the exterior of cells and the neighbouring lot, away form the landfill area.

- **Intermediate and final cover**

When a cell reaches it full capacity, the final cover will be put in place. This cover will be comprised of the following layers, form top to bottom:

- A drainage layer, made up of sand or equivalent material, over a 30 cm minimal thickness;
- An impermeable layer made up of a geosynthetic layer of 1 millimetre minimal thickness;
- A layer of soil or equivalent material, 45 centimetres minimal thickness, displaying characteristics that enable an adequate protection of the impermeable layer;
- A layer of soil or equivalent material, capable of vegetation (recycled top soil) , 15 centimetres in thickness.

- Considering the projected TLS` geometry, the TLS's complete filling will occur in stages. This means that the installation of the final cover will also take place in various steps. In order to limit rain water infiltration throughout the TLS's exploitation, the installation of a intermediate cover to surfaces having not reached the final filling profile and for which exploitation will cease temporarily, is foreseen. The anticipated intermediate cover will consist of a synthetic membrane paired with a protective soil layer.

## 5.3 Leachate treatment

The design of the treatment system for leachates generated as a result of the TLS's exploitation was created while taking three main elements into consideration:

- ***Leachate composition*** : The latter depends on the composition of residual matter eliminated and inherent conditions such as temperature, humidity, thickness, compaction level and residual waste decomposition stage;

- ***Volume of leachate to be treated:*** Leachates will be mainly generated by rain and melt water percolating through residual waste, as well as by water runoff during

the composting platform operations. The amount of leach ate generated by the TLS will vary annually according to its filling stage;

- ***Quality criteria:*** These are established as per the Regulation respecting landfilling and incineration of residual materials (REIMR).

Water treatment will involve a water collection basin, four moving bed biofilm reactors for the biological removal of BOD51 and nitrogen, as well as a clarification system for the removal of suspension matter (SM). The foreseen reactor system is a continuous operation system that will be in function 12 months per year. The moving bed biofilm reactors will be those developed by AnoxKaldnes inc. and known as « Moving Bed Biofilm Reactor » (MBBR). This biological process is not only compact, but also quite resistant to temperature and toxicity variations. Moreover, the reactors treatment capacity may be increased according to ongoing needs. Following treatment by the four biological reactors, anticipated concentrations will be equal or inferior to 10 milligram/liter (mg/l) for soluble BOD51 (REIMR regulation for BOD51 content is 65 mg/l) and equal or inferior to 5 mg/l for NH3-N (REIMR regulation is 10 mg/l).

Effluent from the four biological reactors is then directed towards the dissolved air flotation

This clarification system as well as the four biological reactors will be installed in an enclosed building in order to facilitate operation and maintenance, year round.

Considering the designed flow rate 300 $m^3$/day, the quantity of liquid sludge generated by the treatment process should approximate 1 to 1.5 $m^3$/day. At the beginning of the TLS's exploitation, as the volume of leachate to be treated will be lower, the quantify of sludge generated will also be minimal. These sludges will be stored in one of the two 600 $m^3$ menure pit type concrete basins. Sludges may be stored in each basin, for a period of up to one year. These sludges will be managed onsite, meaning that they will be transported and unloaded to a ditch dung right out of the residual waste buried within the TLS, using a tanker truck.

A water collection basin will be built at the same time as the above-mentioned infrastructures. This collector basin will not be involved in the normal treatment process, but only in case of problems with the biological reactors or clarification system. This basin will therefore make it possible to collect water and allow for the recharging of the treatment process.

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[1] $BOD_5$: Biological oxygen demand - 5 days

The system's operations will be managed by computerized automata to ensure adherence and flow regularization according to design guidelines. The system's operations and deficiencies may therefore be observed and/or identified from a central control station located in the administrative building. Any dysfunction will be detected and signalled (alarm, automatic dialing outside of regular hours of operation, etc.). To that effect, should a problem occur at any stage of treatment, a pipe will allow for the redirection of waters towards the collection basin in order to avoid the discharge of a non regulatory effluent.

### 5.4 Biogas control and management system

A temporary extraction of biogas will take place during cell filling and once completed, an extraction system will be put in place. The temporary extraction system will be comprised of horizontal trapping trenches that will control landfill gas emissions during the operation period.

The permanent gas extraction network will be installed as a portion of the TLS fills, once this portion has received its final cover. This network will be made up of vertical gas collection wells, connected to a pumping and biogas elimination station, through collectors.

A portion of the collected biogas will be recovered and used for wood dryer's operation, while the other portion will be eliminated through a thermal process. In this case, elimination equipment will ensure a thermal destruction of 98% and more of all volatile organic components, aside from methane.

### 5.5 Quality assurance and control

A complete quality assurance program will be established in order to guarantee the conformity of materials used and of the work performed (surveying, geosynthetic impermeabilisation system, leach ate collection system, final cover). This quality assurance program will be put forth by a third party, independent form the contractor who will be mandated with the construction activities and will performing its own quality control assurance.

### 5.6 Terms and conditions of operation

The technical landfill site will be operated in conformity with guidelines of the Regulation respecting landfilling and incineration of residual materials.

- **Residual waste inspection and control.**

A control station equipped with a scale will be installed at the site's entrance, thus enabling a permanent control of the site's access by various users. A complete register of received residual waste will be maintained. Annual operation registers will be kept at the site throughout its exploitation. Following the TLS's shutdown, they will be kept by the operator as long as regulations require such recordings.

- **Daily operations**

Once admitted to the site, trucks will be directed to appropriate areas. For residual waste destined for burial, trucks will be directed though adequate signalling towards the daily unloading dock of whichever TLS phase is currently in exploitation. The TLS's filling will begin in the south-western half of the landfill area and will progress towards the north. Once this portion is filled to its timely capacity, filling of the other half will begin and, as soon as it becomes possible, filling of previously utilized portions will continue until the foreseen final profile is attained.

- **Equipments and personnel**

The management and operation of the TLS will be carried out by a dozen people.

Equipment needed for the operation of the TLS includes two compactors, a mechanical bull, an excavator, a front loader, two ten wheeler vans and a service pickup. Other pieces of equipment originated from local or regional business may be used in order to answer particular needs.

Heavy duty vehicle and equipment maintenance will take place the garage, which will be located within proximity of the TLS's landfill area. LDC will provide all personnel (as well as various subcontractors) and equipment required to fix and/or replace all machinery required for the site's operations, within a 48 hour delay.

## 5.7 Environmental follow up program

The environmental follow up on the Danford Lake TLS will include the verification of ground water, surface water, leachate and biogas quality.

In order to control the ground water quality within proximity of the TLS site and water treatment system, a network of nine observation wells will be implanted. One of these wells will be located in hydraulic upstream in order to serve as reference. Three times per year, namely in the spring, summer and fall, a water sample will be taken from each well, for analysis.

In order to control surface water quality, three samples will be taken; one in hydraulic upstream, the other two, in hydraulic downstream, in water drainage trenches, located around the site.

Leachates originating from various cells and the composting platform will be directed to the pumping water treatment system. At least once per year, a sample of water collected from each of the collection systems will be analyzed. The treatment system's effluent will be sampled once per week for analysis during the treatment system's operations.

At least four times per year, at regular intervals, a measure of the methane concentrations within the buildings and installations located on the TLS's property, as well as within soils limiting the site, will be carried out. Furthermore, methane and oxygen concentrations as well as temperature will be measured at least four times per year, in each of the gas collection wells in order to optimize their performance. The methane concentration on the TLS's landfill area surfaces will also be measured three times per year. A measure of the methane concentration, biogas flow trapped by the biogas pumping system as well as the biogas destruction temperature will be subjected to continuous measuring. Finally, the efficiency of the volatile organic component destruction by the biogas elimination thermal equipment will also be measured, at least once per year.

LDC will supply the Ministry of Sustainable Development, Environment and Parks with the results of analysis or measures described in the present program, within a 60 day period. However, in the event of a violation of limit values, LDC will inform the Ministry, in writing, of the facts and corrective measures undertaken or to follow.

## 5.8 Environmental intervention plan

The environmental surveillance and follow up program will allow for the verification of the efficiency of infrastructures destined for control and management of leachates and biogases generated through the landfill activities. In the event of a malfunction, which

could cause the contamination of the landfill area's surroundings, the surveillance program will enable the detection of such anomalies and a make for a fast environmental intervention, consisting in preliminary work destined to control the problem and to carry out definite resolution measures.

Aside from benefiting from an environmental intervention plan, LDC will train its personnel and will equip itself with a plan for emergency measures. An emergency team will be in service at the site in order to intervene as promptly as possible in case of an emergency. Its function will be to:

- Communicate immediately with authorities and concerned external resources;
- Coordinate emergency operations with authorities and concerned external resources.

### 5.9 Post-shutdown site management

The promoter, LDC is committed to closing down the TLS and pursuing the following activities, for a period of 30 years after shutdown, namely:

- Maintaining the integrity of the final, impermeable cover, over the buried residual waste;
- Operating and maintenance of leachate and biogas collection and treatment systems;
- Follow ups to the environmental surveillance program;
- Transmission to the MSDEP of an annual report on post-shutdown management.

An annual contribution will be provided by LDC to a trust account, at an estimated unit rate of $1,74/m^3$ or $2,33/ ton, for a total cumulated value of 28,8 million dollars after 32 years of TLS operations. This trust fund will be used to ensure that necessary financial resources are available throughout the 30 year follow up period enforced by the Regulation respecting landfilling and incineration of residual materials.

# 6 ENVIRONMENTAL IMPACT ANALYSIS

## 6.1 A systematic approach

The evaluation of environmental impacts aims at highlighting the importance of impacts generated as a result of the establishment and operation of a technical landfill site. This assessment was performed according to a rigorous process, recognized throughout Québec's impact study field.

Firstly, impact identification is carried out using potential impact sources, inherent to the construction, exploitation and shutdown activities of the TLS. These sources of impact are placed in relation with the site's direct and indirect environmental components. Furthermore, both positive and negative impacts are investigated.

After defining potential impacts, we evaluate the importance of environmental impacts, optimize installations and identify environmental protection measures. The residual impact assessment corresponds to the actual impact, once all environmental protection measures have been applied.

The nature of the impact is referenced to the gain or loss aspect, relatively to the environment. Therefore, an effect that is beneficial to the environment is a positive impact, while an effect that is detrimental to the environmental, is considered as negative.

## 6.2 Potential environmental impacts

### 6.2.1 Construction period

- **Impacts to the physical environment**

During the construction phase, the deforestation, excavation and landscaping activities will cause a modification in the grounds profile, which could generate a temporary risk of erosion to stripped soils and changes in surface water quality. In order to minimize the quantity of suspension matter transported towards streams, sediment barriers and/or sedimentation basins will be installed, as needed. Furthermore, all work will be performed in such a way to minimize the potential for erosion and transport of particles towards streams. All of the temporary installations will be removed at the end of construction and normal water runoff conditions will be restored. The bed and banks of the stream being traversed by the access road will be restored. Residual impacts to surface water quality during construction are deemed negligible considering the suggested compensation measures and limited time frame on the construction work.

The circulation of heavy machinery on a construction site always represents a risk for hydrocarbon soil contamination. It is foreseen to have all maintenance and refuelling operations take place in a designated area, in accordance with enforced regulation. This site will be equipped with the equipment required to cater to an eventual accidental spill.

The circulation of machinery may also subtly alter air quality through dust and exhaust gas emissions on the TLS and along traffic lanes. Current compensation measures will be established to counter this type of impact, namely the application of a dust control agent, use of good conditioned vehicles and use of a tarp during the transport of fine aggregate material. The residual impact is deemed negligible as far as onsite work is concerned, as well as for local scale, material transport, since volumes of materials originating from outside of the property will be minimal. The same goes for truck circulation.

- **Impacts to the biological environment**

TLS installations will require the progressive deforestation of approximately 75 hectares, a small portion of which is a small White Spruce plantation; the remainder of the surface has already been subjected to deforestation, approximately 50 years ago (Poplar, Jack Pine, White Pine and Red Pine groves). This sector is destined for harvesting and is part of the timber supply and forest management agreement (TSFMA) granted to Louisiana Pacific Corp. For this reason, the impact of the required deforestation is deemed negligible. Revegetalisation operations will take place as the installation of the TLS's final cover progresses.

Deforestation and infrastructure installation work will also induce a loss of forested habitat for mammals (mainly the white-tailed deer, moose and black bear species) and for birds ( namely the ruffed grouse). However, affected surfaces are not a threat to faunal species in this sector, as they may relocate to neighbouring areas.

The construction of the water treatment outlet towards Picanoc River may temporarily affect the aquatic fauna and its habitat, within proximity of the work. However, since all of the work will be performed in accordance with applicable regulation and as the impact will be very limited in terms of length and scope, the residual impact is deemed negligible.

The installation of the TLS and related infrastructures could influence the inflow of water to the wetland located within close proximity, since a portion of the surface waters collected in peripheral trenches will end up in this wetland. In order to ensure that the establishment of the TLS causes no prejudice to the TLS, an adapting management method is foreseen. This process plans for a periodical follow up on the wetland's water level as well as of the quality of water being unloaded. Therefore, the residual impact on this wetland is deemed negligible.

- **Impacts to the humans environment**

The establishment of the TLS will lead to the loss of usage of a portion of forested land considered as productive for the forest industries. This space, located within public lands, is the object of a TSFMA. While permanent, the impact generated by the project's use of this space remains low and negotiations between the project's promoter (*LDC, Gestion et services environnementaux*) and the Ministry of Natural Resources and Fauna, current land owner, are foreseen prior to the launch of this project, in order for both parties to agree on appropriate compensation measures. Moreover, a detour road will be built to compensate for the loss of the forested road, within the TLS's site. In context, the residual impact is deemed negligible.

During construction, access to peripheral moose and deer hunting sites will be perturbed, but not blocked, thus the residual impact is deemed negligible.

During construction, the increase in transport traffic on Routes 105 and 301 will be minimal, as the majority of natural materials will originate from the site itself. The residual impact on road safety is thus deemed negligible.

All of the work related to the establishment of the TLS will generate temporary employment for the local and regional populations, therefore having a positive impact on the region's economy. This impact is however deemed minimal as per the number and temporary nature of jobs created during the construction phase.

### 6.2.2 Exploitation phase

- **Impacts to surface water quality**

During the TLS's exploitation phase, surface waters collected by the site and access road's peripheral trenches are not contaminated and a follow up on their quality will ensure regular quality assurance.

Leachates will be treated prior to their discharge towards Picanoc River, in order to ensure that water quality always meets guidelines of the Regulation respecting landfilling and incineration of residual materials as well as MSDEP Discharge Standards. The residual impact associated to the discharge of the treatment system' effluent towards Picanoc River is deemed minimal. Even during phreatic lows, the rivers flow rate is at least 500 times higher than the treatment system's design flow rate of 300 $m^3$/day. Furthermore, the environmental follow up program will allow for the verification of the treatment system's effluent waters on a weekly basis. In the event of an unplanned

perturbation to the proper function of the treatment system, the environmental intervention plan will be put into action. This intervention plan will enable a prompt action in order to avoid the discharge of any non regulatory effluent into Picanoc River.

Moreover, a storage area for borrow and excavation materials is foreseen within proximity of the TLS. This area will be installed to recuperated runoff waters (drainage trenches and sedimentation barrier) in order to verify that the quantity of suspension matted (SM) meets the 25 mg per liter guideline, prior to being evacuated towards the drainage trench that discharges to Picanoc River. In context, the residual impact is deemed negligible.

Presence of the TLS and of putrescible matter found onsite may attract animal species known as noxious, such as the ring-billed gull, herring gull, common raven and the American crow. These birds' droppings may present a risk in altering the surface waters' biological quality. The gull population in proximity of the site should be diminished with the establishment of scaring and distancing measures and as a result of the site's great distance from the gull's nesting site (more than 50 km). The residual impact is thus deemed minimal.

- **Impacts to groundwater quality**

The impact on groundwater quality during the TLS' exploitation period is related to risks of leachate infiltration into the phreatic layer. However, this risk is rather minimal when taking into consideration the double liner impermeabilisation system that will be installed to the bottom and walls of the TLS. This impermeabilisation system ensures great leachate confinement within the TLS as well as an efficient and fast drainage towards pumping wells and the water treatment system. The network comprised of nine observation wells installed around the TLS will enable us to regularly verify the quality of groundwater and to implement the environmental intervention plan in the event that analysis results would show a deterioration in water quality.

It should also be noted that the average migration speed of groundwater is of 2.85 meters/year and that the traveling time, from the TLS's landfill area to the western property limit, is of 140 years. Considering all of these elements, the TLS's residual impact on groundwater quality is deemed negligible.

- **Impacts to air quality**

During the exploitation phase, air quality may be altered, mainly by daily burial operations, biogas (source of odours) emissions, papers flying around and dust emissions.

Considering that the burial method plans for a daily cover of residual waste and that the nearest housing (cottages and/or dwellings) is found at a distance of 2 km or more from the TLS, the residual impact is deemed negligible. Aside from the daily cover of residual waste, a litter fence will be installed to surround all areas during operations in order to limit the spreading of light items outside of the TLS and a dust control agent will be used as needed, to control dust on service roads.

Biogas dispersion modeling has shown that the MSDEP's guideline of 6 µg/m³ TRS (total reduced sulphur compounds - responsible for odours associated with biogases) at property limits will be respected at all time, even in unfavourable meteorological conditions. As far as methane is concerned, calculated concentrations will adhere to the guideline of 25% of the lower explosive limit within the site. Methane and TRS emissions will be regularly measured, in accordance with the environmental follow up program on biogases. Therefore, the residual impact associated with biogas emissions is deemed minimal.

- **Impacts to the soundscape**

*Noise related to the TLS*

Simulations of TLS related noise levels have shown that the noise level, even using the worst exploitation scenario, will remain below 40 dBA for residents that are located closest to the TLS. The actual noise level measured at these residences exceeds 60 dBA $Leq_{1h}$, therefore the impact related to the exploitation of the future TLS will be inferior to dBA, which represents an insignificant impact.

*Transport related noise*

During the exploitation period, residual waste collection truck circulation within the Village of Kazabazua, through Route 301, will induce an increase in noise level ranging from 0,4 to 2,7 dBA $Leq_{1h}$ along this particular road. This increase, equivalent to a maximum of 3 dBA per hour ($Leq_{1h}$), represents an insignificant impact to the soundscape.

Simulations enable us to show that all of the MSDEP's sound limits will be respected in all dwellings located within the investigated sector. In context, the impact is deemed negligible.

- **Impacts to fauna**

During the exploitation period, the TLS's presence could slightly modify travel corridors for moose and White-tailed deer species, without representing an obstacle to their travels. In fact, these species are characterized by a fairly large habitat and are not faithful to

wintering sites. Therefore, the impacts of this project to terrestrial fauna and its habitat are deemed negligible.

The noise created by machinery may also generate a slight migration of certain bird species towards calmer zones. A modification of the soundscape as a result of the TLS's activities would however only have a minimal impact on the avifauna since the scope of this impact is limited to the TLS site. Species may easily relocate into proper habitats within close proximity of the site.

Considering that the leachate treatment system's effluent, to be discharged into Picanoc River, will not generate significant modification to the river's water quality, the residual impact to the aquatic fauna is deemed negligible.

- **Impacts to infrastructures and road safety**

To reach the TLS, trucks will primarily use a portion of Route 105 located south of Kazabazua, as well as its northern portion and Route 301. The following table shows impacts of the TLS exploitation on truck traffic for Routes 105 and 301, in a scenario where the quantity of residual waste entering the TLS reaches its foreseen maximum, 250 000 metric tons per year. In this scenario, while highly unlikely in the short run, the average percentage of truck traffic on Route 105 would go up by 1,0 % (south of Kazabazua) to 1,3 % (north of Kazabazua). For Route 301, this percentage would increase by 1,3 % on the portion of this road that is west of the TLS and by 8,5 % for the portion of this road that is situated between Kazabazua and the TLS. The residual impact on road infrastructures is deemed minimal as a result of the minimal increase in traffic when compared to the current situation.

**Foreseen truck traffic in a scenario where the quantity of residual waste entering the TLS reaches its foreseen maximum, 250 000 metric tons per year**

| Path | Debit journalier moyen annuel (DJMA) | Number actuel de passages de camions (journalier) | Number de passages de camions (journalier) | % actuel de camions | % projeté de camions |
|---|---|---|---|---|---|
| Route 105 south of Kazabazua[1] | 5 100 | 612 | 670 | 12 | 13,0 |
| Route 105 north of Kazabazua[1] | 4 000 | 680 | 744 | 17 | 18,3 |
| Route 301 from Kazabazua to the TLS Danford Lake[2] | 1 092 | 162 | 284 | 15 | 23,4 |

1. Average data, from 2000 to 2004, from table 6.7 of February 2006's main report

2. Data gathered by the MTQ over 9 business days in April and August of 2005, from the answer supplied in page 18 of the MSDEP's answers to questions and comments in October of 2006.

Residual waste transport could increase the risk of motor vehicle accidents. These risks are primarily associated with vehicle circulation at the TLS's entry and exit ways onto Route 301 as well as to circulation within the Village of Danford Lake. The residual impact is deemed moderate considering the importance of road safety and the permanent nature of this impact. Efficient and adequate signalling will be installed permanently near the site and its entrance ways and speed limits will be enforced at all times

- **Impacts to the local and regional economies**

Exploitation of the TLS could generate a dozen jobs, of which, 4 to 6 could be permanent. This is deemed a moderate positive impact.

- **Impacts to tourist and recreational activities**

Considering that the project's impacts to terrestrial fauna (moose and White-tailed deer) are deemed negligible and that the same applies to the residual impact on aquatic fauna, no significant residual impact to fishing and hunting activities is apprehended.

- **Impacts to health and safety**

Health and safety risks are associated to a potential malfunction of the leachate treatment system or to the emission of biogases. Until the buried matters become inert, such a malfunction could generate an increase in certain leachate generated components to surface water or an increase in biogas migration. The leachate and biogas collection system must therefore be maintained in operating condition following the TLS's shutdown.

As far as treated leachates are concerned, real impacts are very unlikely, namely because of a highly efficient treatment system and associated control measures, but also as a result of the establishment, by the operator, of a detailed environmental follow up program on runoff water and leachates. Furthermore, an environmental intervention plan will be established if required and the TLS's personnel will be trained in utilizing the appropriate emergency measures to apply in case of an incident. The global impact is therefore deemed negligible.

As far as biogases are concerned, impacts are associated with methane and components showing a potential for odor generation, as discussed in the section pertaining air quality. Risks to human health are far more associated to volatile organic components found in biogases. This aspect of the biogas issue has been investigated in the dispersion study. Even when subjected to unfavorable meteorological conditions, air quality criteria were met at property limits. The impact of biogas to health and safety is deemed minimal.

- **Impacts to the landscape**

A visual analysis of a 2 km radius from the site has shown that the TLS will not be visible thanks to the presence of mountains and existing visual barriers. In order to ensure that treed barriers remain on the northern border of Route 301, agreements are being made with lot owners. The other potential visual breach is located near Picanoc River. In this case, regulation requires that a 15 meter wide riparian corridor be maintained, which will limit visual access to the TLS in the event of deforestation in this sector. In context, the residual impact is deemed negligible.
Finally, the final cover and revegetalisation of the TLS will be carried out in such a way that harmonizes with the surrounding natural environment. The final visual aspect will therefore be improved as work proceeds towards the shut down and revegetalisation of the TLS.

### 6.3 Overall residual impacts

Overall, residual impacts associated with the establishment of the TLS are deemed negligible to minimal. Two impacts deemed as moderate are anticipated. The first is positive and related to the generation of employment during the site's exploitation. The second is negative and related to road safety following an increase truck traffic within the framework of residual waste transport during the exploitation phase. Site isolation as well as the application of very simple compensation measures are such that the construction and operation of the TLS will have very limited impacts on the surrounding environment. Lastly, LDC vows to manage the Danford Lake site in a reliable and efficient fashion from an environmental standpoint. Following the definite shutdown of the TLS, LDC could grant certain forest rights in order to allow for the valorization of faunal conservation for example. Thus, very few negative residual impacts would remain on the long run.