

Temporary Bridges

Temporary structures might be used on winter roads and in conjunction with the pipeline right-of-way to cross watercourses with unstable beds and banks or ones that are too deep, too wide, or too fast flowing for other crossing methods. Common structures include flatbed rail car frames or longer Bailey bridges.

Timber mat supports are sometimes built at each end before the temporary bridges are installed. Ramps will be built from snow, ice or granular material. Curbs might be required to prevent mud or debris from entering the watercourse.

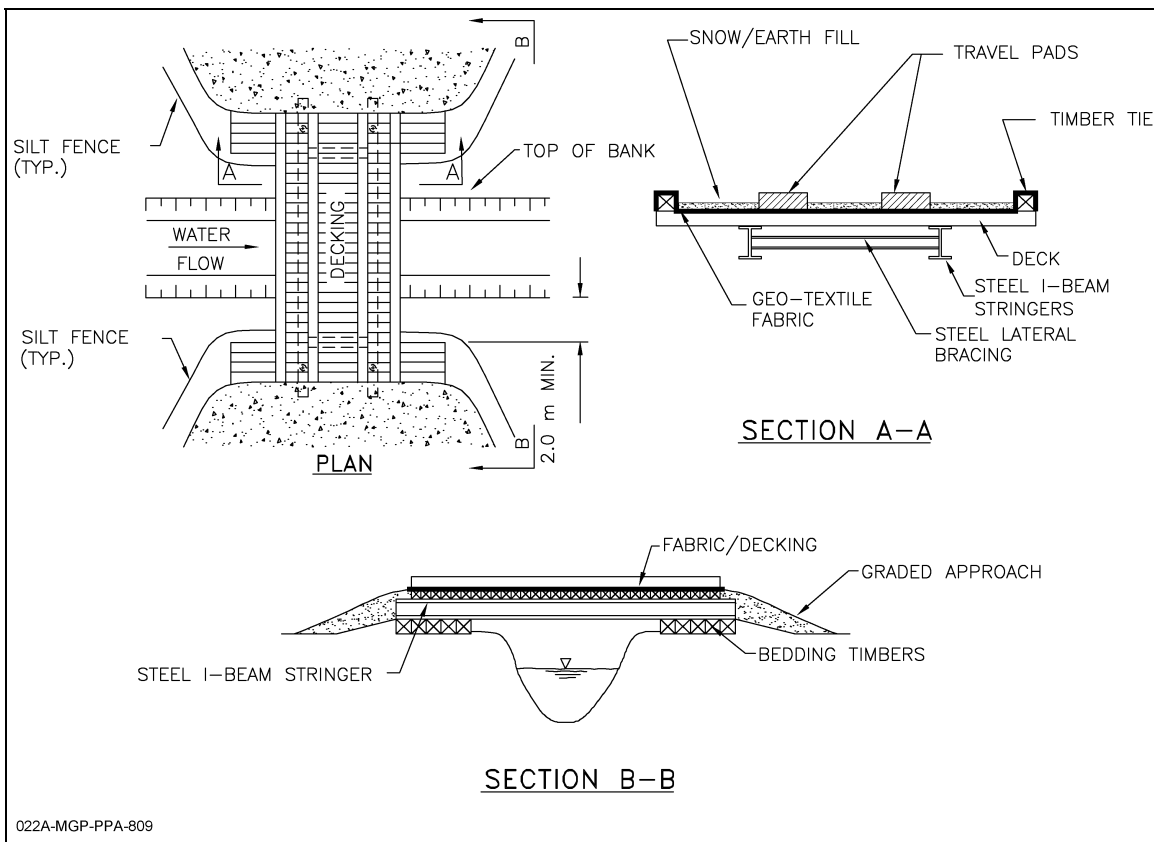


Figure 3-39: Typical Temporary Bridge Structure

Culvert Crossings

Culverts might be used where sediment control and continuous passage of fish is required. Culverts are often used in all-weather roads. The culverts will be put into place, the ends will be sandbagged and the ramps will be installed, covered with clean granular fill, and compacted for traffic. The outlet sides might be rip-rapped for erosion control. If used for winter construction only, the culverts and ramps will be removed before spring breakup.

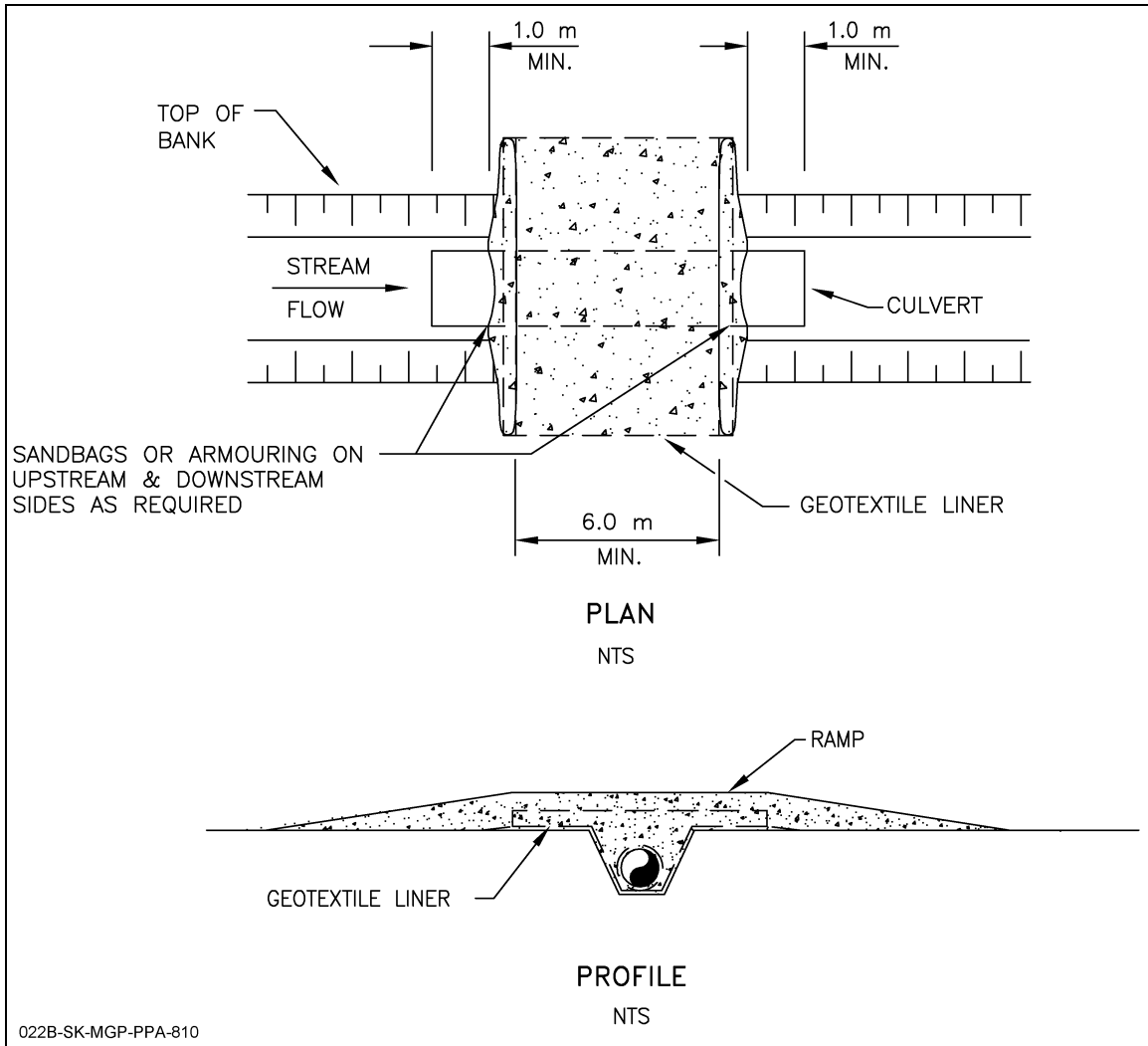


Figure 3-40: Typical Culvert Crossing

Timber Fill Crossings

Timber fill crossings might be used to cross shallow streams with intermittent flow, gently sloping banks, and no fish passage concerns. They might also be warranted in seasons or areas with low snow, where there might not be enough material for a snow or ice fill crossing. Timber mats or timber logs cabled together are used as a base, which is covered with compacted snow to bring the crossing up to grade. Timber and debris will be removed before spring breakup.

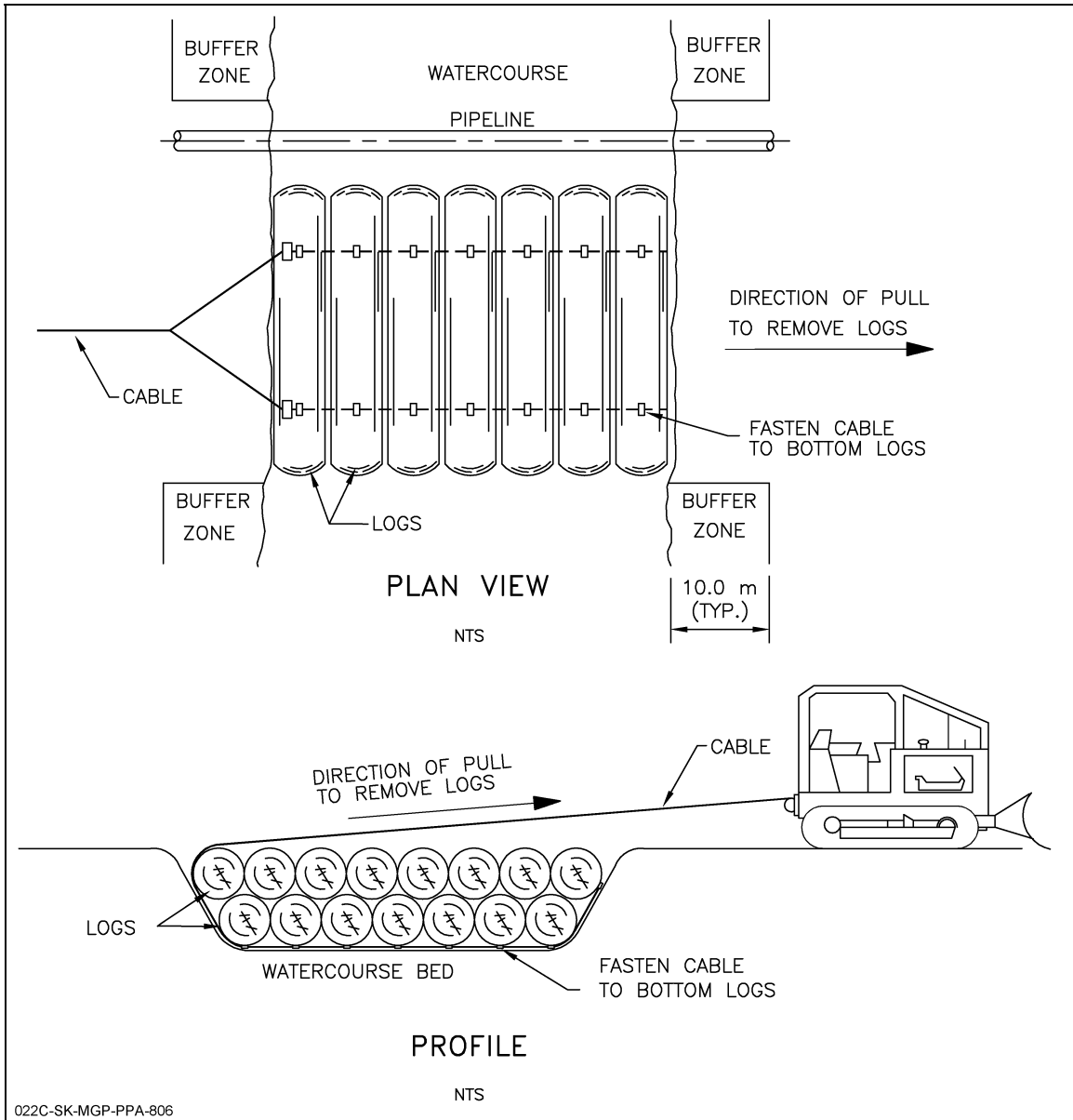


Figure 3-41: Typical Timber Fill Crossing

Ice Bridge Crossings

Ice bridges might be used where there is ample supply of water and the crossing location has gently sloping banks. Once a safe ice thickness at the crossing is reached, snow cats will be used to push snow berms onto each side of the crossing. The travel surface will be flooded in repeated lifts, between the snow berms, to increase the load bearing capacity. Regular maintenance will be required and the bridges will be notched before spring breakup, thereby ensuring free flowing melt water.

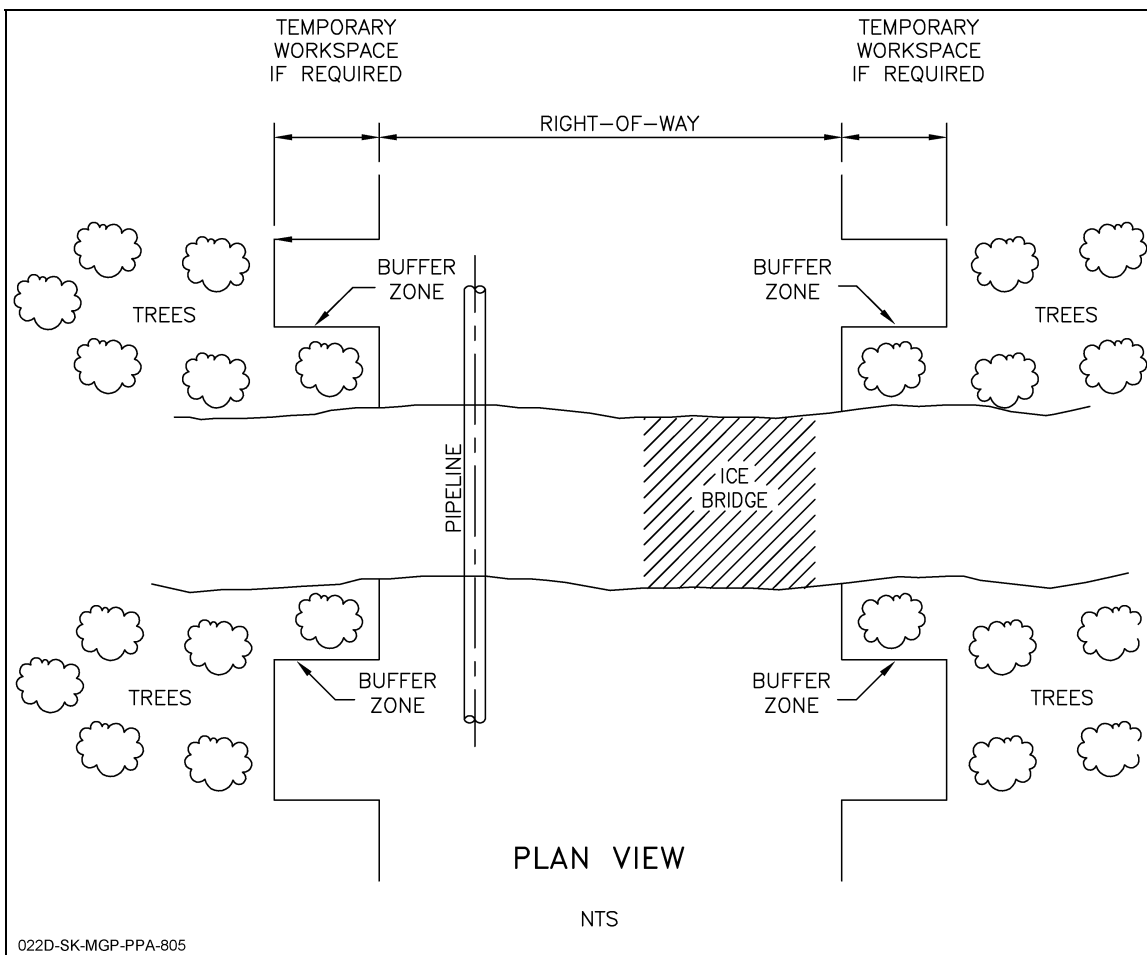


Figure 3-42: Typical Ice Bridge Crossing

Snow Fill Crossings

Snow fill crossings might be used where there is intermittent or no winter flow, the crossing has gently sloping banks, there is ample snow supply, and an ice bridge or temporary bridge structure is not warranted. Snow will be collected from nearby areas or made artificially by snowmaking systems. The travel surface will be built up with repeated lifts of compacted snow and water. As with ice bridges, snow fill crossings will be notched before spring breakup.

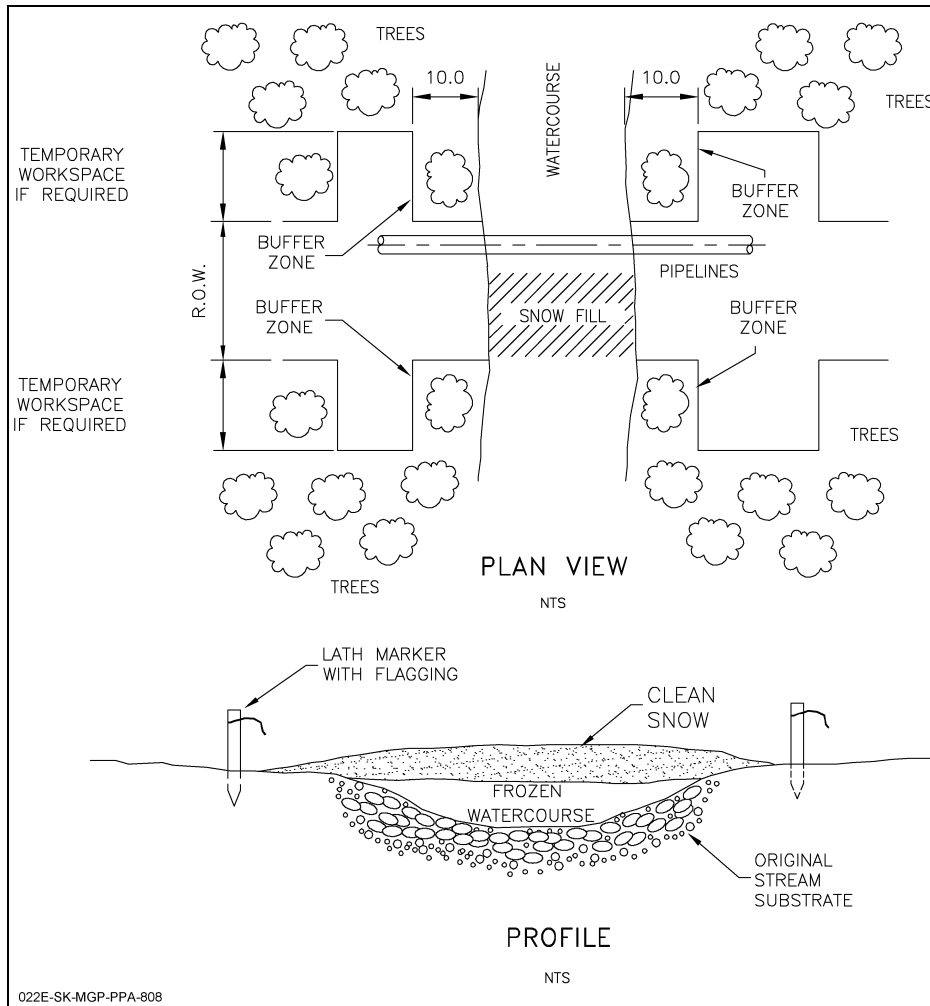


Figure 3-43: Typical Snow Fill Crossing

HIGHWAY, ROAD AND PIPELINE CROSSINGS

No crossings of pipelines or all-weather roads owned or operated by third parties have been identified for the pipelines through the GSA.

TITLE	GSA Crown Lands Application for a Type A Land Use Permit
SECTION	3: Overview of Activities in the GSA
SUBJECT	8: Project Effects and Mitigation

SUMMARY OF PROJECT EFFECTS AND MITIGATION

An overview of the potential effects of the proposed development activities on the biophysical and human environmental settings in the GSA, along with a brief description of the primary strategies for mitigating those effects, is contained in this subject. Detailed descriptions of potential effects and primary mitigation strategies are provided in [Section 8](#). Environmental protection plans (EPPs) will also be developed. The framework is described in [Section 11](#).

The potential biophysical effects of the proposed pipelines and components have been assessed within a one-kilometre wide corridor generally centred along the proposed pipeline route. The findings from this regional assessment were included in the EIS that was submitted to the Joint Review Panel in October 2004.

In addition, environmental studies have been conducted outside the pipeline corridor, where needed, to include infrastructure sites required for construction, such as barge landings, borrow sites, camps, access roads and water sources. The study results, along with the regional findings in the EIS, have been used to identify the potential environmental effects of the development activities in this application.

Biophysical Effects

Typical project activities could result in a number of potential effects on the biophysical environment in the GSA, depending on the type of activity, location, climate and the timing of construction. Typical effects from construction, before mitigation, include but are not limited to:

- increased gaseous emissions
- changes in ground and slope stability, drainage patterns and water and wind erosion
- alteration of uncommon landforms
- soil loss and changes in soil quality, drainage, and physical and chemical characteristics
- removal, burial, mechanical damage or alteration of vegetation
- removal, burial, mechanical damage or alteration of heritage sites

- localized direct and indirect effects on wildlife habitat, localized disruptions to wildlife movement and limited wildlife mortality
- localized alteration to fish and fish habitat
- changes in water and sediment quality
- increased intermittent and continuous noise levels

Primary Biophysical Mitigation

Examples of typical measures that might be used to reduce the effects of development activities include but are not limited to:

- employment of local environmental and wildlife monitors
- constructing primarily in the winter and other periods that avoid sensitive wildlife and fish timing windows
- reducing the footprint of disturbance
- reducing grading and leveling to that required for a safe and efficient working surface
- implementing appropriate drainage, sediment, erosion and slope stability controls
- enforcing traffic and access controls
- avoiding environmentally sensitive areas where practical
- protecting heritage resources
- applying good site management practices for dust suppression
- considering efficiency in equipment selection
- applying best management practices to reduce fuel use
- maintaining equipment exhaust systems

EFFECTS ON THE HUMAN ENVIRONMENT

An overview of the potential effects of the proposed development activities on the human environment in the GSA, including effects on the people and the economy of the region, on traditional culture, on non-traditional land and resource use, on protected areas and on heritage resources is contained in this topic.

Effects

The focus has been on identifying the potential effects of development sites and activities that are closest to the communities, or that could affect resources and activities with high local values, or that might be important to the functioning of the community. Examples of the latter include roads, airports and barge landings.

Economic effects were determined from simulations using employment and expenditure estimates. The simulations (of direct, indirect and induced economic effects) were done using the Statistics Canada's inter-regional input-output model (I-O model). However, because this model only produces results at a territorial or provincial level, effects in the Northwest Territories were allocated to the GSA and the other regions.

Summary of Effects on the People and Economy of the GSA

The proposed development activities are expected to have a long term, positive influence on the people and economies in the communities of Fort McPherson, Tsiigehtchic, Inuvik and the GSA as a whole. Among other things, this influence will be reflected in increased employment, income and business opportunities, capacity development, and the potential for new infrastructure. The influences are assessed and explained at a regional level. General trends are applicable to all GSA communities, and where appropriate, community specific effects are also described.

In the shorter term, spending decisions by some individuals will affect the quality of life of these income earners, their families and their communities. These decisions will also increase the demands on resources and facilities that deliver social, health and protection services to the communities. Inflationary pressures, including on housing in Inuvik, might also occur in the early phases of the project.

Both facilitating and inhibiting influences on traditional harvesting might result from the development. Time spent on harvesting activities might be reduced for some workers and families. However, the wages from project employment might also be used to acquire new and better equipment for more efficient and productive harvesting. Project-related employment might also add to a slow, ongoing decline in Aboriginal language use and culture preservation within the GSA.

During construction, the potential project effects on the people and economy of the GSA include:

- capital expenditures and project-related procurement estimated at over \$350 million
- some expanded business and labour force capacity and opportunities

- increased labour force participation rates, to 78% from 74%
- employment rate growth, to 70% from an average of 61%
- decreased unemployment rates, to 10% from 17%
- population increases, mostly in Inuvik, estimated at about 450 people in the peak activity year of 2008
- temporary creation of up to 400 project-related jobs a year for GSA residents
- generation of about \$80 million in labour income, including \$41 million in direct project related income
- elevated levels of alcohol abuse and related violence and illness, family relationship stress, contagious diseases and STIs

During the operations phase, potential project effects on the people and economy of the GSA include:

- a part of \$140 million in average annual operations expenditures in the NWT will be spent in the GSA
- some expanded business and labour force capacity and opportunities
- an average of about 210 jobs a year for GSA residents, generating about \$15 million a year in labour income

Inuvik is expected to experience most of the procurement, employment and labour income effects because of its size, location and function as a regional transportation and administrative centre.

Primary Human Environmental Mitigation

In recognition of the potential for adverse effects, mitigation strategies have been developed that might be implemented by the project in conjunction with the GNWT, communities, local authorities, service providers, and other third parties. Given the range and magnitude of potential effects, a co-coordinated and collaborative response from the project and these other parties is necessary.

Examples of primary mitigation strategies include:

- developing a procurement plan to build business capacity in the GSA and manage project-related procurement and expenditures
- giving preference to qualified, competitive businesses for the provision of certain goods and services

- working with the GNWT, educational institutions, and Aboriginal associations and communities to address education and training needs to optimize project-related employment for NWT residents
- developing a database of potential workers to match skill sets and identify training needs
- implementing hiring policies that provide preference for direct project hiring in the North
- initiating money management programs and enabling workers to assign part of their wages to savings accounts to encourage positive lifestyle choices
- enforcing policies for alcohol and drug-free workplaces and camps
- implementing measures to help sustain community health
- providing Aboriginal workers with flexible work schedules to accommodate traditional harvesting and other Aboriginal cultural, family and community needs, where practical
- supporting community-based traditional lifestyle initiatives that promote traditional harvesting and positive relationships with communities
- negotiating harvester compensation agreements with the hunters' and trappers' committees or other relevant authorities
- providing cultural awareness training to all workers on the project to promote appreciation and respect for Aboriginal people and their culture
- supporting cultural activities and events that are consistent with the project principles and practices
- periodically providing country foods in the construction camps
- providing construction camps with Aboriginal language reading material, and Aboriginal language radio and television broadcasts, tapes and CDs, where available

