SUMMARY OF THE ENVIRONMENTAL IMPACT STATEMENT (EIA REPORT)

for the

Irving Oil Limited
Liquefied Natural Gas (LNG)
Marine Terminal and Multi-Purpose Pier Project

May 2004

Summary prepared by:

Department of the Environment and Local Government

New Nouveau Brunswick

Environment and Local Government

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List of Acronyms

ACCDC – Atlantic Canadian Conservation Data Center
APA – Atlantic Pilotage Authority
BOG – Boil-off Gas
CCME – Canadian Council of Ministers of the Environment
CEAA – Canadian Environmental Assessment Act
CEPA – Canadian Environmental Protection Act
COSEWIC – Committee on the Status of Endangered Wildlife in Canada
CSA – Canadian Standards Association
CSA Z276-01 – CSA Liquefied Natural Gas (LNG) – Production, Storage, and Handling
DFO – Department of Fisheries and Oceans
EIA – Environmental Impact Assessment
EIS – Environmental Impact Statement
EPP – Environmental Protection Plan
ESA – Environmentally Significant Areas
GDCWQ – Guidelines for Canadian Drinking Water Quality
HADD – Harmful Alteration, Disruption or Destruction
HazOp – Hazard and Operability Analysis
HES – Health, Environment, and Safety Management System
LNG – Liquefied Natural Gas
MCTS – Marine Communications and Traffic Services
MMSCFD – Million Standard Cubic Feet per Day
NAPS – National Air Pollution Surveillance Network
NBDELG – New Brunswick Department of Environment and Local Government
ORV – Open Rack Vaporizer
Orimulsion® - – a trademark name for emulsified bitumen
PM – Particular Matter
RoW – Right of Way
SCV – Submerged Combustion Vaporizer
UPS – Uninterruptible Power Supply
VEC – Valued Environmental Component

1. INTRODUCTION

Irving Oil Limited proposes to develop a Liquefied Natural Gas (LNG) Marine Terminal and Pier at the Irving Canaport facility near Saint John.

The Project facilities would receive and store LNG that is unloaded from tankers, and regassify the LNG into natural gas for delivery to a pipeline. The terminal would be expected to operate continuously, with a design capacity of 28.3 million cubic meters (1,000 MMSCFD) of natural gas per day. The pier would also serve to unload emulsified bitumen (referred to as Orimulsion® in the EIS) from tankers and deliver it to storage tanks at the Canaport facility.

An Environmental Impact Assessment Report/Comprehensive Study Report, which is being referred to as an Environmental Impact Statement (EIS) has been completed by Jacques Whitford Environmental Limited, with the assistance of several other firms under the management of Fundy Engineering and Consulting Limited on behalf of Irving Oil Ltd. The report describes in detail the proposed Project and alternatives considered in developing it. It reviews the existing environment at the proposed site of the Project, assesses the significance of potential environmental effects should the Project proceed, and proposes mitigative measures and follow-up monitoring programs.

The EIS was prepared to meet the requirements of the New Brunswick Clean Environment Act *Environmental Impact Assessment Regulation* (87-83) and the Canadian Environmental Assessment Act (CEAA). This summary has been prepared by the Department of Environment and Local Government to assist the public in becoming familiar with the Project and the information contained in the report.

2. PROJECT DESCRIPTION

a) Project Rationale

Liquefied natural gas (LNG) is natural gas that has been cooled to the point that it condenses to a liquid. This reduces its volume by approximately 600 times, making natural gas available by tanker.

LNG technology allows natural gas to be stored for use during high-demand periods in regions where underground storage facilities are lacking, such as the northeastern United States. Currently there are at least 113 active LNG facilities in the United States, including four marine import terminals. Worldwide there are 39 import terminals and 16 export terminals that handle LNG. Approximately 55 local utilities in the United States own and operate LNG plants as part of their distribution networks.

The report states that the Project is being considered in direct response to the Province of New Brunswick's interest in securing a reliable supply of natural gas. Natural gas from the Project would be destined for the Irving Refinery, to meet local demand, and to meet demand along the existing pipeline corridor.

The Canaport facility offers an existing location with proven capabilities of delivering large quantities of hydrocarbon into southern New Brunswick. It is the closest deep-water facility to the northeast United States. Diversity of both the source of LNG and the means of delivery into downstream markets would increase the reliability of natural gas supply in North America, should the facility be connected with an existing natural gas distribution network.

b) Analysis of Alternatives

Site Selection

The preferred site is near the existing Canaport facility in Saint John. Four sites within 30 km of industrial east Saint John were analyzed to determine if they were technically and economically feasible. Courtenay Bay, Saint John Harbour, and Lorneville sites were rejected primarily because of LNG tanker draft constraints, sufficient area to manoeuvre ships, and/or insufficient acreage available for the on-land facilities.

The Canaport site has adequate draft for the LNG tankers that the pier would be designed to accommodate, and suitable adjacent land is available for construction of the LNG facility. The site is zoned for industrial use and somewhat removed from the City of Saint John, with an existing pipeline Right of Way (RoW) that would partially meet Project requirements. Spill response capability exists, and shipping lanes are established and understood.

The proposed configuration of storage tanks was selected based primarily on the Canadian Standards Association (CSA) thermal exclusion zone requirements from adjacent land uses (CSA Z276-01). The layout optimizes the efficiency of piping arrangements and supporting equipment, considers the best use of existing topography, and minimizes adverse effects to the existing environment.

Route Selection

Two alternatives were considered for the 9-km natural gas pipeline route. Both routes parallel the existing electrical transmission line RoW and the proposed Orimulsion® pipeline RoW for most of their length. One route departs from the RoW near Red Head Marsh. The preferred route, which provides more direct access to the Refinery, departs at Grandview Avenue.

The Orimulsion® and natural gas pipelines will be placed in a common RoW along the length of their common route. The RoW for the proposed Orimulsion® pipeline was assessed in the Coleson Cove Generating Station Refurbishment Project environmental impact assessment (EIA) and was determined to be environmentally acceptable.

No new access roads are being proposed.

Alternative Means of Carrying Out the Project

The major processes for delivering natural gas from the facility are: transporting the LNG to the terminal; unloading the LNG; storing the LNG in tanks; and regassification of the LNG into natural gas.

LNG Tanker Options

LNG would be delivered to the terminal by ocean-going tankers that are double-hulled and insulated to prevent leakage or rupture in an accident. The LNG would be stored in a special containment system within the inner hull, where it is kept near atmospheric pressure and -161^{o}C. Two basic tanker types are available: those with independent tanks and those with membrane tanks. Only those LNG tankers certified by the International Association of Classification Societies in a manner consistent with Transport Canada's certification and inspection requirements would be accepted at the terminal.

Tanker Unloading

Two options were considered for unloading LNG and Orimulsion® from tankers: a monobuoy or a receiving pier.

A monobuoy is a floating offshore facility anchored to the sea floor, from which a submerged pipeline delivers the product to an on-shore terminal. The Canaport facility currently operates a monobuoy for unloading crude oil from tankers, but this cannot handle LNG or Orimulsion®.

The preferred option is a receiving pier consisting of an offshore unloading terminal and a trestle/bridge structure that connects the pier to shore. The LNG is unloaded from the tanker by unloading arms fixed to the pier. A pipeline supported by the trestle delivers the LNG to storage tanks on land.

Two pier designs were considered for the Project. One pier alternative would require drilling/blasting and dredging to achieve the required draft, along with the marine disposal of dredged material. The preferred pier alternative would extend further from shore, to a depth of water where adequate tanker draft already exists, minimizing the amount of dredging required.

LNG Tank Options

LNG storage tanks may be of steel or concrete construction, and are classified by the industry into three principle types: single containment, double containment, and full containment.

The single containment tank is the most common type in the Americas. It normally has a stainless steel inner tank. A carbon steel or reinforced concrete outer shell is intended primarily to retain insulation and to contain the purge gas (product vapour) pressure, but is not designed to contain refrigerated liquid in the event of leakage from the inner tank. The tank is surrounded by a dyke impoundment that is sized to accommodate at least 100% of the tank's volume.

The main advantage of double and full containment tanks are that the thermal exclusion zone distances are minimized, so they can be used where space is limited. The Project site has enough space that a full capacity impoundment area could be constructed for each storage tank, providing the same degree of containment at a reduced cost. Therefore, the single containment tank is the preferred option.

Irving is investigating the use of reinforced concrete for outer tank construction.

Regassification

The regassification process uses pressure and heat to vapourize the stored LNG into natural gas. Five alternatives were initially considered:

- Open rack vapourizer (ORV)
- Submerged combustion vapourizer (SCV);
- Intermediate fluid vapourizers (warm/hot water/glycol case);
- Seawater heating added to the water/glycol heaters with shell and tube vapourizers;
- Other heating sources, such as using wastewater effluent from a treatment plant, or recovering waste heat from an existing industrial facility.

Using supplemental heat from seawater, or from a wastewater treatment plant, a power plant or other industrial facility, if available, is economically attractive as the operating costs are dramatically reduced. However, capital cost is substantially increased. Although seawater is readily available, the cool ambient temperatures of the Bay of Fundy make this option impractical. Both the hot water/glycol system and SCV have relatively low capital costs, but high operating costs. The SCV is somewhat more fuel-efficient with lower operating utility costs; therefore, the SCV is the preferred option.

Alternative Dispersion Models

In siting the LNG facility, provisions were made for an exclusion zone to take into account the effects of a fire resulting from an accident, malfunction, or unplanned event, pursuant to CSAZ276-01. The report describes the established methodology and applicable Codes used in modelling thermal and vapour dispersion, the scenarios considered for this Project, and the exclusion zones established by modelling.

c) Description of Facilities

The Project would consist of a multi-purpose pier and an LNG facility containing a process area, storage tank/containment areas, and a natural gas pipeline. An Orimulsion® pipeline to the Orimulsion® tanks at the Canaport facility would also be constructed and operated.

The main processes are: unloading LNG from LNG tankers, unloading Orimulsion® from Orimulsion® tankers, LNG storage, LNG vapourization and natural gas send-out, and Orimulsion® transfer to Orimulsion® tanks.

The facility would be designed to operate continuously. It would have a send-out capacity of 28.3 million cubic metres per day (1,000 MMSCFD) of natural gas at a pressure of approximately 8,273 kPa. The pier can accommodate tankers up to 200,000 m^3 in capacity and would also serve to unload Orimulsion® from tankers.

LNG and Natural Gas Characteristics

LNG is odourless, colourless, non-corrosive, and non-toxic. Release of the cryogenic or low-temperature liquid can expose facility personnel to oxygen deficiency, freezing injuries, fire hazards, and flammable air-gas mixtures. Lighter than air, the natural gas vapourized from LNG

will quickly dissipate in the open air. However, a build-up of flammable vapour in an unventilated confined space can cause asphyxiation and increase the risk of ignition.

The report outlines the primary Canadian and American Codes as well as the secondary American Codes to which the Project's design and construction would conform as applicable. In addition, Irving uses HazOp (Hazard and Operability Analysis) throughout the design process: a system routinely used in the petroleum industry to identify and resolve potential safety hazards and operability problems.

Pier and Unloading Facilities

The proposed pier includes environmental design features such as quick disconnect unloading arms, and catch basins. A jacket-pile-deck structure would be used, with a tubular steel jacket or frame; steel piles are inserted through guides at the outer corners and driven/drilled into bedrock to anchor the jacket. Pile extensions extend above the jacket legs. The deck is largely prefabricated, then lifted onto the pile extensions and welded in place to complete the pier.

The unloading facilities would consist of LNG and Orimulsion® unloading arms, a loading dock, berthing and mooring dolphins, tug boat berths, access road and pipe trestles, personnel bridges and pipeways, navigational aids, and fire protection systems. The report describes the structure of each of these components and their function in general terms.

Only one product, LNG or Orimulsion®, would be off-loaded at one time at the pier. All off-loading piping is above ground for both products, from the pier to the respective storage tanks.

LNG Storage Facilities

Storage facilities would include three 160,000m^3 single containment storage tanks, each consisting of a stainless steel inner tank and an outer tank of carbon steel or concrete. The tanks are insulated with perlite between the tank shells, cellular glass block and felt material between the bottoms, and a fibreglass blanket on a suspended deck above.

Tanks would have a design pressure of 17.2 kPa and pressure would be maintained at approximately 13.8 kPa during filling operations, using a system of boil-off gas (BOG) compressors and vapour return blowers. Overpressure protection is provided by an atmospheric venting system at the top of each tank.

The tank design would allow for both top and bottom filling to prevent rollover, and a temperature/density probe would be located in each tank to detect LNG stratification. Automatic continuous level measurement would be provided for the tanks, which are fitted with internal tank shut-off valves on the bottom outlet nozzles.

Containment would be provided by an impound area surrounding each LNG storage tank, sized to accommodate 110% (see LNG tank options above) of the gross capacity of each storage tank. Depending on site conditions, the impoundment area may be constructed using the natural bedrock, supplemented with concrete. A sump in a corner of each area would capture and control the flow of any runoff.

Regassification Facilities

The regassification facilities consist of a submerged combustion vapourizer (SCV) and a boil-off gas (BOG)/vapour handling unit. The report explains the operation of these systems, including vapour-handling procedures in the event of a power failure.

Fire Protection

The fire water system would use seawater drawn from the Bay of Fundy, and would consist of pumps, piping and hydrant/monitors. Two seawater pumps would be installed at the pier, one driven by an electric motor and the other by a diesel engine. Fire hydrants and monitors would be located at the pier, and all plant buildings would have at least one fire hydrant within 30 m. In addition, the pier and SCV areas would be provided with large dry chemical extinguishing systems. Four 70 kg wheeled extinguishers using potassium bicarbonate (Purple-K) would be located in the pier head and the process area. Three types of portable hand-held fire extinguishers would be located through the facility, based on the type of fire most likely to occur in each area.

Natural Gas Pipeline

The natural gas pipeline would extend approximately 9 km from the LNG facility to the Refinery. Design criteria and materials specifications for the pipeline are provided in the report. The pipelines would be protected against corrosion by an extruded polyethylene coating and equipped with line-break detection and block valve equipment.

Orimulsion® Pipeline to Orimulsion® Storage Tanks

The new onshore Orimulsion® facilities will be designed, constructed and operated in compliance with provincial regulations. The pipeline from the pier to the Orimulsion® tanks will be designed to the applicable CSA codes and will include flow/pressure monitoring systems for spill management, all in compliance with the applicable Oil and Gas Pipeline Systems code.

Electrical Power Generation

Electrical power to the Project would be supplied from the existing utility power grid system at 13.8 kV. The report provides details of the power distribution system within the facility, including provisions for transformer failure, critical/emergency load support and standby generator, and uninterruptible power supply (UPS) for essential equipment.

A plant grounding system, interconnected with the LNG tank grounding system, would protect personnel and electrical equipment against fault currents, lightning strikes and other power surges. A corrosion-resistant raceway system, including cable trays, conduits, duct bank, manholes and wire ways as required by the final design, would support electrical cables routed throughout the plant.

Outdoor area lighting would use high-pressure sodium fixtures suitable for a marine and hazardous environment, where applicable. Batteries would power the emergency egress lighting. Tanks and elevated structures would be fitted with warning lights to comply with air and safety regulations.

Potable and Freshwater Water Supply

It is estimated that a maximum of five persons would be at site during each shift. The estimated water consumption is 250 L/person/day, to be obtained from an on-site potable well.

Water would be obtained off-site to initially fill the SCV. Once in operation, exhaust gases from the vapourizer burner would produce water to maintain the required level. Make-up water would be needed only if the SCV were to be shut down and drained for maintenance. Water obtained off-site would also be required to initially fill the closed loop water/glycol cooling system, and for occasional make-up in that system.

Ancillary Facilities

The report describes the following ancillary facilities to be erected at the facility:

- main control room and electrical building, also housing the general support facilities area
- warehouse and maintenance building;
- boil-off gas /cryogenic compressor building
- guard house and customs house installed at the pier to house required control stations

d) Construction and Commissioning

The report provides a 42-month histogram predicting the number of employees required for major elements of the Project: from 2 to 250, depending on the phase of construction. The construction and commissioning would result in 551 man years of employment. An anticipated equipment list is also supplied.

The majority of the work would be accomplished within a schedule of 12-hour shifts, Monday through Saturday. A second shift would be planned for tasks such as non-destructive testing on the LNG tanks and equipment maintenance, to minimize interruption to the construction schedule. Some very specific activities would require continuous shifts. A more precise work schedule would be developed as engineering design is completed.

Marine Facilities/Activities

The offshore structures would be fabricated off-site and transported by barge for assembly and installation. The pier would extend approximately 300 m from shore to water depths exceeding 25 m, to minimize dredging. In order to install the jacket structures, approximately 25,000 to 30,000 m^3 of unconsolidated seabed material would be swept/side cast over an area of approximately 9,375 m^2. A similar volume of bedding materials (approximately 500 m^3 /pile) may be required, depending on the stability of the seabed. The total volume of drill cuttings would be approximately 1,000 m^3 (approximately 20 m^3 /pile).

Blasting would be required for the road down to the trestle and for the landfall of the trestle, the amount to depend on the final elevation and slope of the trestle. No blasting is expected to be required below the water line or within the inter-tidal zone.

Salt water intake would be required for the fire suppression system. A 30-cm intake pipe located at the pier would provide salt water for the fire system, with appropriate fish screen structures installed.

There would be relatively few marine vessel trips during construction, compared to existing marine traffic. Heavier, larger volume materials may be delivered by barge. Deliveries of other equipment by sea would be maximized to reduce the use of Red Head Road.

Land Facilities/Activities

LNG Unloading

The unloading equipment, consisting of five off-loading arms, one vapour return arm and supplementary equipment, would be constructed at the pier at the same time as the land-based process area was under construction. The construction method for the unloading area would be similar to that for the regassification area.

LNG Storage Tanks

Construction of the steel single containment LNG storage tanks is carried out in ten stages, detailed in the report, which can be summarized as follows:

- The outer tank steel wall and steel roof are erected concurrently, and then the steel roof is raised to its final position.
- The stainless steel inner tank work is done after air raising of the steel roof. This work is performed in a protected controlled environment.
- The cellular block insulation would be installed in a dry environment. Installation takes place after the steel roof is raised to provide the required weather protection.

Hydrostatic testing of the LNG tanks would require approximately 94,000 m^3 of water and the use of seawater is proposed which has been successfully tested. This water will not be treated with chemicals or additives. Natural oxidation may cause elevated levels of iron that are not expected to exceed CCME guidelines. Water will be tested and treated as required prior to discharge.

The suitability of the outer tank wall to be made of concrete is being investigated. If determined acceptable for use, these would follow a similar construction process and have an inspection/testing sequence similar to the steel outer tank wall.

Regassification

Regassification equipment consists of the LNG process system equipment, pipe and mechanical systems and supporting structures.

After the LNG tank foundations have been completed, foundations that support the large process machinery would be constructed. As the larger foundations are completed, smaller equipment and pipe rack foundations would be installed.

As portions of the process systems pipe work are completed, the pipe would be hydrostatically tested using potable water obtained from the Loch Lomond Reservoir using the Refinery water line.

Pipeline

The Orimulsion® and natural gas pipelines will be placed in a common RoW along the length of their common route. It runs adjacent to an existing transmission line that extends from the property boundary to Red Head Marsh, where it turns east through the industrial park. This RoW would be 50 to 60 m wide, and where its route diverges from the transmission line a new 30 m wide RoW will be obtained (assuming 18 m for the LNG and 12 m for the Orimulsion® RoW, for the purposes of this assessment).

Commissioning

A Commissioning Manual would provide detailed procedures for commissioning the utilities, for purging the tanks and pipelines, for the storage tank and unloading line cool-down, and for the start-up of the send-out system.

Land-Based Vehicle Traffic

Traffic related to construction and commissioning would include heavy equipment, light trucks, and passenger vehicles. Estimated volumes of traffic (average trips per month, by vehicle type and Project component) are provided in the report. The route would be Red Head Road and connecting roads. To minimize Project-related traffic on Red Head Road, the rate of equipment and materials delivery would be spread out over the Construction phase.

Transportation, Storage, Handling and Use of Hazardous Material

A variety of fuels and potentially hazardous materials would be used during this Project. Gasoline, diesel fuel, propane, grease, motor oil, and hydraulic fluids would all be needed for heavy equipment. Other potentially hazardous materials which would be used routinely include acetylene, oxygen and other compressed gases, form oil, paints, epoxies, concrete additives, glycol/methanol, cleaner and solvents.

All material of this nature would be inventoried and monitored during the various phases of the project. Each point source would be evaluated for its risk to the environment, its potential flow path if spilled, secondary containment features, the proposed action to contain or control the spill, and current or recommended measures for reducing the risk of release to the environment.

Site inspections, good housekeeping, and maintenance of equipment and systems would reduce the potential for leaks or spills. Handling of all hazardous materials would be in compliance with the Transportation of Dangerous Goods Act. The Project would have an oil and hazardous materials contingency plan and appropriate emergency spill equipment on site. All Construction Supervisors would be made familiar with these plans.

Emissions and Waste

The marine vessels, vehicles and motorized equipment used in construction of this Project would result in emissions of particulate matter (PM), nitrogen oxides (NOx), carbon monoxide (CO), sulphur dioxide (SO_2) and carbon dioxide (CO_2) as part of their normal operating conditions. Dust would also be generated through routine construction activities and materials handling. (Refer to Environmental Affects Analysis Section on page 23)

The potential sources of noise during construction would be truck traffic at site and on the Red Head Road, on-site equipment, and blasting to achieve grade requirements.

A variety of liquid wastes would be generated during construction, including oils and lubricants from equipment, and wastewater *(i.e.* site runoff, sewage). Storm water management controls such as sedimentation ponds and site drainage ditches would be constructed at the site.

Solid waste generated during construction would include scrap metal, used tires, lumber and general debris. It would be collected and disposed of in an approved manner. Combustible waste would be stored in covered containers. All waste would be disposed of according to applicable regulations.

Hazardous waste would be collected and stored in an approved manner for off-site disposal at a licensed facility. All areas where spillage may occur would have drip pans and collection sumps installed, and gasoline would be stored in approved containers.

During construction, sanitary wastes will be handled by self-contained portable restrooms and disposed of by a licensed contractor. A septic system would be designed and constructed to receive and treat sanitary waste during operation .

e) Operation

Labour Requirements

Approximately 16-20 persons would be employed at the Project site during normal operations. The plant would operate on 12-hour shifts.

Marine Traffic

On average, one LNG tanker would arrive at the terminal every 3.6 days, or 80-120 LNG tanker arrivals per year. Approximately one Orimulsion® tanker per month would be anticipated, with approximately 14 Orimulsion® deliveries per year. Tankers would generally depart at the end of the shipping lanes to the east and approach the pier from east to west. Exclusion zones or restrictions on the movement of tankers and support vessels could be permanently or periodically established in the interest of safe navigation.

Land-Based Vehicle Traffic

During operations, the land-based traffic would consist of commuting workers (approximately 20+ trips per day) and delivery of materials (approximately 5 trips per week). It is not contemplated that LNG would be distributed by truck or other ground transportation.

LNG Facilities

Multi-Purpose Pier

The pier is being designed, using site-specific tidal, temperature, precipitation, wind, wave, current and seismic data, to withstand the conditions at Mispec Point and ensure the safety of vessels moored at the pier. Computer modelling has established thresholds for vessel departure conditions (e.g. wind speed). Based on this analysis and a simulation of vessel movements at the site, to be completed in consultation with the pilots, the weather conditions that would require an unscheduled departure from the pier will be established. Similar to existing procedures used at the Canaport monobuoy, decisions regarding departure would be based on six-hour weather forecasts, as opposed to immediate conditions.

Unloading Facilities

The facility would be designed to unload the entire contents of the LNG tanker within approximately 12 to 20 hours. Only one ship at a time can be berthed at the pier. When no tanker is unloading, the lines could be maintained at LNG temperature by circulating LNG from the storage tanks using one of the send-out pumps.

Orimulsion® unloading is very similar in nature to crude and petroleum products. Irving's experience in unloading these products at the Canaport facility and East Saint John Terminal, along with Industry Best Practices and the Bitor Manual, would be used to provide the Pier Operations Manual for unloading of Orimulsion®.

LNG Storage

The LNG would be transferred via a pipeline to LNG storage tanks, where it would be stored prior to regassification.

Pressure, level and temperature are monitored continuously in LNG storage tanks. Overpressure protection is provided by a heated atmospheric venting system at the top of each tank and a tank pressure relief valve. Tanks would be sited to provide for an exclusion zone that would take into account the effects of a fire or vapour dispersion resulting from a malfunction or unplanned event. The thermal exclusion zone required by CSA Z276-01 code and the vapour dispersion zone are both within the property line of the facility.

Regassification

LNG would be pumped from the LNG storage tanks to the BOG compressors where it would be mixed with boil-off gas. This process re-liquefies the boil-off gas, returning it to a LNG state. The LNG would then be pumped to high pressure (needed to achieve the final delivery pressure)

before it entered the submerged combustion vapourizer (SCV). The SCV uses a natural gas fired combustion burner to heat a water bath, and LNG is vapourized by passing through this heated water via stainless steel coils. The vapourized gas would then be regulated for pressure and entered the pipeline system.

f) Decommissioning and Abandonment

The facility would be designed, built and maintained to operate efficiently for at least its anticipated life span: minimum 30 years. Eventually, it would be decommissioned and abandoned in accordance with a plan to be developed. The plan will have a contingency to allow for shutdown at any time during the anticipated project life and will contain measures to achieve targeted environmental goals.

The process for draining the LNG tanks would be similar whether for maintenance, repairs, or final decommissioning. As much liquid as possible would be pumped from the tanks, and the remainder removed by vapourization. The tank would be isolated to prevent the re-entry of liquid, warmed to prevent condensation on the tank surfaces and insulation, then purged with an inert gas. No hazardous emissions are anticipated during decommissioning and abandonment.

System decommissioning consists of following the decommissioning procedures for individual pieces of equipment, as would be followed before performing repair work on any hydrocarbon liquid or vapour retaining part of the system. Interconnecting pipelines would also be isolated and purged, and the power supply for all motors and instrumentation locked out.

Once the facility was properly and safely decommissioned, water and power supply lines would be disconnected and removed. All surface buildings and structures would be dismantled and removed from the site. Disturbed areas would be landscaped and re-vegetated. Salvageable material would be sold or used at other facilities. Solid waste would be disposed of in an approved manner, and hazardous waste would be collected for disposal at a government-approved site.

A more detailed plan would be developed in consultation with regulatory agencies, and in accordance with applicable regulations, at the time of decommissioning.

g) Accidents, Malfunctions and Unplanned Events

LNG-related Accidents

Although incidents have occurred at LNG facilities that resulted in one or more fatalities to site staff, there have been no recorded fatalities among the general public at any LNG import facility since 1944. The report briefly describes the incidents, the likely cause, mitigation measures to reduce the possibility of a re-occurrence, and the overall excellent safety record of LNG facilities.

Since 1952, LNG has been transported by tanker without a major release of cargo or a major accident. In over 38,000 voyages, 54 incidents involving LNG tankers have been logged; of these, 14 resulted in the loss of some LNG. There have been no LNG shipboard fatalities.

The report presents the effects of various LNG spill or release scenarios, although these are considered unlikely to occur. LNG is not normally explosive, but LNG vapours (primarily methane) can explode if contained within a confined space and ignited.

Based on modelling results and on a review of land uses around the proposed LNG facility, the report concludes that no excluded areas would be impacted by the full dyke fire scenario, or by any of the fires that could occur in other impoundment areas. In addition, the report states that no flammable vapours would reach a property line that may be built on. The proposed Project meets the exclusion zone siting requirements of the Canadian Standards Association document Z276-01 *Liquefied Natural Gas (LNG) – Production, Storage, and Handling.*

Orimulsion® Spill

The report presents an evaluation of Orimulsion® spill scenarios, based on the properties and behaviour of Orimulsion® in the environment, which formed part of the Coleson Cove Refurbishment environmental assessment. This was updated to reflect off-loading at the pier rather than at the monobuoy. It concludes that an accidental Orimulsion® spill, though improbable, presents a lower risk than a Fuel Oil No. 6 spill, and that spill response and containment could be more effective at the pier than offshore at the monobuoy.

Natural Gas-related Accidents

Contingency planning, personnel training and other initiatives would reduce the possibility and impact of a natural gas-related accident, malfunction or upset condition. If the natural gas pipeline were to rupture or explode, causing a fire, it would lead to localized or extensive disruptions of soil. Rehabilitation of the disturbed area would include replacement of subsoil and topsoil, addition of soil amendments as required, and re-grading and reseeding the area to minimize soil erosion.

The report also outlines ways to prevent and/or handle forest fires, vehicle accidents, worker accidents, failure of erosion prevention measures, hazardous material spill, and security.

h) Environmental Management

Environmental Protection Plan

An Environmental Protection Plan (EPP) would be developed before construction begins, and would be submitted to the appropriate regulatory agencies for review. The EPP would outline all environmental protection measures to be employed during construction and operation of the Project, including:

- responsibilities of Irving Oil Limited, and all site personnel;

- purpose, organization and maintenance of the EPP including contractors and subcontractors;
- specific mitigative measures to be implemented during routine and non-routine (e.g., fires) construction and operation activities;
- contingency plans to be followed in the case of an accidental event; and
- a list of permits, approvals, authorizations, and key personnel to be contacted in the case of an emergency.

Public Awareness and Communication

Before public announcement of the LNG Project in July 2001, Irving Oil Limited developed a comprehensive communications plan to inform and consult stakeholders as the Project moved forward. Stakeholders considered in the plan were: employees; the general public; First Nations, media; municipal, provincial and federal governments; neighbours of Canaport and residents of Red Head Road; area fisheries groups; area environmental groups; and the local business community.

The communications program included door-to-door meetings, public meetings/open houses, information kits, individual stakeholder meetings, media releases and interviews, and letters to neighbours. Appendix C of the report provides copies of all Project-related public awareness/communication materials distributed in the past two years.

Emergency Response Plan for Operation

A detailed Emergency Response Plan (ERP) would be prepared before Project start-up in consultation with the appropriate authorities. It would document the procedures to be followed in order to protect human health, the environment, and the facility in the event of an emergency. It would also contain a contact list, a summary of reporting requirements, and an inventory of spill kits and safety equipment.

Marine Terminal Manual

A Marine Terminal Manual would be developed in consultation with the appropriate agencies to address the specific requirements and operations of the LNG facilities and Orimulsion® off-loading/transfer, in accordance with federal and provincial legislation and Irving Oil Limited policies. It would cover the exchange of information between tanker and LNG terminal; preparation for arrival; entering or leaving port; capacity of pier fenderings; mooring at pier berths; and emergency release procedures. A draft Manual would be available six months prior to the start of Project operations and finalized within two months of operation.

Employee Environmental Training

Employee environmental awareness training would be developed by Irving, documented in the Environmental Protection Plan, and required for all employees and other personnel, contractors and subcontractors reflective of their duties, responsibilities, areas and equipment. Training would occur before the commencement of work and be evaluated and updated as required.

The Training Manual for the LNG facility would contain a description of the training that must be given to each operator. It would be used in conjunction with the LNG Reference Manual, Commissioning Manual, Operations Manual, and Maintenance Manual.

Monitoring and Follow-up

Information on monitoring and follow-up for each Valued Environmental Component (VEC), as appropriate, appears in the Environmental Effects Analysis Section of the report beginning on page 23.

In addition to the individual references under each of the VECs, an Appendix on the proposed Follow-up Program (Appendix G) is included in the report and contains information on overall program management, as well as information on the follow-up objectives, content, implementation, and reporting of results.

3. DESCRIPTION OF THE EXISTING ENVIRONMENT

a) Physical Land Environment

Physiography and Geology

With the exception of the urban parts of the region (Saint John and Saint John West), the topography of the Project area is relatively rugged. East of Saint John Harbour is hilly. The land immediately north of the Canaport storage tanks is relatively flat with small bedrock knolls. On the eastern side of Mispec Point are a series of shallow bedrock gullies with sheer rock-faced cliffs along the water's edge.

Exposed bedrock and very shallow soil over bedrock are common in the general area of the proposed pipeline route. Bedrock geology is composed mainly of Triassic sedimentary rocks; surficial deposits are mainly shallow lodgement till with sand and gravel patches, particularly near the shoreline.

Atmospheric Environment

The Saint John Region is considered to have a modified continental climate. The Bay of Fundy and Lurcher marine areas moderate air temperature over the region in both summer and winter.

An ambient air quality monitoring network in the Saint John region is operated co-operatively by Environment Canada and the NBDELG. Saint John has a relatively heavy industrial base, with two pulp and paper mills, three thermal generating stations, an oil refinery, plastic processing, printing operations, and other commercial and industrial sources of air pollution. Located downwind of major urban centres in Central Canada and the Eastern United States, Saint John is also subjected to the effects of long-range transport of air pollutants from the southwest. Nevertheless, the air quality in Saint John is generally considered to be very good.

Outdoor sound quality can be influenced by vehicle traffic, heavy equipment operation, weather conditions, and topographical features such as hills or wooded areas.

Hydrogeology and Hydrology

The surface runoff in the vicinity of the proposed Project drains into the Saint John Harbour. In urban parts of the Project area, surface water is collected in the storm drain system and then discharged. The area of the proposed LNG facilities and pipelines is generally well drained, with some confined areas that are poorly drained. There are six small streams that would be crossed by the proposed pipeline, and one pond outlet that would be diverted.

Little information is available regarding groundwater resources in the vicinity of the Project , but yields equivalent to a supply for one or two-family dwellings are anticipated.

b) Biological Environment

Terrestrial and Wetlands Environments

The report indicates that the only important wetland in the vicinity of the proposed Project is Red Head Marsh, which was intentionally avoided in siting the proposed natural gas pipeline. A small wetland located on the Irving property was evaluated. No other wetland greater than one hectare would be affected by the Project footprint.

Rare plant surveys were conducted in 2002 and 2003. No threatened or endangered plant species were identified in the area.

The relatively large proportion of young forest in the general area does provide good nesting habitat for birds that use scrub or edge, suburban and wetland habitats. An Atlantic Canadian Conservation Data Center (ACCDC) database search returned 50 records for 13 rare birds in the area. Two bird surveys were completed to determined whether there were any bird species requiring special conservation measures within or immediately adjacent to the footprint of the Project. Of the species observed, none are considered species of management concern.

A rare element occurrence query of the ACCDC database returned a record of wood turtle, one of four herpetile species considered of special conservation concern in the Saint John area.

Environmentally Significant Areas

Environmentally Significant Areas (ESAs) are designated by NBDELG. Two ESAs are located within the proposed Project area, both in East Saint John. Red Head Marsh is a Ducks Unlimited impoundment, a highly productive freshwater coastal marsh with a variety of breeding birds. Courtenay Bay is a tidal bay and mud flat with a concentration of shorebirds, and is a winter feeding area for gulls and ducks.

Freshwater Biological Components

The proposed natural gas pipeline would cross six streams: Bean Brook, Beyea Brook, Hazen Creek and three unnamed tributaries to Hazen Creek. Brook trout, mummichog, nine-spine stickleback were found in the streams. American eel were found in the stream downstream of the Canaport pond where the LNG storage tanks are proposed to be located. None of the species found are considered rare or otherwise endangered.

c) Marine Environment

The Bay of Fundy has exceptionally high tidal energy, varying from approximately 6 m at its mouth to a maximum of 15.2 m landward. The substrate is generally sandy with rock and ledge outcrops; the extreme tides result in scouring along the outer beaches and extensive intertidal zones.

The Bay is known for its resident and overwintering marine birds and is a major migration route for coastal seabirds as well as for scoters and other seaducks. Marine mammals using the Bay of Fundy include seals, whales and dolphins.

Approximately 70 species of fish have been recorded in the Bay of Fundy, most of which can be expected to occur near the Canaport facility. This includes both resident species and those that enter the Bay only during spawning or feeding migrations.

The marine fisheries surrounding Canaport are included in the Maritimes Region as defined by DFO. In 2001, Scotia Fundy Region had landings valued at $48 million, of which lobster, herring, scallops and sea urchins were the most valuable. Major commercial species within the Fundy Shore of New Brunswick fisheries include: Atlantic salmon (fishery suspended) and herring; groundfish (cod, haddock, pollock, flatfish and halibut); lobster and other commercially important invertebrates (sea urchins, scallops, crabs, clams and periwinkles); and rockweed and dulse.

d) Rare and Endangered Species and Their Habitats

Of the various New Brunswick and Atlantic Ocean (Bay of Fundy) species listed by Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as species of special conservation concern, the Least Bittern has been recorded at Red Head Marsh; the Harlequin Duck has been observed at Anthony's Cove; and Atlantic salmon, shortnose sturgeon, and Atlantic cod are known to occur in the vicinity of the proposed Project. Of the listed marine mammals, only the harbour porpoise has been observed in the vicinity of the proposed Project and North Atlantic right whales may enter the shipping lanes on occasion.

No plant species listed by either COSEWIC or the New Brunswick Endangered Species Act are known to occur in the Project area. Ten vascular plant species ranked by ACCDC as rare were found in the Project area.

e) Socio-economic Environment

The Project would be located in a sparsely populated rural area of southwestern New Brunswick, in the eastern part of the City of Saint John.

The economy of southwestern New Brunswick is primarily a resource-based economy. The main inland resources are related to forestry, while fishing and aquaculture dominate the coastal/marine areas; other industries include quarrying and agriculture. Most of the manufacturing in the area (e.g., pulp and paper, fish processing) is conducted in conjunction with the primary industries.

Saint John serves as a regional service centre; a transportation hub (road, rail and port) for imports/exports and regional delivery of goods; and as a commercial centre serving some 140,000 residents within an 80 km radius.

Public Transportation Services

Marine

The Port of Saint John is an independent and locally operated Canada Port Authority, handling an average of 25.8 million tonnes of cargo per year (2001-2002) with 1,692 ship arrivals in 2002. Types of cargo include forest products and steel, containerized cargo, and bulk cargo such as petroleum, potash and salt. Currently, up to 70 very large crude carrier shipments are made to the Canaport site per year. LNG and Orimulsion® shipments would arrive via existing designated shipping lanes in the Bay of Fundy.

Roads

Bayside Drive is the main City route into the East Saint John industrial area. Red Head Road, the main access to Mispec Point/Canaport facility, intersects with Bayside Drive at the entrance to the Grandview Industrial Park.

Land Use

The Project is located within the municipality of Saint John.

The land use of the LNG Terminal at the Canaport facility is zoned Heavy Industrial. This land is owned privately by Irving. There is no change in the designated land use required for the LNG facility. The proposed facility boundary is located approximately 750 meters from the nearest boundary of another zone.

All of the lands that would be crossed by the proposed natural gas pipeline from Red Head Marsh out to Canaport are zoned variations of rural and/or residential. Those in the area of the two industrial parks, Grandview and McAllister, are zoned Heavy Industrial.

Beyond the specific land for use in the project, the existing land use in the proposed Project area includes residential, commercial, forested woodland, industrial and recreational. Planning and development are regulated under the Rural Planning District Regulation and Provincial Building Regulation of the New Brunswick Community Planning Act.

Residential land use in the Project area is primarily single-family dwellings. Commercial land use along the Red Head Road is mainly small businesses serving a local market, such as convenience stores. Industrial uses include the Canaport facility, the Irving Refinery, two industrial parks and the Hazen Creek Sewage Treatment Plant.

4. ENVIRONMENTAL EFFECTS ANALYSIS

a) Atmospheric Environment

"Atmospheric Environment" refers to the layer of air from the earth's surface to a height of approximately 10 km, typically characterized by three subcomponents: climate, air quality, and sound quality (noise).

The report concludes that no measurable cause-and-effect relationship could be established between the Project and climate change.

A *significant adverse residual environmental effect* on air quality is one that results in a greater than 5% increase in mass emission rates of any air contaminant of interest (PM, SO_2, NOx and CO) in the assessment area during any specific phase of the Project, or that degrades air quality such that the maximum Project-related ground-level concentration of those contaminants leads to an exceedance of the respective ambient air quality standards.

A *significant adverse residual environmental effect* on sound quality is one where a Project-related activity creates a "nuisance" at the nearest residential property: by causing an ambient sound pressure level that frequently exceeds 55 dB_A during any specific phase of the Project; or, where ambient levels already exceed 55 dB_A, by causing a sound pressure level that is an increase of more than 5 dB_A above the existing conditions.

Environmental Effects Analysis

Effects on Climate are primarily related to changes in temperature, precipitation, wind, and sea level as a result of greenhouse gas emissions as a significant contributor to global climate change. As the proposed Project would emit more than 8 kilotonnes CO_2 equivalent per year, it would be categorized as a Large Final Emitter and be subject to mandatory monitoring and reporting. In comparison with greenhouse gas emissions from all sources in New Brunswick and Canada who's contribution to climate change is recognized as a global issue, greenhouse gas emissions from the Project are predicted to be very small. Nonetheless, the report has examined the use of best available technology that would minimize greenhouse gas emissions and that is economically feasible. The report also commits to employing adaptive management approaches to managing greenhouse gas emissions during the operating life of the facility. The Report indicates that the Project should not result in any substantive interaction with Atmospheric Environment that would result in discernible changes to regional, national, or global climate patterns.

During Construction, there would be the potential for dust generated in earth-moving and other construction activities, as well as the emissions of combustion gases (including greenhouse gases) from construction equipment, a concrete batch plant at the site, commuter and construction vehicles, vessels and tugs/barges. Mitigation would include a number of initiatives including the application of dust suppressants during periods of heavy activity or dry weather, use of a baghouse on the concrete silos, use of low sulphur fuel for vehicles, preserving natural buffers and minimizing dust generation during high winds. Significant adverse effects on air

quality are not anticipated from increased vehicle traffic emissions during construction, given the anticipated volume of traffic and its short duration. Traffic during operation would be less, and traffic during decommissioning should be comparable to the levels during construction.

Predicted construction-related emissions of PM, SO_2 and NOx would be generally less than 2% of the total emissions from selected major sources in the Saint John airshed, and carbon monoxide emissions less than 4% of the total. During operation, the submerged combustion vaporizers or SCVs (6 in operation and 1 spare) used to re-gasify the LNG into natural gas for pipeline transport and the 2 930 KW natural gas-fired boiler used for process heat and steam supply and as a thermal fluid heater are anticipated to be the main sources of continuous emissions from the facility. During operation, the emissions of all conventional air contaminants would be generally in the order of 2% of the total from selected major sources in the Saint John airshed. Overall emissions associated with the project are predicted to result in an increase in total emissions to the Saint John airshed of less than 5%, and the applicable air quality standards are not expected to be exceeded. The magnitude, frequency and duration of decommissioning activities are such that air quality standards would be unlikely to be exceeded in that phase.

Accidents, malfunctions and unplanned events having a potential for adverse environmental effects on air quality include marine vessel accidents, hazardous materials spills, accumulation of gas in a confined area, forest fires and other unplanned events, as well as improbable events such as terrorist attacks. The report indicates that most can be mitigated through preventative maintenance.

Given the design consideration and the strict requirements for operation of the proposed Project, and the operational history of the LNG industry, the likelihood of a substantial LNG spill or release is extremely low. Although the potential effects on air quality of a catastrophic spill or release are rated as significant, this is not likely to occur.

An assessment of the potential for on-road vehicle traffic to cause adverse effects on air quality during construction was conducted for roadways associated with the Project. The maximum ground level concentrations along the road-side were predicted to be well below the applicable provincial ambient standards for all contaminants modelled.

There could be short-term, intermittent, and reversible air quality effects during construction, but the long-term operations are expected to result in improved air quality due to reduced emissions resulting from an increased supply of natural gas which is anticipated to displace other fuel types.

Project activities and vehicle and vessel traffic could affect sound quality in all phases. Planned mitigation would include noise control (e.g. mufflers) and the scheduling of noisy activities during normal daylight working hours where possible. Strobe lights could be used instead of backup beepers for any necessary night operation of heavy equipment. The cumulative environmental effects on sound quality by this Project in combination with others in the region are rated not significant.

Significance

The residual environmental effects on the Atmospheric Environment are rated as not significant for all Project activities assessed, except Accidents, Malfunctions and Unplanned Events which are rated as significant but not likely to occur.

Follow-up

Several ambient monitors are currently operated by the National Air Pollution Surveillance Network (NAPS) and NBDELG in areas surrounding the proposed Project. The operation of the facility would include several natural gas monitors on the property to detect fugitive leaks of LNG or natural gas, and a preventative maintenance and repair program would minimize and correct any leaks that may occur. Additional routine monitoring of ambient air quality and noise is not anticipated, given the planned mitigation; however, noise monitoring could be required to address any possible complaints received from residents, particularly during construction activities. Prior to construction, a 24-hour baseline noise monitoring would be conducted at Mispec Beach. Should nuisance complaints arise during pile driving, Irving would monitor sound levels and, if those exceed significance criteria, would implement a mitigation plan which would have been developed in consultation with DELG. The sound emission mitigation plan may include a variety of measures (e.g. work scheduling, temporary sound barriers). Irving would work with area land owners and those at Mispec Beach to discuss the planned action plan in the event that a noise nuisance is identified.

The follow-up program (referenced in Appendix G of the report) also makes reference to outlining provisions for greenhouse gas emission management including emissions inventory through the NAPS reporting, participation in the Large Final Emitters Program, and through ongoing periodic consideration of best available technology.

b) Groundwater

Groundwater was selected as a VEC because of the potential for disruption or contamination of the water supply of residents along Red Head Road, and in the vicinity of the pipeline.

A *significant residual environmental effect* defined as a Project-related environmental effect that degrades the quality of groundwater by exceeding the maximum acceptable concentration (MAC), interim maximum acceptable criteria (IMAC), or aesthetic objectives (AO) of one or more parameters, as specified in the Guidelines for Canadian Drinking Water Quality (GCDWQ) for potable domestic water supplies, for a period of more than 30 days. In the event that a concentration already exceeds GCDWQ levels, any Project-related increase in concentration is considered significant.

A Project-related effect is also considered significant if it reduces the quantity of groundwater recoverable from the aquifer to meet the present and future needs of current users.

Environmental Effects Analysis

The report indicates that most physical and chemical environmental effects on groundwater would likely be temporary and occur during construction and commissioning. Residual effects from water use could occur throughout the operation of the Project, and potential accidents due to spills, although unlikely, could occur in all phases.

Project-related activities that have the potential to affect Groundwater quality and/or quantity include site preparation, concrete production, and site water management. Operation of the LNG facility and pipeline, the presence of trenches and rock benches, water management, and site waste management have the potential to affect Groundwater quality and/or quantity.

Increased run-off and sedimentation/turbidity of water can result from clearing, grubbing, and stripping of vegetation during site preparation. Wash water from concrete production would likely have a high pH and could affect the groundwater chemistry if allowed to leach into the ground. Mitigation would include erosion control and containment measures.

Blasting activities could affect groundwater quality and/or quantity and cause property damage to well structures, pumps and water lines. A residual well water survey would be conducted of wells within 500 metres of a blasting area prior to blasting operations in specific areas at risk, to include the homes at Rocky Corner.

An on-site well would be constructed to supply up to 50 m^3/day of potable water (i.e. non process water) during construction and operation. Removal of groundwater could result in a lowering of the water table. A pumping test will be completed on the proposed on-site well to evaluate the amount of drawdown expected. Once the facility had been decommissioned and the potable well was no longer in use, the water level in the well and surrounding media would return to its pre-pumping level.

Sanitary wastewater would be routed to a septic tank with leach field. The New Brunswick Department of Health and Wellness regulates licensing requirements and permitting for on-site sewage treatment. Both the septic tank and leach field would be constructed in accordance with the requisite codes. Effluent from the leach field could contain elevated nutrients and bacteria that could affect the local groundwater quality. The well would be constructed to prevent surface water intrusion into the well, and landscaping would be completed to direct surface water away from the well.

Malfunction and accidents that could potentially affect Groundwater quality and/or quantity include hazardous materials spills during all phases of the Project. The report states that the likelihood of a major spill is low due to the storage and handling procedures in the EPP, and applicable regulations. The physical properties of LNG (it floats on water and evaporates quickly) limit the potential for significant adverse environmental effects on Groundwater resulting from accidental LNG releases.

Large quantities of petroleum products are stored at the Canaport facility. Petroleum products would be stored at the Project facilities, subject to provincial regulations. Potential interactions would occur only if a malfunction or accident occurred at each of the facilities, which is considered unlikely.

The Project would be sited some distance away from the potable water well existing at the Canaport facility, to minimize the potential for well interference: the potential for cumulative environmental effects on Groundwater quality or quantity is considered to be low.

The presence of permeable material in the Orimulsion® and natural gas pipeline trenches could alter shallow groundwater flow. However, as both pipelines would share one corridor, the cumulative effect is expected to be the same as that of a single pipeline.

Significance

No significant residual effects, including cumulative environmental effects, are expected to result from Project activities, taking into account any proposed mitigation. The report concludes that groundwater in the vicinity of the Project has the capacity to meet present and future needs.

Follow-up

An inventory of residential water wells within 500 m of blast locations would be completed before initiating any blasting. This would include an interview with the well owner, documentation of well construction specifics, collection of a water sample for chemical and bacteria analysis and photographic documentation of the well location. Where several wells are present within the 500 m blast monitoring radius, selected representative wells would be inspected, sampled, and closely monitored during the construction phase. Wells within 200 m of other construction activities will be surveyed prior to construction.

Groundwater level monitoring will be completed to determine the natural level upgradient of the rock bench and will continue during construction. Monitoring requirements will be reviewed after the well survey to ensure that the monitoring program is appropriate. Irving would report monitoring results to DELG and others as outlined in Appendix G of the report.

Irving will implement a contingency plan (outlined in Appendix G) to provide temporary water during construction and to repair or replace any wells found to be permanently damaged, should any wells be adversely affected by the Project.

c) Marine Environment

"Marine Environment" refers to all marine flora and fauna and their habitat, including species of special conservation concern. The EIA focus is on the marine area of the proposed receiving terminal, including the Outer Saint John Harbour up to the entrance of the shipping lanes. The assessment also considers the potential environmental effects of an LNG accident within the Bay of Fundy and the potential effects of the Project (including vessel traffic) on the North Atlantic right whale within the Bay of Fundy ecosystem. Selected indicator species are Atlantic salmon, North Atlantic right whale and lobster.

A *significant adverse residual environmental effect* on marine fish and invertebrates is defined as one that affects the marine environment so as to cause a decline in abundance or change in distribution of population(s) of indicator/representative species over one or more generations. Natural recruitment may not re-establish the population(s) to its original level in one generation.

A *significant adverse residual environmental effect* on marine fish habitat would be one that results in an unmitigated or non-compensated net loss of fish habitat as required in a Fisheries Act HADD authorization. This may consist of a residual effect that alters the ecological function of the marine environment such that fish and invertebrate use of that habitat does not return to baseline conditions within five years.

For potential effects on any marine species with special conservation status, such as the North Atlantic right whale, a *significant adverse residual environmental effect* would include the loss of one or more individuals from within a population, or any substantial change in distribution, migration or behavioural patterns.

Environmental Effects Analysis

Construction of the pier has the potential to adversely affect the marine environment, although the preferred pier configuration would require only localized seabed preparation. Installation of piles would require drilling bedrock to a depth of 5m, and side-casting and leveling of the seabed may be required. Blasting would be required for the road to the pier and the pier trestle landfall, but no blasting is expected to be required below the waterline or in the intertidal zone. Pier construction could result in increased turbidity of the water, and side-casting would result in the removal of benthic habitat and the direct mortality of benthic organisms.

Pier construction would likely require an HADD from DFO to allow the construction of the alteration of the seabed necessary for the placement of the pier bases. Disturbance of the seabed would also require an ocean disposal permit under CEPA.

Project activities would be undertaken, where applicable and feasible, outside of the biologically-sensitive period.

The footprint area of the pier would be small and construction is anticipated to occur over a 9-month period. No dredging to accommodate ships at the pier construction would be undertaken. The magnitude of potential environmental effects is considered to be low, the geographic extent would be limited, and the effects would be limited to a single event. With the exception of direct mortality, each of the potential environmental effects is considered reversible with time.

Commissioning of the LNG facility would require 95,000 m^3 of seawater for hydrotesting and cleaning. The intake pipe would be installed at the pier, with its opening a few metres below the lower low tide level. Screens would be installed for prevent the intake of marine fish. After hydrotesting, residual metals in the used water are not expected to exceed water quality guidelines; however, the water would be tested and treated as required prior to discharge.

Process water would be generated at the LNG facility during normal operations, from the submerged combustion vapourizers and from oil-water separators. After treatment, the water would be discharged to the east retention pool, from where it would be periodically discharged to the Bay of Fundy after testing to ensure compliance with water quality regulations. This freshwater discharge would likely have adverse effects on the seaweed community in the intertidal zone, but the effect would be localized and reversible. Mixing by tidal currents would reduce any potential freshwater plume beyond the intertidal discharge point.

Decommissioning and abandonment would require regulatory approval and would comply with all requirements at that time. Removal of the pier would likely cause loss of benthic habitat that has colonized on the pilings, and potential loss of fish and fish habitat that the pier may have generated. Temporary turbidity could also result from disturbance of the sea floor.

An accidental release in the marine environment of LNG or Orimulsion® could potentially cause direct mortality at the population or individual level, and loss or avoidance of habitat. The behaviour of LNG in seawater is not well known as the history of LNG shipping has no substantial releases. It would lower the water temperature rapidly at the air/water interface but the effects would decrease with depth and are predicted to be not significant for fish habitats. At the surface, elevated methane levels could result in asphyxiation of marine mammals or result in fire if an ignition source is present. If spilled LNG reached shore, the intertidal habitat could experience cryogenic effects resulting in direct mortality. Overall, however, because LNG floats on the water and evaporates rapidly, the persistence of environmental effects would be less severe and over a shorter timeframe than other types of hazardous materials spills. The report indicates there is emerging research on the behaviour of LNG in the marine environment. New information would be reviewed on a consistent basis to ensure current response procedures and technologies are reflected in the Emergency Response Plan.

In the case of an Orimulsion® spill, the effects would vary depending on the amount spilled and the location and conditions. Shellfish could be tainted through ingestion or filtration of weathered bitumen particles. Unlike crude oil, spilled Orimulsion® will not stay on the surface but will extend down perhaps 1-2 m. It would disperse to near shore environments and shorelines under strong tidal action. Near the Project site, dense seaweed cover onshore could be easily removed to mitigate a serious spill and this habitat loss would be reversible. Saint John ALERT would have specialized equipment and trained personnel to manage Orimulsion® spills according to a government- approved response plan.

Tanker collisions with marine mammals are unlikely outside the shipping lanes due to the slow vessel speed required for manoeuvring and berthing. Marine vessel traffic would also generate propeller noise that could affect the behaviour of fish and marine mammals. However, this would be of short duration and be similar to existing noise sources in the vicinity. The overall effect of tanker traffic on the Marine Environment would be similar to existing tanker traffic, with slightly increased frequency.

Project-related marine traffic would be incremental to existing vessel traffic to Saint John Harbour and crude oil tanker traffic to the Canaport monobuoy. Cumulative effects would occur on local fish and fish habitat and could increase vessel collisions with uncommon species such as the North Atlantic right whale. Although marine resources in the vicinity and along established routes would likely have adjusted to routine activities, cumulative effects would occur on fish, fish habitat and species of special conservation concern.

Significance

The report concludes that the residual environmental effects on the Marine Environment are rated as not significant for all phases of the Project and for all Project activities assessed. Significant residual adverse environmental effects could result from a catastrophic spill of LNG

or Orimulsion®; that is, a very large volume spilled at an ecologically sensitive time of year in a location where rare, threatened or endangered species would be present. Such an event is anticipated to be very unlikely, based on the safety record of LNG and Orimulsion® tankers. In the unlikely event of a vessel collision with a North Atlantic right whale, the resulting environmental effect would be significant.

Follow-up

Follow-up would be conducted to assess the environmental effects of suspended solids on the water column, deposition on the bottom, fate and stability of the dredge spoil deposits, and general effects of the construction on the receiving environment. Follow-up would also serve to assess the pier as a substrate for colonization by marine life. If monitoring is required pursuant to Fisheries Act and CEPA authorizations, or a follow-up program required pursuant to CEAA, these programs would be implemented. If it is determined that the marine portion of project would result in a HADD, a fish habitat compensation plan would be developed and approved by DFO, and habitat compensation would be monitored for its effectiveness.

The follow-up program referenced in Appendix G of the report states that recognizing that new research is emerging on the behaviour of LNG in the marine environment, Irving would work with Responsible Authorities, NBDELG and appropriate response agencies to periodically review and discuss this information. Irving would ensure that it is incorporated, as appropriate into the Emergency Response Plan and other applicable aspects of facility management.

d) Freshwater Fish and Fish Habitat

"Freshwater fish" refers to fish that live in freshwater during at least part of their life cycle. "Fish habitat" refers to spawning, nursery and feeding grounds, food supplies and areas used for migration by fish or other organisms that fish depend on.

A *significant residual adverse environmental effect* would be one that results in an unmitigated or non-compensated net loss of fish habitat:

- a reduction in the ecological function of that habitat such that fish and invertebrate use of the habitat does not return to baseline conditions within five years; and/or
- a reduction in the abundance of a fish community that is dependent upon that habitat, such that natural recruitment and reproduction would not restore the community to its original level in one generation (typically two to three years).

Long-term Project-related exceedances of the Canadian Council of Ministers of the Environment (CCME) water quality guidelines for the protection of aquatic life would also be considered significant.

Environmental Effects Analysis

Many construction activities that would be undertaken in the immediate vicinity of the watercourses have the potential to alter fish habitat, by reduced shading and cover, changes to channels following pipeline installation, and sedimentation of important habitat features such as

gravel deposits suitable for spawning. Critical fish habitat (*i.e.* known or likely spawning habitat) was not identified at or within 100 m of the proposed pipeline stream crossings.

All site preparation work would be conducted under a Watercourse and Wetland Alteration Permit and any applicable codes and standards would be applied. Erosion and sedimentation control measures and buffer zones would be used as appropriate to maintain water quality.

Mitigation measures for wastewater generated during construction would be addressed in the EPP. At a minimum, wastewater disposal would not occur within 100 m of a watercourse or water body.

If blasting were required in or near a watercourse, this would be carried out in accordance with Guidelines for use of Explosives in Canadian Fisheries Waters and the requirements of DFO's Approval. Environmental effects to fish and habitat could be minimized through use of mitigation measures which include but are not limited to exclusion of fish from the blasting area, use of non-propagating explosives and time-delayed detonation of multiple smaller charges.

Site preparation and construction of the LNG storage tanks would eliminate the outlet creek between the ocean and the Canaport pond. Without mitigation, this would isolate the pond and result in the direct loss of the fish habitat. The outlet creek would be realigned to allow passage between the Bay and the pond. The new stream channel would be constructed before the existing creek was eliminated. Realignment of the Canaport stream will likely require HADD authorization pursuant to the Fisheries Act.

Potential interactions of the Project with freshwater resources during operation and maintenance are anticipated to be limited. Vegetation control activities within 30m of a watercourse could be required, in which case a Watercourse and Wetland Alteration Permit would be obtained.

Decommissioning and abandonment would have the potential to cause a change in habitat in the removal of the pipeline, as well as fish mortality associated with increased public access to the area. Accidents, malfunctions and unplanned events that could interact with fish and fish habitat include forest fires, a hazardous materials spill in the sensitive zone or loss of containment during a watercourse crossing of the pipeline.

The current fish populations and fish habitat within the assessment area reflects the cumulative environmental effects of past and present projects. Water quality and fish habitat quality are generally good and considered healthy. Although pipeline construction would result in the removal of some vegetation at crossings and from some stream banks, overall the environmental effects of the Project are rated not significant.

Significance

Mitigation measures to prevent or minimize possible adverse affects would be addressed in the EPP and applicable permits and authorizations. With mitigation, the adverse residual environmental effects on freshwater fish habitat are predicted to be not significant.

Follow-up

All construction activities would require inspection and monitoring to ensure that erosion control structures were properly installed, maintained and removed. An on-site environmental inspector would be present during construction of all pipeline watercourse crossings and the Irving realignment of the Canaport pond outlet creek to ensure that the EPP and all regulatory requirements. These sites would be inspected routinely during the first year of operation, as required under CEAA, to ensure that permanent erosion and sedimentation control measures were successful. If it is determined that the Project will result in a HADD, a fish habitat compensation plan will be developed and approved by DFO, and habitat compensation will be monitored for its effectiveness and reported as required.

e) Terrestrial and Wetland Environments

"Terrestrial Environment" refers to the existing land-based habitat and wildlife, with the exception of migratory birds. "Wetland Environment" refers to wetlands as defined by the New Brunswick Clean Environment Act.

For the purposes of this assessment, lands cleared for the Project site, including the pipelines, are assumed to be a permanent habitat loss. However, in the case of the gas pipeline RoW, between the LNG tanks and the Irving Refinery, the area to be cleared and re-contoured would generally be a change in habitat type from forest to open field.

A *significant adverse residual environmental effect* on the Terrestrial and Wetland Environments is one that alters terrestrial and/or wetland habitat in such a way as to cause:

- a change or decline in the ecological function of that habitat; or
- a change or decline in the distribution or abundance of a rare plant or animal population that is dependent on that habitat, such that natural recruitment would not restore the community to its original level within one generation.

With regard to rare vascular plant species (ranked S1, S2 or S3 by ACCDC, and by the New Brunswick Department of Natural Resources as "May Be At Risk" or "Sensitive"), a *significant adverse residual environmental effect* is one that alters the terrestrial habitat such that that the long-term survival of the species population is substantially reduced as a result.

A *significant adverse residual environmental effect* on any threatened or endangered species listed by the federal Species at Risk Act or the NB Endangered Species Act is one that results in the loss of any individual of these species, or the permanent loss of critical habitat for these species.

Environmental Effects Analysis

Site preparation work for the land-based components of the Project would include clearing and grubbing for the RoW which would contribute to habitat fragmentation. The trenching and pipeline installation activities would provide temporary barriers to wildlife movement. During operation, RoW vegetation maintenance or repairs to the pipeline could reduce habitat quality,

cause direct mortality to plants and wildlife, or result in habitat fragmentation. Decommissioning activities are similar to those associated with construction, but site reclamation after abandonment would create the potential for any habitat fragmentation to be reversed over the long term.

Impacts on the terrestrial environment could be limited by minimizing the area to be cleared, which the Project layout and engineering design have taken into consideration by locating the pipeline RoW and LNG facilities adjacent to existing features, where possible. Most of the affected land would be shrub and edge habitats with a small portion of mature coastal forest.

The proposed pipeline route was selected to avoid all but two wetlands, the 2.4 ha Canaport pond wetland and a 0.5 ha fen located along the pipeline, 1.2 km north of Red Head Road. The only important wetland in the Assessment Area is Red Head Marsh; however, no activities or components of the works would be located within 30 m of the marsh. The required realignment of the outlet from the Canaport stream would be designed to maintain the elevation and function of the wetland. Due to bedrock on either side, trenching would be needed where the pipeline crosses the second, smaller wetland. There could be adverse environmental effects of a trenched crossing but these could be mitigated with protective construction techniques, and the function of the wetland maintained.

Given that no plant species of special conservation concern have been found, the effect on rare plants is considered not significant. The potential for loss of wood turtle habitat could be mitigated through the same measures used to moderate the potential effects on fish habitat, in particular by restricting the amount of disturbance to the ground and vegetation within 30m of stream banks. Increased vehicle traffic on Red Head Road in all phases could result in the avoidance of the usual habitat or restrict wildlife from crossing the road. The report indicates that there is no critical habitat along the Red Head Road and any wildlife using the area is likely acclimatized to traffic noise.

Previous industrial and commercial activities in Saint John have had, and continue to have, an effect on terrestrial and wetland habitats within the vicinity of the Project. The cumulative existing and proposed loss of terrestrial habitats in the Mispec Point area is approximately 20% of the land base. The LNG storage tanks would remove approximately 15 hectares of shrub and forested habitats. Establishment of the LNG pipeline would alter much of the 9 km long, 18 m wide RoW from forest and shrub habitat to grasslands. An additional 12 m width of RoW for the Orimulsion® pipeline will add to the total area lost in the vicinity of the Project. Locating the facilities beside existing areas of disturbance and routing the pipeline RoW so it lies immediately adjacent to existing linear corridors could mitigate the potential cumulative effects of habitat change and fragmentation.

Significance

Mitigation measures to prevent or minimize possible adverse affects would be addressed in the EPP. With planned prevention and mitigation, the cumulative environmental effects of the Project on Terrestrial and Wetlands Environments are predicted to be not significant.

Follow-up

All construction activities would require inspection and monitoring to ensure that erosion control structures were properly installed, maintained and removed. An on-site environmental inspector would be present during construction to ensure that the EPP and conditions of the Watercourse and Wetlands Alterations Permits were met, and planned mitigation measures carried out. In addition, open pipeline trenches would be inspected to ensure that no wildlife became trapped or buried.

A follow-up plan will be implemented in association with the two wetlands, with monitoring to occur at 3 years and 5 years following the Orimulsion® pipeline construction, and following the natural gas pipeline construction. The Orimulsion® pipeline follow-up could result in changes to construction practices if the planned techniques, identical to those planned for the natural gas pipeline, did not work. A follow-up program will also be implemented for the Canaport pond, three and five years following construction of the new outlet, in addition to the follow-up program required for any HADD Authorization and any follow-up required pursuant to CEAA.

During inspection, any mitigation measures that are identified to be ineffective or in disrepair would be remedied as soon as possible. Any loss of wetland function would be reported to NBDELG and Environment Canada for discussion of possible remedial action.

f) Migratory Birds

"Migratory Birds" refers to birds listed in the Migratory Birds Convention Act that occur in the Project vicinity for at least part of their life cycle.

Bird habitat located within the limits of clearing for the proposed LNG facilities and Orimulsion® pipeline is assumed to be a permanent habitat loss. However, in the case of the gas pipeline RoW, between the LNG tanks and the Irving Refinery, the area to be cleared would generally be a change from forest to field habitat.

A *significant adverse residual environmental effect* on Migratory Birds is one that alters critical bird nesting, foraging or migration habitat in such a way as to cause:

- a change or decline in the ecological function of that habitat; or
- a change or decline in the distribution or abundance of migratory bird populations in the Fundy Coast Eco-region or Bay of Fundy that are dependent on that habitat, such that natural recruitment would not restore the community to its original level within one generation.

Environmental Effects Analysis

Marine construction and pier operation activities have the potential to result in avoidance by marine migratory birds. Site lighting and lights from vehicles and heavy equipment may disorient migrating birds or attract them to the construction area. The planned schedule will avoid the peak migration period of scoters and other sea ducks, and down-shielded lighting will be used where safety and navigation considerations permit. LNG storage tanks will be

approximately 55 m high, lower than structures typically associated with bird strike problems. If bird mortalities are noted, Irving will discuss diversion techniques with the Canadian Wildlife Service.

Establishment of the LNG and Orimulsion® pipelines would alter much of the RoW from forest and shrub habitat to grasslands. Routing the pipelines along similar alignments, and so that both alignments were located primarily within the existing easement for the transmission lines, could mitigate this potential effect. The LNG facilities will remove approximately 15 ha of shrub and forested habitats. Locating the facilities beside existing areas of disturbance could mitigate the potential cumulative effects of habitat loss and fragmentation.

Some past and current projects such as Canaport and the Orimulsion® Project have affected wetlands; however, it is unlikely that those wetland habitats were highly productive for waterfowl breeding, given what is known about these habitats before development. No productive loss of productive waterfowl habitat is expected as a result of the Project.

Project-related accidents, malfunctions and unplanned events that may have an adverse effect on terrestrial and marine migratory birds include marine vessel accidents, hazardous material spills, spill of LNG and/or Orimulsion® in the marine environment, vehicular accidents (*i.e.*, collisions with birds) and forest fires. The report considers these scenarios and possible mitigation, including preventative measures and rapid response.

Significance

Mitigation measures to prevent or minimize possible adverse affects, identified in the report, will be addressed in the EPP. With the proper environmental protection practices, the cumulative environmental effects of the Project on Migratory Birds are predicted to be not significant.

Follow-up

An on-site Irving environmental inspector would be present during construction to ensure that the EPP and Conditions of Approval are met. The status of scoter migration will be determined at the beginning of construction and, if present, monitored for interactions with construction. Due to the relatively low bird activity at the pier location observed during the winter season, monitoring during winter operation of the pier is not warranted.

Appendix G of the report adds that in the event that early April construction is required, in concert with the Pt. Lepreau Bird Observatory, early morning monitoring would occur when scoters are known to be in the area.

g) Commercial Fisheries

"Commercial Fisheries" refers to commercial fishing activities adjacent to the proposed terminal and pier, as well as in the Outer Saint John harbour up to the entrance of the shipping lanes. The assessment includes the potential effects on commercial fisheries of an LNG accident in the Bay of Fundy shipping lanes. EIA considers all vessels currently or seasonally fishing within this

assessment area and the economic value of their total catch, as well as the resources within the (considerably larger) DFO-designated fishing zone for which fishers hold licenses.

A *significant adverse residual environmental effect* would be one that results in an unmitigated or non-compensated net loss of Commercial Fisheries as a result of the Project. This may consist of a residual environmental effect that alters commercial fishing activities or fisheries resources in quality or extent that results in:

- fishers unable to fish in their commercially licensed area for one fishing season or more;
- fishers unable to pursue economical fishing activities to earn a livelihood in the zoned fishing area for which they hold a commercial license for more than one year;
- fishers unable to carry out fishing activities for more than one fishing season; and/or
- a fisher subjected to personal injury or loss of life.

Long-term, Project-related sharp declines in fishery resources, differentiated from declines attributable to natural variation or overfishing, would also be considered significant.

There is no specific legislation aimed at protecting marine fisheries resources for commercial purposes; the protection of marine resources generally falls under the Fisheries Act and the Oceans Act. Marine resources are also protected by legislating fishing quotas, fishing seasons, and gear and vessel restrictions.

Environmental Effects Analysis

Irving Oil Limited owns the water lot surrounding the proposed LNG facility. Fishing is allowed in this area provided it does not interfere with the operation of the Irving Canaport facility. The key area of interest is the lobster fishery and the potential for lobster trap damage or loss.

Pier construction activities would be scheduled for outside of fishing season, where practical, and fishers would be consulted on the planned activities. An exclusion zone would be in place as required during the proposed 9-month pier construction period.

Vessel transportation of construction material or potential disposal of dredged material could partly occur outside the Irving water lot, resulting in the temporary loss of access to certain fishing grounds. Irving would consult with fishers and regulators to select the most appropriate routes, lanes and corridors.

During operation, marine vessel traffic would consist primarily of the tankers and tugs but could also include maintenance equipment for the proposed pier. Designated shipping lanes, approaches (from the end of the shipping lanes to the pier), vessel turning basins and anchorages would be used. Fishers would be given advance notice of vessel arrivals and departures.

The decommissioning of the pier would have similar adverse effects as with its construction, such as vessel transportation and potential blasting/dredging to remove piles. Abandonment would result in positive residual environmental effects with new fishing grounds provided as a result of the removal of the pier.

Accidents, malfunctions and unplanned events, although unlikely, could potentially result in significant adverse environmental effects. LNG-related potential accidental events in Bay of

Fundy shipping lanes were determined to be not significant to the Marine Environment and therefore would not affect Commercial Fisheries beyond possible damage to any fishing gear on the water surface. Adverse effects may result in the unlikely event of a catastrophic Orimulsion® spill during off-loading at the pier, and accidental releases of other hazardous materials could result in the establishment of temporary exclusion zones around fishing grounds, taint shellfish or contaminate fishing gear. However, the EPP would contain spill response and contingency plans for the marine environment, and planned mitigation would reduce the potential for accidents to occur.

Cumulative effects of existing and Project-related vessel traffic, including marine traffic to Saint John Harbour and the Canaport monobuoy, could change the accessibility of fishing grounds for fishers and possibly damage fishing gear. However, planned mitigation (implementation of exclusion zones) would enable fishers to avoid loss of gear or damage. In periods of exclusion, fishers could pursue fishing elsewhere in their license area.

Compensation for lost or damaged fishing gear outside the exclusion areas will be considered on a case-by-case basis. No allowance will be provided to compensate fishers for lost or damaged gear within the exclusion zones.

Significance

The residual environmental effects on Commercial Fisheries, including cumulative environmental effects, are rated as not significant for all of the Project activities assessed. The exception is Accidents, Malfunction and Unplanned Events that could have significant adverse effects but are considered unlikely to occur.

Follow-up

Irving will make available to fishers all Project information that may relate to fishing on the Irving water lot for each phase of the Project. If a Fisheries Act authorization is required for the marine components of the project, follow-up monitoring with local fishers may be required. Annual reporting by Irving of Project-related claims to damaged fishing gear outside of exclusion zones and vessel traffic lanes may also be required, as well as monitoring to confirm predictions of the environmental assessment.

h) Health and Safety

Health and Safety was selected as a VEC primarily due to concerns about potential health and safety risks to the public and workers associated with potential LNG-related accidents, malfunctions and unplanned events, as well as those associated with emissions, and accidents involving personal injury (worker and public). Marine tanker and vehicle traffic-related accidents were also of concern.

A *significant adverse residual environmental effect* would occur where serious injury (e.g. permanently disabling) or loss of life could arise as a result of an accident, malfunction or unplanned event.

Environmental Effects Analysis

The environmental effects of the proposed Project on public and worker health and safety are determined largely by the proposed design of the facility as well as local atmospheric and weather conditions. Conventional activities of the Project are not expected to have significant Health and Safety effects, largely due to Health, Environment, and Safety Management System (HES management), inherent safety features and planned mitigation.

Construction activities would be conducted almost entirely within the Project footprint and members of the public would not have unsupervised access to construction sites. As such, the public would not be exposed to most activities that could otherwise affect Health and Safety.

According to the report, with planned mitigation the only potential Health and Safety effects would be as a result of Accidents, Malfunctions and Unplanned Events. During construction and operation, accidents could be associated with the increase in marine traffic and on-shore vehicle traffic. Road traffic related to the Project has been assessed elsewhere in the report, however, and its effects were determined not to be significant. During operation, the potential for accidents would also be related to the hazards inherent in the handling, storage and processing of LNG and, to a lesser extent, transporting and off-loading Orimulsion®.

Worker health and safety could potentially be affected by noise, dust, hazardous materials, and conventional construction hazards related to hoisting and rigging, working around heavy equipment, excavations, working at height, and welding and cutting. Dust, noise and combustible gases would be emitted at levels that are within regulatory limits and would be expected to result in effects on Health and Safety that are not significant. Worker accidents are addressed by protective legislation and regulations (e.g. Transportation of Dangerous Goods Act) as well as the Irving Health and Safety Plan, Marine Terminal Manual and HES management system.

This Project would be implemented such that all applicable regulations, codes and standards governing public and worker Health and Safety would be met.

Significance

The potential for significant environmental effects to occur on Health and Safety as a result of Accidents, Malfunctions and Unplanned Events would require a large release of LNG, such as a major marine spill or catastrophic failure of a storage tank. Although the environmental effects could be significant, such an event would be very unlikely given the safety record of LNG systems, the Project design, and planned mitigation for LNG spills.

Follow-up

Follow-up activities for each Project phase would be defined in the EPP and would be consistent with the overall Irving HES management system.

i) Land Use

The EIA focuses on potential changes to the use of lands adjacent to all Project areas with regard to property values, insurance and insurability, noise, visual aesthetics and risk of accidents. This includes lands adjacent to any off-site Irving-owned lands required for marshalling yards, as well as Red Head Road and the view from Mispec Beach.

A *significant residual environmental effect* is one where the proposed Project cause a change or disruption that restricts or degrades present land uses, such that the activities cannot continue at current levels and are not compensated for.

Environmental Effects Analysis

Many of the Project activities during construction and commissioning would potentially have environmental effects on current land uses, due largely to the fact that the proposed construction work would result in increased traffic to the Project site. Residential and public land uses in particular could be affected by air, dust and noise, emissions generated by construction equipment and increased vehicle traffic.

Site preparation activities (*i.e.*, clearing and grubbing, blasting, grading) would remove the vegetation in the immediate area of the LNG facility and temporarily disrupt vegetation on the pipeline RoW, as well as having the potential to create dust. The ground-breaking activities would be limited to the area proposed and required for the facility and the pipeline, and would not be expected to have an adverse effect on any aspect of the natural environment.

Current land use on some residential properties along Red Head Road could be temporarily displaced during trenching and pipeline installation, and access to some properties could be temporarily limited. Watercourse crossing with the pipeline could temporarily interact with recreational land use by temporarily restricting access to certain areas of the streams.

There would be long-term implications for Land Use along the RoW, as Federal and Provincial regulations limit some activities (e.g., excavation) within a certain distance of the pipeline in the interests of public safety.

The CSA Z276-01 Code prohibits certain types of land use around LNG facilities and requires exclusion zones for safety purposes. These are consistent with existing land uses.

There is public concern that the presence of the pipeline and LNG facility in the vicinity of homes could result in higher insurance rate and lower property values for homeowners. A recent study by the Interstate Natural Gas Association of America determined that there was no significant effect to sale prices of properties located along natural gas pipelines. A Regional representative of All State Insurance Company confirmed that proximity to industrial facilities (specifically LNG facilities) is not a factor they consider in determining homeowner insurance rates. All aspects of the Project would be constructed to conform with national and international codes and standards, including the establishment of exclusion zones around the facility and extensive safety measures, and the ability to use adjacent residential properties will not be compromised by the Project. The report concludes that it is not likely that insurance rates and property values would be adversely affected.

There is also a concern that the view of the proposed LNG storage tanks would detract from the natural beauty of the area and result in fewer visitors to Mispec Beach. The location of the tanks next to the existing tanks should minimize the visual impact, along with a 50-m tree buffer to mitigate the visual effect from Red Head Road. The tanks would be visible from most of the beach, although the view is distant (2.5 km away). The distant view of the proposed berth and tanker on the horizon would also be somewhat intrusive to the natural setting. The report notes that oil tankers have moored off Mispec Point since 1970 and have become a part of the visual fabric of Saint John's waterfront.

New tanker arrivals during the operation phase would increase marine vessel traffic, and could require safety exclusion zones that could restrict other uses of the marine environment. Other stakeholders and users of the Bay of Fundy and Saint John Harbour would be notified of exclusion zones and all other safety measures.

Activities related to the eventual decommissioning would be similar to those during construction, but less intrusive and the effect on Land Use not significant.

The potential for hazardous materials spills affecting Land Use is considered low, due to the nature of the Project and the planned preventative measures to be included in the EPP. This would be further mitigated by Contingency Plans to respond to such accidents and minimize any effects. Modelling of various accident scenarios has demonstrated that Land Use around the facility would be significantly affected only in the case of a catastrophic event, which is considered very unlikely to occur. The potential adverse environmental effects of an accident or unplanned event on Land Use are rated not significant.

The Canaport facility has been operating since 1970 and the current state of land use issues along Red Head Road and the Mispec area have developed in conjunction with that facility.

Significance

The residual environmental effects of the Project on Land Use, including cumulative effects, are rated as not significant.

Follow-up

No follow-up or monitoring is recommended in the report.

j) Archaeological and Heritage Resources

"Archaeological and Heritage Resources" refers to any physical remnants found on top of and/or below ground (including the sea floor) that inform us of past human interaction with the physical environment, including Architectural Site and Historic Places. Palaeontological resources (fossil-bearing rocks) related to the biophysical heritage are also considered.

Archaeological and Heritage Resources were selected as a VEC in recognition of the interest of potentially affected First Nations, the general public as a whole, and provincial and federal

regulatory agencies. The significance of environmental effects depends largely on the significance of the archaeological or heritage resources that may be affected.

A *significant adverse residual environmental effect* is a Project-related disturbance to or destruction of all or part of an archaeological or heritage resource considered by provincial regulators to be of major importance (due to its rarity, undisturbed condition, spiritual importance, or research importance) and that cannot be mitigated.

Environmental Effects Analysis

Archaeological and Heritage Resources are relatively permanent features of the environment, but are highly susceptible to ground-disturbing activities (e.g. construction activities) at any time of year. However, archaeological fieldwork to mitigate adverse effects is more easily carried out between late spring and early autumn when ground conditions are favourable.

The archaeological survey of the proposed Project area has identified certain areas where the potential exists for significant archaeological resources. It is generally recommended that an archaeologist test and/or review any such areas that appear as if they would be affected by construction activities, such as where the pipeline would cross a watercourse. The gravel beach terrace on the western edge of the Project property, in particular, has been identified as having high archaeological potential. At present, it is not anticipated that that it would be affected by construction. Once construction plans were finalized, it would be determined whether the beach and terrace at the northeast would be affected. If not, the report states that a buffer zone would be established during construction; if it would be affected then appropriate mitigation including archaeological testing should be carried out before disturbance.

There are three known shipwrecks off the Mispec coast, but their exact location has not been determined. Excavation work at the pier location has the potential to affect any shipwrecks in the Mispec area; however, no shipwrecks were observed in a review of photographs and video of this area of the sea floor undertaken as part of the marine habitat survey.

At this time it has not been determined whether any of the WWII bunkers or features at Mispec Point would be affected by the Project. Though part of the Saint John Defensive Network, a provincial Historic Site, these have not been well documented. Irving would conduct an inventory of the features before the Project commenced. If it appeared that any of these would be affected, officials of the provincial Heritage Branch would be kept informed as they have requested.

There is the potential for significant palaeontological resources in certain areas of bedrock within the vicinity of the Project. A palaeontologist would be given the opportunity to examine any bedrock excavated from the trench or RoW in these areas before it was disposed of or reburied. Geotechnical testing before construction would likely show where bedrock may be encountered along the pipeline route.

Accidents, malfunctions and unplanned events could significantly affect Archaeological and Heritage Resources but are considered unlikely to occur. Most accidents that would result in additional groundbreaking would take place within the pipeline RoW or at the LNG facilities, where the heritage survey had already taken place and where disturbance would have occurred

during construction. Forest fires and the failure erosion control features are considered unlikely with planned mitigation. Accidental spills requiring clean up are most likely to occur within the footprint of the RoW where vehicles and equipment would be used and parked. Due to precautions taken by contractors, spills tend to be infrequent and minor, requiring only limited groundbreaking in mitigation. Vehicle movement outside the RoW is not anticipated to have an adverse effect. The limits of the RoW and LNG facility would be clearly marked and an Environmental Protection Plan (EPP) would address what Project personnel should do if a heritage resource was unexpectedly encountered.

Significance

The residual environmental effects of the Project on Archaeological and Heritage Resources, including cumulative effects, are rated as unlikely and not significant.

Follow-up

Appendix G of the report states that if a suspected archaeological/heritage resource were encountered during construction, the procedures to be described in the EPP would be followed, including the cessation of construction activities in the area of the discovery and contacting the provincial regulating agency of archaeological resources.

k) Aboriginal Land and Resource Use

Aboriginal Land and Resource Use was selected as a VEC to evaluate any potential environmental effects on the current use of land and resources for traditional purposes by Aboriginal persons as required under the Canadian Environmental Assessment Act (CEAA).

A *significant residual environmental effect* on Aboriginal Land Use is any medium or long-term Project-induced change in the current use of adjacent land for traditional purposes by Aboriginal people or communities.

A *significant residual environmental effect* on Aboriginal Resource Use is a medium or long-term Project-induced change in the current use of resources for traditional purposes by Aboriginal people or communities.

Environmental Effects Analysis

The report states that given that there are no known current Aboriginal uses of land and resources in the assessment area, there are no known interactions of the proposed Project with this VEC. Therefore, the potential environmental effects are rated as not significant and no additional mitigation or follow-up is recommended, although Irving would continue to consult with the Union of New Brunswick Indians and other First Nations Groups.

l) Road Transportation Network

Road Transportation Network has been selected as a VEC of the proposed Project because of its importance to the safe transportation of the public and Project workers, and for timely emergency response. As well, the public has expressed concern that Project-related use of Red Head Road could affect the rate of erosion and loss of land near the shoreline. The EIA report focuses on the Red Head Road and its feeder roads, where Project-related traffic could leave the most substantive impact.

Note: the report used a measurement of traffic conditions as defined by the Transportation Research Board. Six levels of service are designated by the letters A to F, with A being the best traffic flow conditions and F being the worst.

Environmental Effects Analysis

During construction, a variety of land-based activities would require the transportation of equipment, materials and personnel to and from Canaport, and to access points along the proposed pipeline route. Similar transportation requirements would exist in decommissioning. During operation of the facility, Project-related traffic would be limited to personnel, deliveries, equipment transport and maintenance activities.

Construction traffic could affect road infrastructure. Irving Oil Limited would work with the City of Saint John to identify planned traffic and maintenance requirements, and would observe Provincial and City weight restrictions. Delivery of heavy material and equipment would be by marine transport where practical.

The Road Transportation Network is anticipated to operate efficiently during the peak construction phase, and throughout the life of the Project. Levels of service are expected to continue to remain overall at very good to excellent, with no significant delays and the lowest turning movement operating at level C. Irving would implement traffic management mitigation measures including car pooling, staggered shift hours, bussing, alternate transport for equipment, and employee awareness of speed limits.

During all phases, there would be a potential for Project-related traffic to be involved with vehicular accidents. Based on the predicted traffic volumes, there should be no significant increase in accident frequency or accident severity. Accidents that did occur would have a temporary environmental effect on traffic flow, especially during peak periods. Traffic flow would be disrupted and some delay experienced by motorists in the area.

Significance

The potential environmental effects of the Project on the Road Transportation Network, in all phases and overall, are rated as not significant.

Follow-up

The report recommends that traffic flow at the Bayside Drive/Red Head Road and Red Head Road/Canaport Access Road intersections should be monitored periodically during peak travel

periods. Minor adjustments to phasing/timings of the Bayside Drive/Red Head Road signal could be appropriate to reflect directional traffic flow. If delays were experienced at Red Head Road/Canaport Access Road during the Construction phase, a flag person could be used during the evening peak traffic flows.

m) Labour and Economy

"Labour" refers to direct employment by the Project as well as the indirect creation of jobs in other sectors.

"Economy" refers to the spin-off benefits to other sectors of the local and provincial economies from Project expenditures on material and services, as well as from the labour income generated.

A *significant adverse residual environmental effect* for labour is one that results in long-term negative changes to current employment statistics in the Saint John area or New Brunswick as a result of the Project.

A *significant adverse residual environmental effect* for economy is one that results in a long-term decline in economic activity in the Saint John area or New Brunswick as a result of the Project.

Environmental Effects Analysis

The report states that virtually all activities in all Project phases would result in employment and business expenditure. Benefits effected by direct and spin-off employment and contracting are determined using the Statistics Canada Input-Output Model Inverse Matrix Industry Sector Multipliers for New Brunswick.

The Project would create approximately 551 person-years of direct employment during the planned 42 months of construction. The preliminary estimate of the costs of all Project construction is $750 million. The direct labour income of $26.4 million would spin-off another $14 million in indirect expenditures from the personal consumption activities of the Project workers. Spin-off jobs in other industrial and service sectors of the economy are projected to be 257 person-years. Direct expenditures on materials, equipment and services of $362 million have been estimated, with an anticipated spin-off of another $211 million in indirect expenditures within the province.

Plant staff requirements through the operations phase have been identified as 20 employees per week, based on a rotation of five per shift, 24 hours per day and seven days per week. Over 30 years this comes to 600 person-years, which would spin-off 117 person-years of employment in other sectors. The full-time operations staff would either be hired locally or new residents would be brought into the area. In either case, with unemployment rates of 8.2% in Saint John and 10.4% in the province, these jobs should be filled easily without stress on the labour supply.

Decommissioning and abandonment of the facility would generate employment and expenditures on labour and work services, and would spin-off additional labour and expenditure activities in other sectors similar to those for the construction phase. The eventual closure of the Project facilities, however, would end the long-term employment associated with the operation and the

spin-off benefits. Accidents, malfunctions and unplanned events could result in temporary or permanent facility closures. Proposed mitigation for temporary or permanent closure includes temporary employment insurance and re-employment programs provided by federal and provincial governments. With such mitigation, the residual environmental effects on Labour and Economy are rated not significant.

Significance

The residual environmental effects of the Project on Labour and Economy are rated as positive for the Construction and Commissioning, and Operation phases, and as not significant for the Decommissioning phase. Temporary or permanent losses of operations jobs and economic activity could occur due to accidents, malfunctions or unplanned events, and the Project's eventual decommissioning. According to the report, these would not result in long-term negative changes in employment or a long-term decline in the economy of Saint John or New Brunswick.

Follow-Up

The report recommends that governments implement temporary employment insurance and re-employment programs, if and when required, to mitigate residual effects of decommissioning or an unplanned stoppage.

n) Vessel Navigation

The EIA report focuses on marine traffic in the shipping lanes (for LNG tankers) and in Saint John Harbour (both LNG and Orimulsion® tankers) from the end of the shipping lanes to the pier at the Canaport facility, as well as within the existing Irving water lot. The annual vessel activity for the Project is estimated at 80-120 LNG tanker arrivals per year and 14 Orimulsion® tanker arrivals per year.

A *significant adverse residual environmental effect* would occur where increases in marine vessel traffic would lead to a significant accident and subsequent release of the ship's cargo to the environment; or a long-term (greater than 1 year) or permanent change in established marine vessel routes; or a change in marine vessel access to areas normally available in the Port of Saint John.

Environmental Effects Analysis

Over the proposed 42 months of construction and commissioning, approximately 20-30 barge trips are estimated for delivery of construction materials. This low level of activity would not be expected to disrupt marine vessel movement. Pier construction is estimated to take 9 months, during which time an exclusion zone would protect marine vessels in the construction area. The level of marine vessel activity estimated for the Project's eventual decommissioning and abandonment would be similar to the construction and commissioning phases.

During Project operation, marine traffic would consist primarily of LNG tankers, Orimulsion® tankers and tugs, representing approximately 8% of overall commercial harbour traffic, although the increase in the traffic in the Canaport area would be considerably more since currently only

approximately 70 very large crude carriers and approximately 14 fishers use the area near Mispec Point. No other cargoes are contemplated for the pier at this time, and vessels will not be re-fuelled at the pier. An exclusion zone could be put into effect when a tanker approaches or is moored at the pier. Exclusion zones would be expected to fall within the existing Canaport water lot and be of 24-36 hours duration for each tanker arrival. Stakeholders *(i.e.*, local fishers) would be advised in advance of restricted access to the area. Irving has committed to dialogue with fishers in the vicinity of the pier on planned approaches and the timing of ship movements.

Project-related activities would result in a marginal increase in marine vessel traffic density in Saint John Harbour and the Bay of Fundy, with the intermittent exclusion of marine vessels from the immediate vicinity of the pier and within the existing Irving water lot. There could be a slight increase in transit time for vessels in the Canaport area and a potential for delays, but such an increase could be managed by the MCTS operated by the Canadian Coast Guard. Public and fisher access to areas which currently have unrestricted access would not change substantively, although there would be some restrictions on vessel movement for which advance notice would be given.

Safe management of marine vessel traffic in the Port of Saint John and in the Bay of Fundy is well established, and governed by proven shipping policies and procedures. The LNG and Orimulsion® shipping industry has an excellent safety record, which is detailed in the EIS report, and rigorous criteria would be used to select the tankers that would deliver to the pier. Crews and operators would be trained to high standards, and officers selected for Orimulsion® tankers would be proficient in both English and the predominant language of the crew.

Marine vessel traffic accidents are potential but unlikely to result from Project-related activities at any phase of the proposed Project. The report states that any such accidents would cause only a temporary loss of access or alteration of navigation routes as a result of exclusion zones established in response to potential leaks or spills.

A catastrophic failure of a LNG tanker or LNG containment in a tanker is not considered a credible event given the design of the LNG tankers and their marine safety record, and the mitigation planned for the shipment of LNG. LNG and Orimulsion® accidents and spills of the magnitude to potentially affect marine vessels in the Port of Saint John are considered highly unlikely to occur.

The increased Project-related tanker traffic would have the potential to interfere with shipments of crude oil to the Canaport facility and with Orimulsion® to the pier. However, the Coleson Cove Generating Station Conversion EIA concluded that there would be no effect of Orimulsion® shipments on marine vessel traffic. The largest potential cumulative environmental effect would be related to crude oil tanker traffic to the Canaport monobuoy during operation.

The Canaport facility is also owned and operated by Irving Oil Limited, and crude oil shipments to Canaport have been safely received since 1970: a high level of cooperation would exist between the Canaport and the Project, and communication protocols and procedures are already well established. The nominal increase in tanker traffic associated with the Project would not result in unmanageable environmental effects to Vessel navigation. It should be noted that

pilotage is provided for all crude oil tankers and would be provided for LNG and Orimulsion tankers by the Atlantic Pilotage Authority/ Saint John Harbour Pilots.

Significance

The residual environmental effects of the Project on Vessel Navigation, including cumulative environmental effects, are rated not significant.

Follow-Up

As referenced in Appendix G of the report, a Marine Terminal Manual would be prepared in consultation with the Saint John Port Authority, APA/Saint John Harbour pilots, the Canadian Coast Guard and Transport Canada. It would outline the specific procedures for managing marine vessel traffic in Saint John Harbour and at the pier, including the establishment of exclusion zones. Monitoring or follow-up programs are not proposed. A follow up program may be a requirement of the Navigable Waters Protection Act approval for the construction – operation of the marine terminal. As well, Irving has proposed to consult with stakeholders (e.g. fishers) of routes and exclusion zones.

o) Effects of Environment on Project

The definition of "environmental effect" under the Canadian Environmental Assessment Act (CEAA, Section 2(1)) includes "any change to the Project that may be caused by the environment." The types of environmental activities that could have an effect on the Project include severe weather, climate change, Red Head Road slope stability, acid rain/acid fog, and forest fires.

A *significant residual effect* of the environment on the Project would be one that would result in:

- a long-term interruption in service;
- a substantial loss of the Project schedule;
- damage to infrastructure such that public health and safety is at risk; and/or
- damage to infrastructure that would not be technically or economically feasible to repair.

Effects Analysis

Materials specified for construction of the Project would comply with all applicable Codes and would maintain structural integrity under the anticipated conditions of weather and climate, including the corrosive effects of long-term exposure to salt sea spray.

High winds, dense fog, rain or snow could potentially affect the transfer of fuel at the pier. If sea conditions did not allow safe operation, tankers would not be allowed to dock or remain but would be dispatched to Port of Saint John anchorages.

Construction activities related to the Project could also be postponed; however, the proposed schedule does allow for weather conditions typical for the region. The EPP would include

provisions for site drainage and sedimentation and erosion controls to mitigate the effects of flooding.

A section of the Red Head Bluffs has a history of erosion and slope failure. The City is aware of the potential for effects on residential land use and the Red Head Road and is contemplating construction of a bypass road but has no plans to proceed. The report states that given that the instability exists on a City road, Irving Oil Ltd. cannot reasonably be expected to be responsible for property damage that may occur as a result of this pre-existing condition.

The predicted temperature increase resulting from Climate Change would not result in an effect of the environment on the Project. Although there is the potential for a slight increase in the number of delayed transfers resulting from an increase in storm events or storm duration, the increase in precipitation would not be a limiting factor in Project operations. The marine terminal would be designed to account for the maximum predicted increase in mean sea level, while land-based Project facilities would not be expected to be affected.

Significance

Professional engineers would design the Project to withstand the effects of the environment, applying good engineering practices and various Codes and Standards. The environment could potentially affect construction activities, fuel transfer, and natural gas send out; however, flexibility in scheduling is considered adequate to address these concerns. While an earthquake with a magnitude substantively greater than the design-base earthquake for the structures could have a significant effect, it is extremely unlikely. Overall, given the planned mitigation measures, all residual effects of the environment on the Project are predicted to be not significant.

5. CONCLUSION

Based on the results of the environmental impact assessment, the report concludes that the Project would not result in likely significant adverse environmental effects following the application of identified mitigation.

The complete EIA report is approximately 775 pages long (not including appendices) and contains extensive detailed information, maps and tables. For those interested in reviewing the full EIA report, copies have been placed at the locations indicated below:

- Department of Environment and Local Government, 20 McGloin Street, Fredericton, NB
- Department of Environment and Local Government, 8 Castle Street, Saint John, NB
- Bayview Convenience, 1197 Red Head Road, Saint John, NB
- Care Centre, McAllister Place, 519 Westmoreland Road, Saint John, NB
- City of Saint John, 15 Market Square, 10th Floor, City Hall, Saint John, NB
- Saint John Regional Public Library, 1 Market Square, Saint John, NB
- SNB Centre – Saint John, 15 King Square North, 1st Floor, Saint John, NB

6. OPPORTUNITIES FOR PUBLIC COMMENT

Following the release of EIA documentation for review, the public is invited to comment on the report and attend the public meeting which is scheduled as follows:

JUNE 29, 2004 beginning at 7:00 PM
At the SIMONDS LIONS AUDITORIUM
185 Loch Lomond Road, Saint John, NB

To register to make a presentation at the public meeting, please contact the Department of the Environment and Local Government (DELG) at (506) 453-3700 (collect). The public meeting will also provide opportunity for general comments.

To submit written comments, which should be received on or before July 14, 2004 or 15 days following the date of the public meeting, please forward them in the official language of your choice to:

Project Assessment Branch – Irving LNG Project
C/O the Department of Environment & Local Government and the Canadian Environmental Assessment Agency
P.O. Box 6000 (20 McGloin Street), Fredericton, NB E3B 5H1
Tel: (506) 444-5382, Fax: (506) 453-2627, Email: EIA-EIE@gnb.ca

At the end of this period, a summary of public input will be prepared and made available to the public. At any time after this date, the provincial Cabinet may make a decision relevant to the Project.

7. CONTACT INFORMATION

- For further information concerning the EIA process, please contact:
  Germaine Pataki-Theriault, Project Manager
  Project Assessment Branch, Department of the Environment and Local Government
  P.O. Box 6000, Fredericton, NB E3B 5H1
  Telephone: (506) 444-5382, Fax: (506) 453-2627, Email: germaine.pataki-theriault@gnb.ca

- For further information regarding the public consultation process, please contact:
  Michelle Daigle, Public Consultation Coordinator
  Educational Services Branch, Department of the Environment and Local Government
  P.O. Box 6000, Fredericton, NB E3B 5H1
  Telephone: (506) 453-3700, Fax: (506) 453-3843, Email: michelle.daigle@gnb.ca

- For further information on the proposed LNG Project, please contact:
  Michael Hanrahan
  Irving Oil Limited
  Saint John, New Brunswick E2L 4H6
  Telephone: (506) 202-2000, Fax: (506) 202-3121

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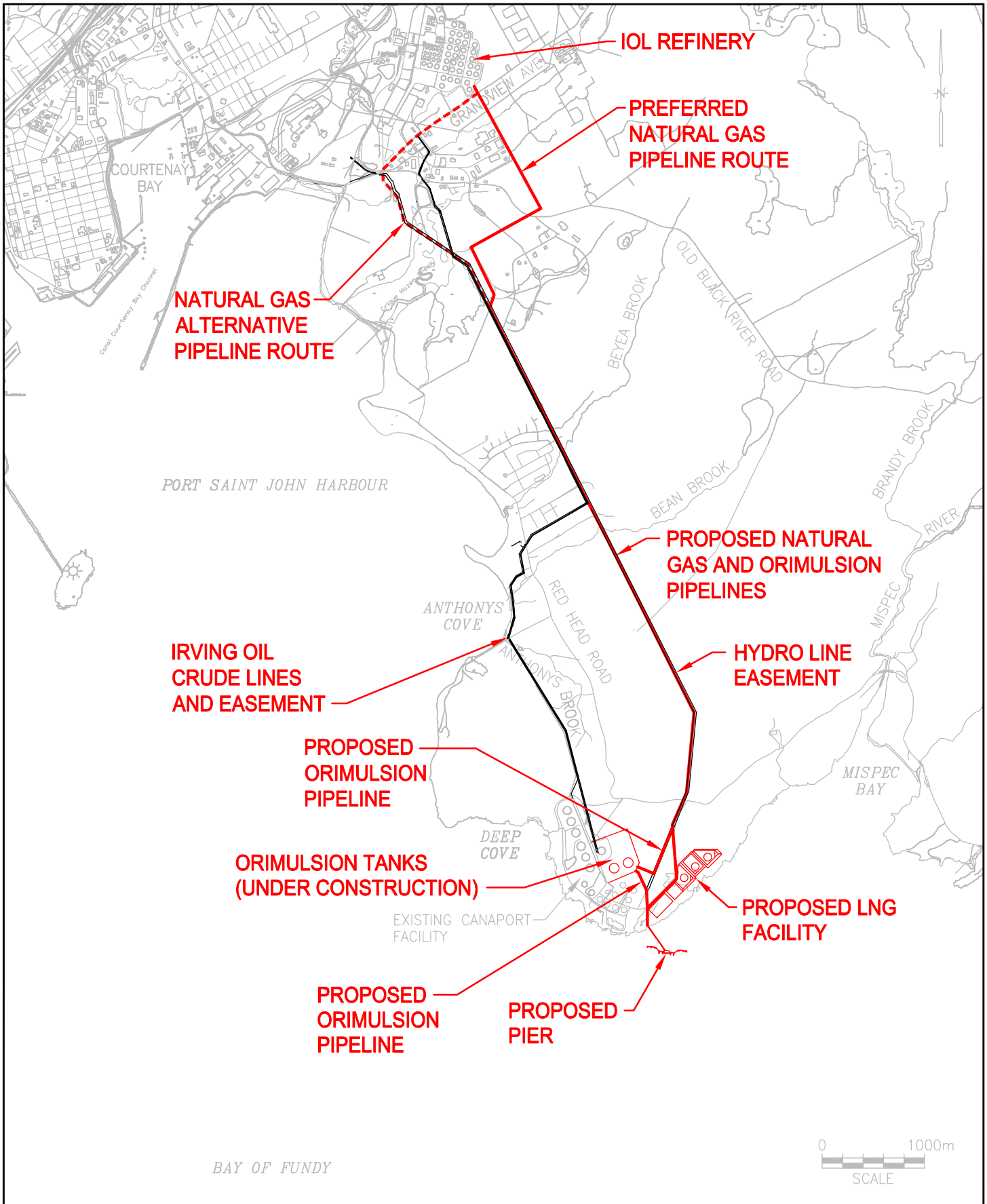

GENERAL ARRANGEMENT OF KEY PROJECT FEATURES CANAPORT LNG PROJECT

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Jacques Whitford
Consulting Engineers
Environmental Scientists