2.0 PROJECT PLANNING

The planning that will guide the development, design, Construction, Operation, and overall execution of the Project is described in this chapter.

First, a brief history and overview of the petroleum refining industry provides the historical and market context for the Project. Next, the principles to be followed and approach of the Proponent for the design, Construction and Operation of the Project are described. These lead to the elaboration of the purpose, rationale and need for the Project, alternatives to the Project, and technically and economically feasible alternative means of carrying out the Project. The Project schedule, including a discussion of the Proponent's plans with respect to the pace and sequence of Construction activities, is presented. Finally, the environmental management initiatives and practices and procedures that will be used to reduce environmental effects of the Project are outlined.

2.1 History and Overview of the Petroleum Refining Industry in North America

The first commercial oil well was hand dug at Oil Springs, Lambton County, Ontario, Canada in 1858 (OSHA 2003), followed closely by the first well drilled in the United States in 1859 at Titusville, Pennsylvania. The first refinery was opened two years later in 1861 at McClintocksville, Pennsylvania to refine crude oil into kerosene.

Petroleum refining has evolved considerably since those early years in response to changing consumer demand for better and different products. The original product of refineries, kerosene, was produced as a cheaper and improved source of lamp fuel compared to the previous standard, whale oil. The development of the internal combustion engine in the late 1800s led to the requirement to produce gasoline, and later diesel fuel. The evolution of the airplane created a need first for high-octane aviation gasoline, and then for jet fuel. Today's modern refineries have evolved through engineering and optimization to produce a wide variety of products to meet consumer demand, including among many others, gasoline, diesel, jet fuel, propane, butane, fuel oil, coke, and asphalt.

Since the first commercial refinery, the petroleum refining industry has continuously evolved to respond to market demand for different products and to adapt to developing environmental regulations and policies. Throughout its history of well over a century, the petroleum refining industry has been developing and improving its safety performance and process efficiencies. Advances in refining and environmental control technologies have made today's refineries the cleanest since their inception.

The United States is the largest producer of refined petroleum products in the world (Energy Information Administration 2008a). At the end of 2000, the United States had 150 operating refineries with a total combined capacity of 2.6 million m^3/d (16.6 million bbl/d) (Energy Information Administration n.d.).

There are 18 refineries operating in Canada with a total combined capacity of about 334,000 m^3/d (2.1 million bbl/d) (NEB 2008). Historically, Canada has been a net exporter of gasoline and middle distillates (jet fuel, heating oil and diesel), exporting amounts in excess of Canadian requirements.

2.1.1 North American Supply and Demand Forecast

North America is presently experiencing a shortage of petroleum refining capacity (Competition Bureau 2005). The last refinery to be built in the United States was in 1976 (US House Committee on Energy and Commerce 2006), and in Canada, in 1984. Although many expansion programs over the last decades have increased the capacity of existing refineries in North America, the added supply has not kept up with the increased demand. Much of the North American supply of refined petroleum products is from the United States Gulf Coast, with many large refineries in Texas, Louisiana, Alabama, and Mississippi. In recent years, some of these refineries have been affected by severe weather events (*e.g.,* hurricanes Katrina and Rita) which exposed the vulnerability of the eastern North American supply of refined petroleum products to such events.

Canadians consume more than 40 billion litres of gasoline each year, and consumption has been increasing at an annual rate of about 1.5%. As of the end of 2007, Canada had 18 refineries operating across the country, supplying approximately 7,000 branded retail outlets with transportation fuels, and exporting a substantive proportion of their production to other markets (CPPI n.d.).

As a net exporter of refined petroleum products and crude oil, most of Canada's exported petroleum products are transported to the United States (Energy Information Administration 2008a). World energy consumption is expected to increase by 50% between 2005 and 2030. World use of petroleum products is expected to increase by approximately 34% during that same time period (Figure 2.1) (Energy Information Administration 2008b).

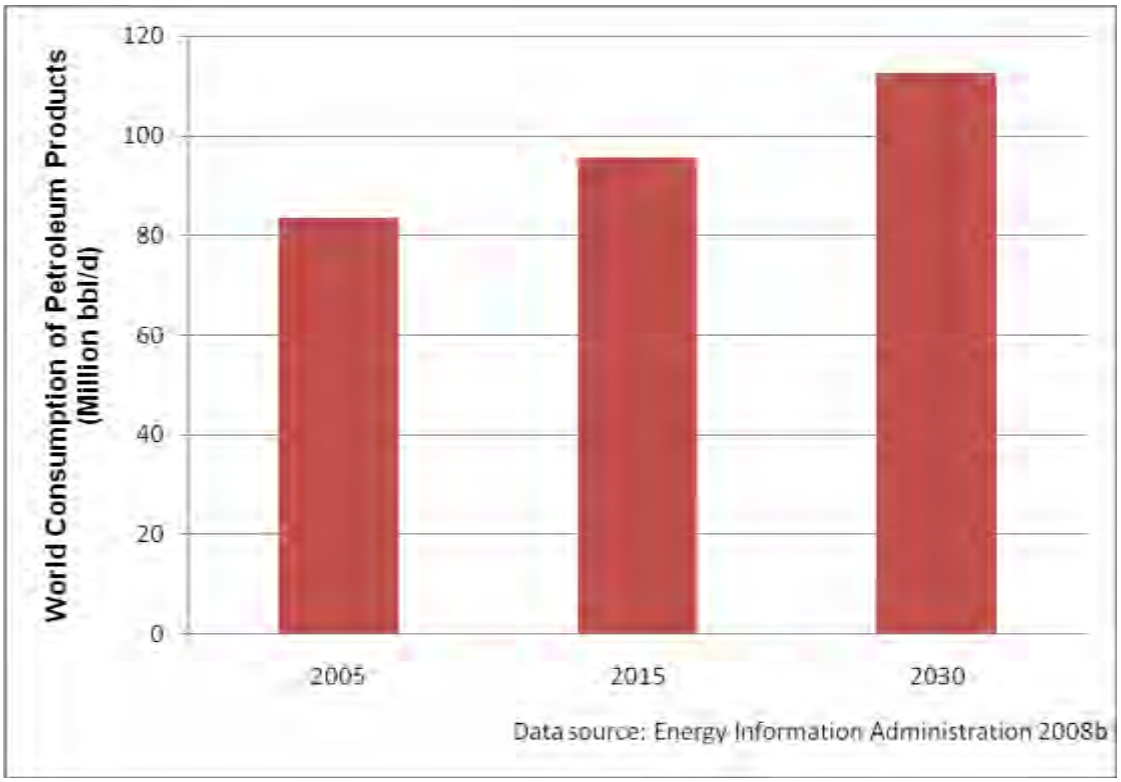

Figure 2.1 Forecast of World Consumption of Petroleum Products, 2005-2030

The Project would increase the reliable supply of petroleum products to the North American and world markets. In the eastern United States, the primary market for the majority of the Project's output,

petroleum consumption was 6.5 million barrels per day in 2005 (Energy Information Administration 2005). Although rated at 40,000 m^3/d (250,000 bbl/d), the Project would produce up to 48,000 m^3/d 300,000 bbl/d) of petroleum products, or nearly 4.6% of the 2005 consumption of the eastern United States. By producing such products in Saint John, outside of the major hurricane prone areas area of the Gulf of Mexico, the Project would increase the reliability of supply of refined petroleum products for North America.

2.2 Irving Oil – A Tradition of Quality and Refining Expertise

Irving Oil was founded in 1924 by K.C. Irving in Bouctouche, New Brunswick. Irving Oil grew steadily over the next several decades, eventually leading to the construction of its first refinery in Saint John to supply products for the network of gas stations the company had built throughout Atlantic Canada and Québec. The existing Irving Oil Refinery in Saint John began operation on July 20, 1960 with a capacity of 40,000 bbl/d. In 1970, Irving Oil opened the first deep-water marine terminal in the western hemisphere, the Canaport terminal at the entrance to Saint John Harbour. The capacity of the existing Saint John refinery has expanded over time, in the 1970s and again in the late 1990s. It is currently the largest refinery in Canada, with a rated processing capacity of 250,000 bbl/d of crude oil, but producing approximately 300,000 bbl/d of finished products.

Irving Oil has a track record of continuously enhancing its operations and refining process to produce environmentally responsible petroleum products, often ahead of regulatory requirements. Irving Oil has led the Canadian petroleum refining industry in environmental management. In 1977, it was the first Canadian company to remove lead from its high-octane gasoline. In 1999, Irving Oil became the first to market low-sulphur gasoline, five years before regulations were in place. In 2002, the company's low-sulphur gasoline averaged 45 parts per million (ppm) of sulphur, which was 84% lower than the Canadian industry average. It was the first Canadian refinery to offer low sulphur diesel, again ahead of regulations. Irving Oil was also the first Canadian oil company to own and operate double-hulled tankers, which bring crude oil to Saint John and deliver finished product to the company's marketing region.

Continued investment has always been important to Irving Oil. In 1998, the company invested over C$1 billion in its "King of Cats" refinery upgrade project, during which a large residue fluid catalytic cracking unit was installed. The upgrade was aimed at shifting the refinery's production to higher-value transportation fuels, while enhancing environmental performance and efficiency.

The commitment to enhanced environmental performance and products has resulted in a number of national and international awards for Irving Oil, some of which are listed below.

- In 1999, Irving Oil received the Betz Dearborn Return on Environment Award, a global award based on the company's commitment to environmental performance and economic excellence.
- In 2001, Irving Oil received the Canadian Council of Ministers of the Environment (CCME) Innovations Award, in recognition of Irving Oil's Auto Makers' Choice low-sulphur gasoline, a gasoline that also brought it the Maine Coalition for Sustainable Development Clean Energy Award in 2000.
- The Canada's Climate Change Voluntary Challenge and Registry (VCR) Gold Status Leadership Award recognized Irving Oil's voluntary efforts to reduce greenhouse gas emissions since 1999.

- In 2003, Irving Oil became the first oil company to win a United States Environmental Protection Agency (US EPA) Clean Air Excellence Award, in recognition of the outstanding and innovative efforts to make progress in achieving cleaner air, because of its production of low sulphur gasoline ahead of regulation.
- The magazine World Refining named Irving Oil the 2004 Refiner of the Year, in recognition of its activities that best exemplify the attributes of a successful refiner, including technological development and environmental stewardship.

Since the existing Saint John refinery first opened in 1960, safety has been at the forefront of its operation. Safety policies, procedures and employee training have continuously evolved and improved as new technologies and innovations were developed. With over 48 years of experience operating a petroleum refinery in Saint John, and over 38 years of operating a deep water marine terminal in Saint John, Irving Oil has become a leader in environmental and safety best practices. Irving Oil has been and continues to be an industry leader in environmental performance, innovation, and continuous improvement, and continues to demonstrate its experience, excellence, and expertise in the highly competitive North American petroleum refining and distribution market.

Irving Oil continuously works to stay at the forefront of refining technology and environmental performance. The existing Saint John refinery has a similar capacity to that proposed for the Project, and throughout its refining history, Irving Oil has proven itself as an industry leader in environmental performance and safe, efficient operations. Despite its relatively small presence in the North American and global petroleum market compared to other industry giants (*e.g.,* Exxon-Mobil, Valero, BP), through its experience and expertise, long-term approach, and commitment to the region, Irving Oil continues to demonstrate that it can play a key role in the North American refining industry as a reliable, stable, quality and progressive supplier of refined petroleum products.

2.3 Project Commitments

Since the conception of the Project, Irving Oil committed to developing a new, world-class refinery and marine terminal that will build on its past performance in operating the existing Saint John refinery, and lead the industry in safety, operational efficiency, and environmental stewardship.

Comparisons between refineries are very challenging, as each refinery is relatively unique. Refineries have different configurations, capacities, and efficiencies from one refinery to the next. They use different inputs, refine a wide range of different crude slates, produce different products, and other factors that may influence their individual performance, reliability, and environmental footprint. These and other factors make it very difficult to make a direct comparison of environmental performance (including emissions).

The Project will be a high conversion refinery that produces high-end transportation fuels from heavier feedstocks than those normally refined by most Canadian refineries. To this end, the Project will incorporate several key features that include:

- The refining of heavy sour crude oil, as opposed to typical lighter sweet or sour crudes processed currently;
- The use of coking technology for refining crude oil to maximize conversion, as opposed to the more conventional catalytic cracking processes that result in medium conversion;
- The use of a large hydrocracker to maximize diesel fuel production;

- The use of a large hydrogen plant for producing hydrogen for the hydrocracker; and
- The use of an on-site cogeneration plant to produce steam and electricity used by the Project, rather than conventional steam generating boilers and purchasing electricity from the electrical grid.

These features of the Project, including its feedstocks, products, technologies, and configuration, as well as other factors make it challenging to make a direct comparison of its performance (including environmental performance) to the existing Saint John refinery or other refineries in North America. Nonetheless, the careful planning, design, selection of technologies, planning, construction and operation of the Project will contribute to the Proponent's objectives of developing the Project in a sustainable manner while achieving its business objectives.

To this end, the Proponent has developed and planned the Project with a number of commitments in mind. Specifically, a successfully designed and constructed Project Eider Rock refinery will:

- Be readily adaptable to the changing global market;
- Result in a minimal environmental footprint in air contaminant and greenhouse gas emissions, water use and wastewater release, and energy use, on a per unit basis of output delivered to the customer;
- Use the best available proven technology that is economically achievable for environmental performance and reliability;
- Incorporate human factors such as lighting, ergonomics, health, and general worker well-being into the design, to enhance the lives of Project workers and, after start-up, operational personnel; and
- Support the economic, environmental, and energy goals of New Brunswick and its people.

Several principles form the Project commitments, which will guide all stages of the Project. Elements of the Irving Oil commitments in respect of the Project are described in the following subsections.

Safety

A safety culture and value system, as has been created at the existing Saint John refinery, will be adopted during the Project. A total recordable injury frequency of 0 has been targeted. The Project will be designed as a fit for purpose, reliably operable, and safe facility. Safety will be at the forefront in every design decision and building safe operation into the facility design is a central engineering objective. The Project designers will use safety in design methodologies and design standards to ensure the facility will be operated and maintained safely. The implementation of process safety management and other operational, safety, reliability, and preventative maintenance processes and practices will assure its operation is as safe as it can be.

Safety features will be incorporated into every aspect of the design of the Project. The Project will be designed with the best available proven technology that is economically viable, and reliability and process safety by design will be incorporated in every aspect of its design, Construction, and Operation. Control systems, sensors and monitors will have redundancy incorporated into their design, and monitoring systems will have back-up. Equipment will be selected to meet strict design codes and standards, and a Quality Assurance system will be implemented to ensure that the final design meets those standards. Hazards and Operability (HAZOP) analysis (a process safety management tool) of the design will provide an additional level of assurance against the potential for process upsets and unintentional releases.

Safety in design is paramount, and revolves around the following concepts:

- Consistency in engineering to achieve low risk designs;
- The development of designs that follow industry recognized standards;
- Adherence to all regulations and codes;
- Satisfactory resolution of all risk mitigation issues; and
- Safety in design and execution according to a plan.

The design engineers for the Project will conduct a Layers of Protection Analysis (LOPA). LOPA is another process safety management process for assessing risks of one or more hazard scenarios, and is completed following the HAZOP analysis. LOPA determines whether adequate safeguards are in place, or if more are needed. These key principles and practices in process safety management will assist in designing the Project in a manner that prevents safety and reliability concerns, rather than correcting them after the fact.

The selection process for contractors and licensors will include an evaluation of current safety practices and innovations to help to ensure that all Project personnel place the highest value on safe operations.

In all phases of the Project, and with respect to all Project components, safety will not be compromised because of schedule or cost considerations.

Environment

The Proponent is committed to demonstrating continued leadership in environmental performance. As with the existing Saint John refinery, the Proponent will continue to lead by example in the application of Best Available Proven Technology that is economically viable for environmental control units and by managing its operation in a sustainable manner. Specifically, individual technologies will be selected that are:

- Best, for the protection of the environment and society as a whole;
- Available, to allow implementation, under economically and technically viable conditions, taking into consideration cost and benefits of the technology;
- Proven, by existing units in use in a similar service and of similar size to the unit proposed for the Project; and
- Economically viable, among technologies that serve a similar purpose.

The selection of individual technologies that are best, available, proven, and economically viable will contribute to the Project being best in class, providing superior refining performance in comparison to similar refineries that process similar crudes and produce similar products in a similar environment. The selection of technologies will be based on a unit by unit evaluation of the safety, reliability, refining performance, environmental performance, and economics of the various technologies. The units that are individually determined on their own as being the best available proven technology economically viable will be selected to form part of the Project, and the collection of these best in class units will form a best in class refinery. Thus, in this context, it is important to note that best in class does not necessarily mean lowest emissions compared to other refineries, but rather incorporates these other factors.

Furthermore, criteria used to select technologies will include:

- Proven operation;
- Proven reliability;
- Long-term viability, taking into account the existing facilities and planned development;
- Cross-media impacts including material use, energy use, emissions, and noise; and
- Economic viability.

Emissions from the Project will be reduced through responsible design, equipment selection, and environmental management. In addition, the Project will be designed to balance the use of energy efficient technology to lower the potential generation of greenhouse gas emissions, and will be constructed so that it has options for future carbon capture and sequestration, or conversion ability for the emission of greenhouse gases through technology advancements or environmental innovation. Alternative means of carrying out key portions of the Project are being considered in an effort to reduce the anticipated demand on natural resources (*e.g.,* alternatives to reduce water consumption).

Public, Stakeholder, and Regulatory Engagement

The Proponent will continue to be proactive in its engagement of the public, neighbours, stakeholders and government agencies. The communication will be frequent, open, inclusive and transparent, and will occur directly with stakeholders through speaking opportunities, stakeholder engagement, and one-on-one discussions, as well as through the news media. Public/government relations will focus on ensuring stakeholder engagement is effective and providing regular Project updates to stakeholders and government agencies locally, provincially, and nationally. The Proponent firmly believes that all public, stakeholder and government relationships appreciate over the long-term, and it is committed to effectively communicating with stakeholders, including neighbours to the Project. The Project engagement and consultation program is described in more detail in Chapter 4.

Innovation and Creativity

Innovation is the ability to generate ideas and solutions to pressing problems, or producing new opportunities that have value. Creativity is the ability to take that new idea and make it valuable. Innovation and creativity are highly valued attributes for the design phase of the Project. Unique sources of value for the Project will be sought out, identified, and investigated to enable the best Project performance possible.

The Proponent has hired external expertise from the Rocky Mountain Institute to assist with incorporating innovation into the Project. This third-party is essentially reviewing the refining process, to help identify more effective or efficient ways to refine oil. This process will challenge past assumptions and practices. Using these external experts, one of the Proponent's goals is to achieve better energy efficiency and environmental performance.

2.4 Project Purpose

The purpose of the Project to be assessed under the New Brunswick *Environmental Impact Assessment Regulation* is to build and operate a petroleum refinery with a rated nameplate capacity of 40,000 m^3/d (250,000 bbl/d, nominal) for crude oil processing, and associated land-based and marine-

based infrastructure in Saint John, New Brunswick, for supplying refined petroleum products to the North American market and elsewhere.

2.5 Rationale and Need for the Project

The Project is intended to achieve the following outcomes:

- Increase the scale and complexity of Irving Oil's existing petroleum refining and distribution infrastructure in Saint John, thereby protecting the existing Saint John refinery from future economic risks;
- Supply incremental ultra-low sulphur gasoline, diesel fuel, and other products for the North American market and elsewhere;
- Increase the reliability of supply of refined petroleum products for the North American market;
- Support the development of an Energy Hub in New Brunswick;
- Contribute to and preserve existing economic prosperity by creating and maintaining employment and related economic spin-off activities of existing and proposed facilities;
- Support the Province of New Brunswick in its goal of achieving self-sufficiency by 2026, by providing the key components of a sustainable and fiscally stable future for New Brunswick; and
- Maintain long term viability of the existing refinery.

The Project would increase the reliable supply of petroleum products to the North American and world markets. By producing such products in Saint John, outside of the areas that are prone to hurricanes and other severe weather, the Project would increase the reliability of supply of refined petroleum products for North America to meet increasing energy demands. Combined with the operation of the existing Saint John refinery, the Project will create value for the production of clean petroleum products for markets from heavy crude oil. Such an investment will provide a more robust and efficient refining infrastructure in Saint John, thereby taking advantage of economies of scale and protecting the Proponent's existing refining assets from potential downturns in the economy that could otherwise result in economic risks during periods of slowed economic growth.

Substantive efforts have been made by the business community in Saint John in recent years to establish the region as an Energy Hub for Atlantic Canada. The Government of New Brunswick has expressed its support for developing the Energy Hub. The goal is for New Brunswick generally, and the Saint John area specifically, to become a major centre for the supply of energy in northeastern North America, whether in the form of electrical power, natural gas, or refined petroleum products, to the growing eastern North American market. The Energy Hub provides opportunities and momentum for existing and new companies to grow and work together, which in turn, supports a market for technical companies (*e.g.,* engineering, design, fabrication, and others) and supporting services (*e.g.,* hospitality, logistics, transportation, and real estate). New Brunswick is ideally suited to the task, having substantive existing technology, assets, infrastructure, and skills to fuel this expanding market. Energy is specifically targeted as one of the priorities in the Saint John Growth Strategy developed by Enterprise Saint John (Saint John Board of Trade 2005). The development of a new refinery and associated infrastructure in Saint John will support this development.

Importantly, as mentioned in Section 1.2, the Project will contribute to the self-sufficiency and sustainability goals of the Government of New Brunswick by creating jobs, generating income and tax revenue, and increase provincial gross domestic product during Construction and Operation.

In summary, the Project will secure the existing and future refining infrastructure in the region, contribute to and maintain economic prosperity in the province, support the further development and stability of the Energy Hub, and increase the supply of ultra-low sulphur gasoline and diesel fuel for the North American market. The Project, playing a major part in the establishment of an Energy Hub in New Brunswick, is a key component of a sustainable and fiscally stable future for New Brunswick.

2.6 Alternatives to the Project

The Proponent has considered the "Null" or "Do Nothing" alternative, alternative energy supply, and other alternatives to the Project to meet the requirements of the Final Guidelines and EA Track Report. These are discussed below.

2.6.1 "Null" or "Do Nothing" Alternative

The Final Guidelines and EA Track Report require that the "Null" or "Do Nothing" alternative be considered. The Null alternative would involve not building or carrying out the Project as originally conceived and described in the EIA Registration/Project Description. The null alternative would obviously not result in environmental effects, positive or adverse. Given that the potential adverse environmental effects of the Project are not likely to be significant (Chapters 7 to 23), and while the positive environmental effects are substantial, those positive outcomes would not be realized. The Project is critical for the long term management of business risk for Irving Oil. Failure to diversify, grow and adapt to changing crude supplies and product needs could potentially compromise the company's future viability. Not proceeding would undermine efforts of the Province to achieve self-sufficiency and to realize and grow the Energy Hub.

As such, the Null alternative is not a reasonable or viable alternative to the Project and does not meet the Project purpose as described in Section 2.4, and it is not considered further in this EIA Report.

2.6.2 Alternative Siting

The Project could conceivably be sited elsewhere in east Saint John; Saint John; New Brunswick; or elsewhere. At the onset, the Proponent focused its siting efforts to east Saint John for carrying out the Project. Site locations outside of east Saint John were not considered viable because the Proponent's existing refining and related infrastructure is located there. Many commercial synergies between the Project and existing infrastructure in Saint John would not be possible by locating the Project elsewhere. It would not improve and likely adversely affect the economic feasibility of the Project if the land-based Project components were located at a distance from the existing single buoy mooring (SBM), which, along with the Project marine terminal, will be used to unload crude oil.

Other locations within east Saint John for carrying out the Project were reviewed and evaluated by Irving Oil through engineering pre-feasibility work. Initially, three areas were under consideration for locating the Project: Grandview Avenue, near the existing Saint John refinery; Black Point; and Red Head Mountain. In the review of these possible sites, environmental, socio-economic and engineering attributes were identified, and a review of aerial photographs, topographic mapping to various scales,

hydrological maps, property and zoning maps, and other existing anthropological and ecological data was conducted to assist in this regard. It was determined the neither the Grandview Avenue, Black Point or Red Head Mountain sites alone would not be suitably sized for building a 40,000 m^3/d refinery. There are no other sites in Saint John that are economically and technically feasible for the siting of the Project.

Given this, building the Project at other locations would not meet the Project purpose as described in Section 2.4. Accordingly, alternative locations to Saint John were not considered further in this EIA Report.

2.6.3 Alternative Energy Supply

Some stakeholders have suggested that a new petroleum refinery should not be built, but instead, the Proponent should explore alternative sources of energy generation. In general, there is increasing public concern and awareness with respect to climate change and sustainable development. Related to this is an emerging market demand for alternative energy sources that do not use carbon-based fuel or result in greenhouse gas emissions. To further this objective, the Proponent is currently exploring tidal power generation possibilities in the Bay of Fundy, and wind power electrical generation in various areas of New Brunswick. These initiatives are, however, separate from Project Eider Rock.

As discussed previously in Section 2.1, however, there exists a continued and growing North American demand for petroleum products in the North American market and elsewhere, and a limited or shortage in supply of these products to satisfy this demand. While alternative energy sources such as hydro, wind, solar and tidal energy play a key and growing role in satisfying a portion of the energy demands for this market, it is very unlikely that consumer demand for petroleum products will decrease in the next few decades. The North American population will continue to use these products for several decades, according to current forecasts, and new refineries will be required for North America to meet this growing demand, despite a growing movement to more sustainable alternative sources of energy and energy conservation. Further, the increasing trend toward refining of heavier crude oil requires facilities that are designed to be able to refine these heavier crudes. The Project is thus ideally positioned to meet this demand and provide the supply in an environmentally responsible way.

As such, while alternative forms of energy may assist in supplying a portion of the current and future energy needs of the region, they are not a feasible alternative to the Project, but rather complement the Project in the reliable, diversified, and sustainable supply of various forms of energy to the eastern North American marketplace. Given this, alternative energy supply will not be considered in this EIA Report.

2.6.4 Other Alternatives to the Project

No other alternatives to the Project are considered as they would not meet the Project purpose as outlined in Section 2.4.

2.7 Alternative Means of Carrying Out the Project

During the detailed engineering design phase, a variety of technologies, systems, and components will be evaluated for use in the Project. As a result of this evaluation process, the best available proven technology that is economically viable for each type of processing unit or operation will be selected for use. A variety of technologies are available for the various components of the Project, however it is

desired to select those technologies that will effectively and efficiently optimize both safety and environmental performance. Alternative means of carrying out the Project are described in further detail in Sections 3.2.3 and 3.3.4.

There will be a need for underground pipelines (water and natural gas), sleeperways for above-ground pipelines (interconnecting the new refinery complex with the storage tanks, marine terminal, and existing Saint John refinery), conveyors, and a rail spur, to support the Project Operation. In addition, an electrical transmission line will likely be required to supply the electrical needs of the Project.

The precise requirements for the ROWs for this infrastructure have been established and evaluated on a preliminary basis as part of a linear facilities corridors selection study. A general corridor (the Linear Facilities Corridors Assessment Area) was initially established for these elements between the Project and the existing Saint John refinery. Various routing options were evaluated based on environmental, engineering, and social constraints, and in consideration of input from the public. A preferred corridor and alternative corridors that are technically and economically feasible have been identified in the course of conducting the study. Further information on the route selection process, constraints, and alternatives analysis will be provided in Section 3.5.6.

2.8 Project Schedule

When the Project was initially proposed by the Proponent, the Construction of the Project was planned to be carried out over a 4-5 year period, beginning in 2010 and with commercial operation beginning in 2015. The preliminary overall Project schedule as was originally planned is summarized as follows.

- Environmental Assessment: First quarter of 2007 until the second quarter of 2009.
- Engineering: First quarter of 2007 to the fourth quarter of 2011.
- Site Preparation and Pre-Construction: Third quarter of 2010 to the fourth quarter of 2011.
- Construction: Second quarter of 2011 to the second quarter of 2015.
- Commissioning: Third quarter of 2013 to the second quarter of 2015.
- Operation: Beginning in the second quarter of 2015.

As a result of the recent economic downturn and labour availability challenges, the Proponent has re-evaluated the pace and sequence of Construction and Operation of the Project. In Chapter 15 of this EIA Report, the challenges of securing the labour force required for Construction of the Project will be discussed. In Chapter 16, the potential increased demands on community services and infrastructure (*e.g.,* housing, social services) and the associated challenges will be presented. The Proponent has thus proposed a two-phased pace and sequence of Construction and Operation of the Project, discussed below. The revised Project schedule will minimize the extent of potential social concerns that could have resulted with the original schedule for the Project, and prolongs the economic benefits of the Project to the Saint John region.

The environmental impact assessment of the Project began in January 2007 with the submission of the EIA Registration/Project Description to regulatory authorities. Under current assumptions and subject to regulatory approval by this time, it is anticipated that the EIA/EA could be completed by mid- to end of 2009. For conservatism, it has been assumed that the EIA/EA work would be completed by the third quarter of 2009.

It is proposed that the Project would be constructed in two phases over an approximate 6-8 year period. The updated overall schedule for the Project, including a two-phased pace and sequence of Construction for the Project, is illustrated in Figure 2.2.

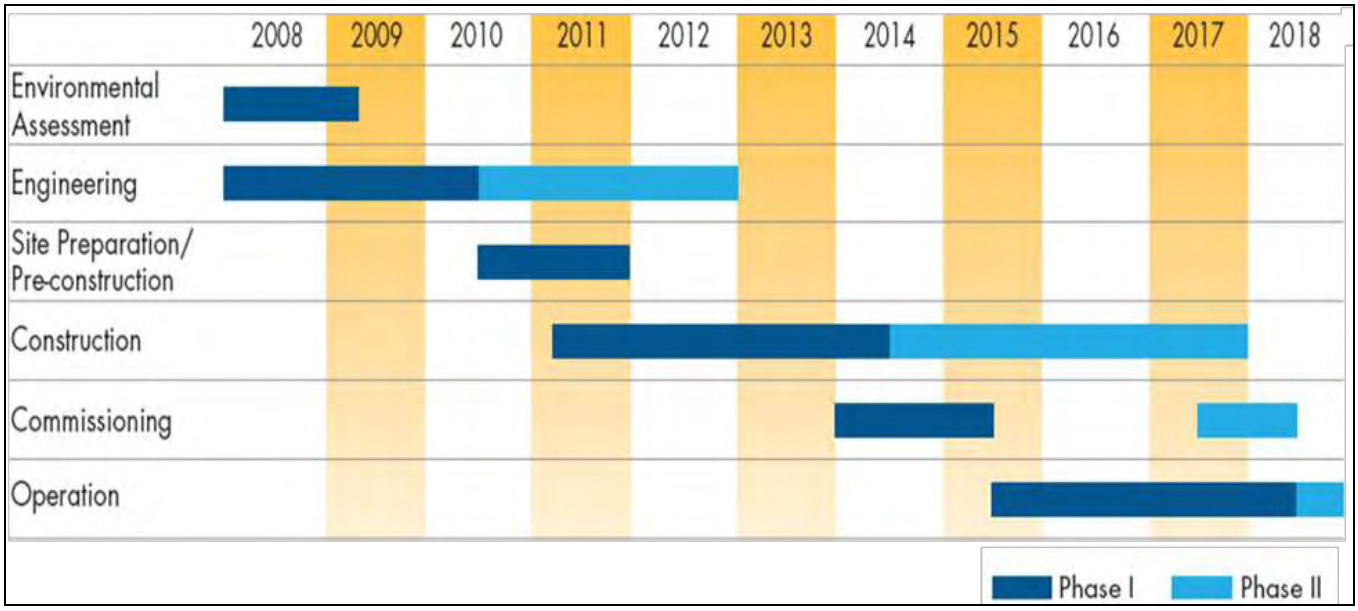

Figure 2.2 Overall Project Schedule

As was planned with the original schedule, site preparation and pre-construction would commence in 2010. The Construction and Operation of the two Project Phases could potentially overlap, seeing the first phase constructed and operational by 2015 and the construction of Phase 2 starting in 2014. Commissioning of Phase 2 would be carried out between mid-2017 and mid-2018, when commercial operation of Phase 2 would begin.

The specific details of which Project activities would be conducted in Phase 1 or Phase 2, as well as which components would be constructed in each phase, are currently being evaluated by the Proponent and its design engineering team to arrive at the most sensible, efficient, and viable configuration of each Project phase. Even though the specific details of which components would be constructed and operated in each phase are not currently known, the overall end result at the completion of Phase 2 will be the entire Project as is described in its entirety in Chapter 3 of this EIA Report. The Proponent will ensure that each phase is conducted with strict adherence to the Project Commitments discussed in Section 2.3 above, including ensuring the safe, reliable, environmentally sound, and innovative construction and operation of the Project.

As mentioned above, phasing the pace and sequence of Construction activities over a longer period of time accomplishes several important objectives and outcomes that inherently and effectively act as mitigation for potential adverse environmental effects of the Project. Phasing the pace and sequence of Construction allows for the economic benefits, construction-related expenditures, and economic spin-offs of the Project to be carried out in the region over a greater period of time, thus creating a more sustainable local economy and minimizing the potential for "boom or bust" that could otherwise occur. The potential for labour shortages of skilled workers and tradespersons in the region is lessened by carrying out construction activities over a longer period of time, thereby minimizing peak construction demand for workers. Similarly, the potential adverse environmental effects that could occur on community services and public infrastructure, such as potential housing shortages and increased

demand on social and emergency services, would also be mitigated by phasing. Project-related peak traffic requirements to and from the construction site would also be lessened, thereby mitigating the potential environmental effects to road infrastructure and traffic level of service. Most importantly, phasing allows for an effective and sustainable control of costs associated with the Project, allowing for more manageable expenditures related to the Project and allowing for Operation of Phase 1 to generate revenue that could be used to offset the costs of carrying out Phase 2. Thus, carrying out the pace and sequence of Construction activities in two separate phases serves as an important mitigation measure to reduce or minimize environmental effects of the Project as a whole.

In this EIA Report, the environmental effects of the Project as a whole (*i.e.,* without consideration of the phasing of the pace and sequence of Construction and Operation) will be assessed, as a means of ensuring that the assessment of environmental effects is as conservative as it can be. Carrying out the pace and sequence of Construction and Operation in two separate phases is thus not discussed in great detail in this EIA Report, other than as a general mitigation measure for environmental effects that could otherwise result from the Project carried out as a whole.

2.9 Environmental Management

A variety of environmental management policies, procedures, and systems will be developed for the Project. They are generally described in the following sections.

2.9.1 Health, Safety, and Environmental Management System

A Health, Safety, and Environmental (HSE) Management System will be developed and implemented as part of the Operation of the Project. Elements of the system will be in place during Construction (*e.g.,* environmental protection and contingency planning). Irving Oil would periodically audit these HSE practices and where necessary, the internal audit group would contract third party experts to assist with audit engagements. Audit reports will be circulated to management and to executive management for review and action. Finally, all audit reports will be subjected to routine follow-up to ensure that recommendations including any required process enhancements are appropriately resolved on a timely basis.

The health and safety of Project employees, sub-contractors, and the general public, is of primary importance to the Proponent, as is the commitment to minimize environmental effects. Accordingly, the Proponent's Engineering, Procurement, and Construction (EPC) group will take a proactive approach toward maintaining a safe and secure work environment and will maintain a system to manage the environmental effects of the Construction and Operation. All Project procurement decisions (*e.g.,* hiring contractors) will be made in conjunction with the HSE Management System.

The refinery will have a video monitoring system installed, allowing security services to monitor the facility on a continuous basis. A perimeter fence and a gatehouse facility will be constructed to control access to the site.

2.9.2 Building Design Codes

Specific codes and standards in the National Building Code of Canada, the Canadian Standards Association (CSA), and the Province of New Brunswick acts and regulations, among others, address specific issues related to environmental activities as summarized below. These Codes or standards

may include, but are not necessarily limited to, those summarized in Table 2.1. Note, this is not an exhaustive list and is intended only to be illustrative. The design team will identify and follow all applicable codes.

Table 2.1 Selected Codes and Standards That May be Applicable to the Project

Code or Standard	Title
National Research Council of Canada	
NBC 2005	The National Building Code of Canada 2005
NFC 2005	The National Fire Code of Canada 2005
Canadian Standards Association	
CSA-A23.3	Design of Concrete Structures
CAN/CSA-A23.1/A23.2	Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete
CAN/CSA-S16-01	Limit States Design of Steel Structures
CAN/CSA-S136	North American Specification for the Design of Cold-Formed Steel Structural Members
CAN/CSA-G40.20/G40.21	General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel
CSA-W59	Welded Steel Construction (Metal-Arc Welding)
American Society for Testing and Materials	
ASTM A36/A36M	Standard Specification for Carbon Structural Steel
ASTM A193/A193M	Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High Temperature or High Pressure Service, and other Special Purpose Applications
ASTM A307	Standard Specification for Carbon Steel Bolts and Studs, 60000 PSI Tensile Strength
ASTM A325	Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
ASTM A500	Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
ASTM A563	Standard Specification for Carbon and Alloy Steel Nuts
ASTM A572	Standard Specification for High-Strength Low-Alloy Columbian-Vanadium Structural Steel
ASTM A992	Standard Specification for Structural Steel Shapes
ASTM F436	Standard Specification for Hardened Steel Washers
American Petroleum Institute	
API Standard 650	Welded Steel Tanks for Oil Storage
API Recommended Practice (RP) 540	Electrical Installations in Petroleum Processing Plants
American Concrete Institute	
ACI 306.1	Standard Specification for Cold Weather Concreting
Other	
Code of Federal Regulations	Track Safety Standards
DFO	Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters
Environment Canada PN1326	Environmental Code of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products.
Commission Internationale de l'Éclairage	Guide on the Limitation of the Effects of Obtrusive Light from Outdoor Lighting Installations
Transport Canada TP 743 E	TERMPOL Review Process 2001, Technical Review Process of Marine Terminal Systems and Transshipment Sites
National Fire Prevention Association (NFPA) 30	Flammable and Combustible Liquids Code
National Fire Prevention Association (NFPA) 58	Liquefied Petroleum Gas Code

Table 2.1 Selected Codes and Standards That May be Applicable to the Project

Code or Standard	Title
National Fire Prevention Association (NFPA) 59	Utility LP-Gas Plant Code

The Project will be constructed to meet all applicable building, safety and industry codes and standards. The engineering design of the Project will consider and incorporate potential future changes in the forces of nature that could affect its operation or integrity (*e.g.,* climate change), and all Project components and infrastructure will be designed and built to adapt to or withstand these effects. The facility components will be designed to meet the National Building Code for wind, snowfall, extreme precipitation, and other weather variables. The Project will also be designed for seismic events pursuant to the requirements of the NFPA 59. In the event of a seismic event, the facility would likely be shut down and checked for damage.

2.9.3 Standard Operating Procedures (Commissioning, Operation, and Maintenance)

Standard Operating Procedures for Commissioning, Operation, and Maintenance will be detailed in Manuals, to be developed prior to each respective phase of the Project. The manuals will be based on the specific systems provided by the selected manufacturers of the system components. The manual will be drawn upon extensively as sources of process information required for operation and training.

The manuals will outline the roles and responsibilities of operators and other personnel, and outline various required procedures during normal operation or emergencies. All employees and operators will be fully trained in the standard operating procedures and emergency response procedures to ensure the safe and reliable operation of the Project.

2.9.3.1 Training Manual

A Training Manual for the refinery will contain a description of the training program and requirements that must be given to each operator of the facility, and will be used in conjunction with other manuals, including:

- Commissioning Manual;
- Operation Manual, and
- Maintenance Manual.

The Operation Manual, in particular, will be drawn upon extensively as a source of the process information that needs to be presented during training.

2.9.4 Public Awareness and Communication

The Proponent is committed to open and forthright communication with the public. To this end, a variety of communication methods will continue to be implemented during all phases of the Project to ensure public awareness and that all community members and stakeholders are easily able to communicate with the Project team.

A Community Liaison Committee will be established during Construction and will meet regularly in the local area. This committee will provide a forum for interested community members and Project

neighbours to gain information about Project activities, and speak with members of the Project team and share with them any comments or concerns they may have.

Important milestones, events, and/or activities throughout the Project will be released to the news media for wide distribution. The Proponent will also strive to respond to media inquiries and interview requests.

A community newsletter will be regularly distributed to Project neighbours and other interested community members. This newsletter will contain information about any upcoming Project-related events, Project activities, and other information of interest.

Each year, the Proponent will host an open house, at which stakeholders, neighbours, and other members of the public can gain information about the Project, and meet with and ask questions of members of the Project team. This annual open house will be advertised in local media outlets, and in the community newsletter.

The Proponent currently operates a toll-free telephone information line for the existing Saint John refinery and for Project Eider Rock (1-888-525-1777). An email address (eiderrock@irvingoil.com) has also been established for the Project. Throughout Construction, these will continue to be maintained and operated as a forum for the public to contact the Project team with any questions, comments, or concerns they may have.

2.9.5 Environmental Protection Plan for Construction

An Environmental Protection Plan (EPP) will be developed to guide the Construction of the Project in accordance with applicable federal and provincial environmental protection legislation and regulations. The EPP will be submitted to the appropriate regulatory agencies for review. In addition to referencing key aspects of design mitigation, the EPP would outline all environmental protection, mitigation, and response measures to be employed during Construction.

The EPP will be designed to be a site-specific field-usable document that will contain the following information:

- Responsibilities of Irving Oil, contractors, and all site personnel;
- Purpose, organization and maintenance of the EPP including contractors and subcontractors;
- Specific mitigation measures to be implemented during routine and non-routine (*e.g.,* fires) construction activities;
- Contingency plans to be followed in the case of an accidental event during Construction (*e.g.,* spill response, erosion and sedimentation control failure, discovery of an archaeological resource); and
- A list of permits, approvals, authorizations, and key personnel to be contacted in the case of an emergency.

An EPP will be developed prior to the commencement of Construction, and will be submitted to the appropriate regulatory agencies for review.

Environmental awareness training for employees will be required and documented in the EPP. Employee environmental awareness training will be developed by the Proponent. All employees, site personnel, contractors, and subcontractors will receive appropriate training reflective of their duties and responsibilities. Awareness training will occur prior to the commencement of work and will be

evaluated and updated as required through various work performance evaluations and activity procedures.

2.9.6 Emergency Response Plan for Operation

A detailed Emergency Response Plan (ERP) for the Project will be developed, in consultation with the Saint John Fire Department, the New Brunswick Emergency Measures Organization (NBEMO), the Saint John Emergency Measures Organization (SJEMO), the New Brunswick Department of the Environment (NBENV), Environment Canada, and the provincial Fire Marshall's office.

An ERP is an integral part of the facility's operation. The purpose of the ERP is to document the procedures to be followed in the event of an emergency. Emergencies involving hazardous materials on-site may occur with process equipment, materials in storage or during handling and transportation. The objectives of the ERP are to establish, document, and communicate emergency response procedures that are protective of human health, the environment and the facility. The ERP would include a contact list, a summary of reporting requirements, and an inventory of spill kits and safety equipment. The ERP would be developed in accordance with the requirements of the federal *Environmental Emergencies Regulations* under the *Canadian Environmental Protection Act* and other requirements that may apply.

At minimum, the ERP will incorporate emergency response procedures, contingency plans, monitoring, cleanup, and reporting requirements for on-site operational upsets, spills, and other accidents, malfunctions, and unplanned events.

2.9.7 Oil Pollution Emergency Plan

The marine terminal to be constructed as part of the project will be designated as an "Oil Handling Facility" under the *Canada Shipping Act, 2001*. Given the Proponent's extensive history of successfully operating a marine terminal at Canaport and the presence of fully equipped, trained and available spill response capability on land (through internal and external resources) and in the marine environment (through ALERT), the development of a detailed Oil Pollution Emergency Plan is not required or feasible at this early planning stage of the Project. However, prior to Operation of the Project, if and as required, an "Oil Handling Facility Oil Pollution Emergency Plan" will be prepared.

The Oil Handling Facility Oil Pollution Emergency Plan for the Project will be developed to meet the requirements of Section 168 of the *Canada Shipping Act, 2001*, and as prescribed by regulation. The plan will address issues such as resources, mobilization, health and safety, training and exercises, and response strategies. The plan will be compliant with the *Canada Shipping Act, 2001* and is reviewed by Transport Canada at each recertification application.

ALERT Inc., based in Saint John NB, is the Transport Canada approved response organization for the Bay of Fundy. ALERT provides on-water oil spill response management services through dedicated staff, trained in house responders and trained contractors. ALERT provides training on an ongoing basis to all direct and contracted personnel. ALERT conducts drills and exercises as required by the *Canada Shipping Act, 2001* with both ALERT and Irving Oil/Canaport personnel. The marine terminal for the Project will be required to enter into an agreement with ALERT Inc. and a similar service will be provided.

2.9.7.1 Overall Response Strategies

For spills in port, there will be an immediate and active on-water spill response capability. The type of response will be dictated by the nature of the incident and the weather and sea conditions at the time of the spill. Containment and recovery equipment to deal with small and modest-sized spills will be pre-staged in the area of the marine terminal and at ALERT Inc. such that it can be quickly deployed in the event of a spill. The most effective means of responding to a hydrocarbon spill on water is to contain it rapidly, then recover the spilled product. The response strategy will likely include the following elements.

- Activities related to vessel movements and cargo transfer will be monitored such that an immediate response can be implemented in the event of a spill.
- Containment equipment will be pre-staged at the marine terminal to facilitate rapid response.
- Upon discovery or notification of a spill, a response strategy will be developed and executed based on the actual wind and sea conditions being experienced at the time.
- In the event of a spill, containment booms will be rapidly deployed to surround the spill, and a recovery plan will be implemented.
- For oil that escapes containment, slick movements would be monitored and modelled to develop an appropriate response strategy, containment, and eventual recovery. Such recovery would be either on water or on the shoreline, or both.

For larger spills at the marine terminal, or for those that may result from a tanker incident away from the marine terminal, the response will require the activation of additional resources, as prescribed in the planning standards outlined in Sections 168 and 169 of the *Canada Shipping Act, 2001.* These standards mandate a tiered response capability through a Transport Canada certified response organization. The volume of oil handled at the refinery will lead to the location being classified as a Primary Area of Response, so the response time standards will be:

- 150 tonne (t) response capability: within 6 hours (h), equipment to be deployed on-site;
- 1,000 t response capability: within 12 h;
- 2,500 t response capability: within 18 h; and
- 10,000 t response capability: within 72 h.

2.9.7.2 Spill Response Equipment Requirements

A designation as an Oil Handling Facility under the *Canada Shipping Act, 2001* commits an operator of a marine terminal so designated to satisfy several planning requirements. First, the operator must have a contingency plan. The guidelines for Oil Handling Facilities also specify that an inventory of equipment be maintained that is commensurate with the size of the facility. Based on a planned maximum transfer rate of 9,200 m^3/h (58,000 bbl/h) for the Project, the Project will likely be classed as a Level 4 facility, and will therefore be required to consider a 50 m^3 spill for planning purposes.

The spill behaviour modeling for this size of spill indicates an initial slick width (of thick oil) of 31 m. Based on this, and the planning standards for this size of spill, a reasonable amount of boom for initial spill containment would be 500 m of 61 cm boom. A basic inventory of equipment for the facility should include:

- 500 m of protected water containment boom;
- Small workboats for deploying and positioning the boom;
- Skimmer suitable for recovering fresh and weathered oil;
- Temporary storage, and a pump and hose to transfer the recovered product to on-land storage; and
- Sorbent boom and pads for recovering sheen and lesser concentrations of oil.

2.9.7.2.1 Spill Management Simulations

Spill management simulations are used to exercise the important management aspects of spill response. Participants in such exercises should include the terminal management and staff, response organization spill manager and command centre staff (planning, operation, logistics, and finance), the field supervisors, and responders. The key areas to be covered in the simulation include spill assessment, resource mobilization, and operation.

Spill management simulations are designed in association with the response organization. The goals of the exercises and training are to ensure that a high level of preparedness is maintained by staff and contract personnel, and equipment is deployed to demonstrate use.

2.9.7.2.2 Operational Response Drills

Operational Response Drills are used to practice countermeasures, strategies, and techniques, and will be held on a regular basis with all operational staff. Topics to be covered include:

- Initial at-source actions;
- Communications;
- Spill tracking exercises;
- Nearshore containment and recovery; and
- Shoreline protection and containment.

For the Project, the main active response effort will be a containment and recovery response for oil that may be spilled at or near the loading facility. This may involve the deployment of a boom to contain spilled oil, deployment and operation of a skimmer to recover the oil, deployment of a temporary storage device, and use of pumps and hoses to transfer the oil to storage for recycling or disposal. Drills will likely be carried out on at least an annual basis to practice boom deployment, to ensure that personnel are familiar with the procedures and that the equipment is in a ready condition.

2.9.8 Marine Terminal Operation

The marine terminal will develop safety procedures and contingency plans to minimize the risks of an accident or unplanned event throughout the life of the facility. The TERMPOL review process and the Marine Terminal Manual will contribute to the safe operation of the marine terminal and are described below.

2.9.8.1 TERMPOL Review Process

The Proponent has committed to completing a TERMPOL review process following the completion of the EIA for the Project. TERMPOL is a process directed by Transport Canada to evaluate operational

ship safety, route safety, and management and environmental concerns associated with the location, construction and operation of a marine terminal handling bulk petroleum products and related concerns.

Overall, the rationale of the TERMPOL review process is consider the potential environmental effects of shipping activity related to the Project, risks associated with the proposed routing, navigational safety of ships, the level of service required to facilitate safe navigation, ship designs, pollution prevention, and contingency planning.

The berthing and deberthing of ships at the marine terminal will require tugboats and the development of dedicated navigation procedures. These activities will be included in the TERMPOL review process.

2.9.8.2 Marine Terminal Manual

A Marine Terminal Manual would be developed to address the specific requirements and operations of the marine terminal in accordance with federal and provincial legislation and the Proponent's policies. This would be developed in association with the TERMPOL review process.

The draft Marine Terminal Manual would be provided to the Transport Canada for review and approval. The manual will be developed in association with key stakeholders such as the Canadian Coast Guard, Atlantic Pilotage Authority, Transport Canada, and the Saint John Port Authority.

2.9.9 Greenhouse Gas (GHG) Management Plan

The Project will result in GHG emissions from the refinery facilities that will comply with federal and provincial policies and regulations. The goal of the Project is to be to be among the best in its class for this industry sector. However, the Project, if it is constructed in a manner similar to the design of last refinery built in North America, would indeed have "medium or high intensity or volume" GHG emissions (CEA Agency 2003) that should be considered by way of a detailed analysis of the potential emissions from the Project, and of the steps taken to minimize those emissions and to manage those that remain.

As required by CEA Agency (2003), the Proponent will develop a GHG Management Plan for the refinery. It should be recognized, however, that the engineering design is at an early stage, and although evolving, it will continue to evolve for some time. The final design, including the specific units that will be built and their resulting GHG emissions, will only be available once licensors have been selected and specific units have been designed, at some later time prior to or during Construction of the Project. Once the selected technologies and associated emissions are known, the GHG Management Plan will be developed. Because the Project is still in the early engineering design phase and much further engineering and planning are yet to be completed, it is not possible to develop the GHG Management Plan at this time. The Plan, once developed, will be a dynamic document that will be continuously reviewed and updated as the Project moves toward construction and onward throughout its operation.

The Proponent recognizes that climate change is a serious, global environmental concern and that it demands an urgent, worldwide response. There is an emerging scientific consensus that recent changes to global climate are primarily caused by human activity, including increased concentrations of carbon dioxide and other GHG in the atmosphere as a result of fossil fuel use. The Proponent also recognizes that fossil fuels will continue to provide the majority of the world's growing need for energy for decades to come and, therefore, that companies engaged in the business of providing that energy must operate in ways that advance the achievement of a sustainable future. To this end, the Project will be designed and operated:

- To be a leader among refineries of its class in reducing and managing GHG emissions; and
- To provide the cleanest fuels possible from the crude oils processed.

Specifically, the Project will be designed and operated:

- To encourage minimization of GHG emissions beyond the minimum requirements of all regulatory guidelines, including consideration of life cycle cost, pre-investment options, and innovation;
- To meet or exceed all relevant federal and provincial regulations, standards, and requirements, both current and those anticipated;
- To encourage continuous improvement in all aspects of the refinery towards reducing the intensity of GHG emissions to lowest practicable levels compared to similar refineries that process similar crudes and produce similar products in a similar environment;
- To employ adaptive management techniques to allow flexible response to future regulatory initiatives;
- To incorporate elements so that the Project has options for future carbon capture should such technology become technically and economically feasible, thereby anticipating and incenting future design and technology enhancements for GHG capture;
- To actively encourage and consider innovative, non-process opportunities to reduce GHG emissions within and beyond the Project, involving internally and externally generated carbon offsets from expanded use of alternative and renewable energy, sequestration, and energy efficiency projects;
- To enable reporting to the public with transparency beyond the minimums required by regulation, including disclosure of annual GHG emissions and GHG initiatives compared to performance; and
- To use the best available proven technologies selected from among economically viable options to manage air pollutant emissions.

The Proponent is committed to continuing to develop the GHG Management Plan for the Project. As the Project develops, so will the plan; however, it is anticipated that it will contain and expand upon all elements described above.

2.9.10 Groundwater Monitoring Program

As described in Chapter 8, a groundwater monitoring plan will be developed for existing residential groundwater wells surrounding the Project-related land-based facilities as well as the selected corridor for the linear facilities associated with the Project. The groundwater monitoring program will build upon the residential well sampling conducted in support of this EIA to characterize the groundwater in and adjacent to the Project Development Area (PDA) and the Linear Facilities Corridor Assessment Area. This will likely involve additional sampling and testing of residential groundwater wells at a frequency to be specified in the plan, and supplemented as necessary by the drilling and sampling of specific groundwater monitoring wells for the Project.

Groundwater samples will be analyzed by an accredited laboratory for inorganic and organic content, including bacteria. The analytical results of samples collected from residential wells will be communicated with the respective homeowners. Initial sampling will be conducted prior to the start of Construction, and will continue periodically throughout the Project.

2.9.11 Vegetation Management Plan

A Vegetation Management Plan will be developed for the Project and will contain procedures for maintaining access to facilities by clearing and/or cutting back vegetation. This will be especially important for the safe access to linear facilities. The plan will detail the required clearing for access, and the methods to be used when clearing or cutting. The Proponent will not use toxic herbicides for vegetation control where alternatives that offer similar performance exist. Removal of vegetation by mechanical methods (*e.g.,* mowers) will likely be the preferred method.

2.9.12 Decommissioning and Abandonment Plan

A Decommissioning and Abandonment Plan will be developed near the end of the useful life of the Project, to guide decommissioning, abandonment and closure activities that may be associated with the Project at the end of its life. More information about Decommissioning and Abandonment is provided in Section 3.2.6.

2.9.13 Follow-Up and Monitoring Initiatives

A follow-up and monitoring program will be designed and conducted, as appropriate, during Construction, Operation, and Decommissioning and Abandonment. Recommendations for follow-up and monitoring are provided for each Valued Environmental Component at the end of Chapters 7 to 21, where they are warranted.

The follow-up program will determine the effectiveness of mitigation and verify the accuracy of the environmental assessment.

Monitoring will involve the collection of a series of repeated measurements over time, and may be categorized as compliance monitoring or environmental effects monitoring. Compliance monitoring will be undertaken by the Proponent to ensure that regulated levels of parameters in releases from the Project are met. Environmental effects monitoring, including that of environmental incidents, will also be implemented to confirm whether or not the mitigation measures to lessen or minimize potential environmental effects have been successful.