Part A – Project Introduction

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A. PROJECT INTRODUCTION

A.1 THE PROJECT

Connacher Oil and Gas Limited ("Connacher") plans to expand its in-situ oil sands operations located approximately 70 km south of Fort McMurray, Alberta in the Athabasca oil sands fairway area. Connacher is the owner of two Steam Assisted Gravity Drainage ("SAGD") developments. The first development is known as the Great Divide Pod One SAGD project ("Pod One"). The second development is the Algar SAGD project ("Algar"). The Pod One and Algar projects are located in a 58 section area of oil sands properties ("Great Divide") leased by Connacher from the crown in the Divide region near Mariana Lake, Alberta, in the Regional Municipality of Wood Buffalo ("RMWB").

Pod One has a design steam generation capacity of 4,320 m^3/day (27,000 bbl/d), which at its long-term target peak operating steam:oil ratio ("SOR") forecast of 2.7, is anticipated to facilitate production of 1,600 m^3/day (10,000 bbl/d) of bitumen over a project life of more than 25 years. Pod One commenced commercial operations in March 2008 and is currently ramping up to near design capacity. The Algar project has a design steam generation capacity of 4,800 m^3/day (30,000 bbl/d), which at its forecast long-term target peak operating SOR of 3.0, is anticipated to facilitate production of 1,600 m^3/day (10,000 bbl/d) of bitumen over a project life of more than 25 years. Algar was approved in 2008 and construction was completed in April 2010. Commissioning of the Algar plant is anticipated to be completed in mid-May 2010, followed by a period of up to 90 days of initial steam circulation of the oil sands reservoir prior to steam injection and first production anticipated in Q3 2010

The Great Divide SAGD Expansion Project ("the Project") will involve increasing bitumen production within Great Divide from 3,200 m^3/day (20,000 bbl/d) of currently approved levels to 7,000 m^3/day (44,000 bbl/d). The central processing facility ("CPF") at Algar will be expanded from 1,600 m^3/day (10,000 bbl/d) of bitumen processing capability to 5,400 m^3/day (34,000 bbl/d) to process and treat the increased bitumen production. The Pod One CPF will not be altered as part of the Project. This application provides the details of the bitumen production plans for the Project, which is expected to occur in three phases and has an estimated 25 year life. Connacher's independent reserve evaluators, GLJ Petroleum Consultants Ltd. ("GLJ"), has assigned 471 million of proved ("1P") plus probable ("2P") (2P is comprised of proved and probable reserves) plus possible ("3P") bitumen reserves to Great Divide as at December 31, 2009, which Connacher believes will support the proposed Project production targets.

A number of figures have been provided to assist in the understanding of the Project location and components:

- Figure A.1-1 – Project Location Map
- Figure A.1-2 – Project Phases
- Figure A.1-3 – Project Phases with Air Photo
- Figure A.1-4 – Project Phases with LiDar and Topography

The three phases of development are planned to include the following components:

Phase 1:

- expansion of the CPF by 3,800 m^3/day to 5,400 m^3/day which will occur entirely within the existing Algar CPF footprint;
- additional lay down area adjacent to the CPF will be required;
- additional area for remote sumps will be required;

- nine well pads with 59 well pairs, required to increase production by 3,800 m^3/day to 7,000 m^3/day;
- access roads and infrastructure, including borrow pits;
- total estimated footprint required is 145.5 ha.

Phase 2:

- twelve well pads with 73 well pairs, required to maintain the full production of 7,000 m3/day;
- access roads and infrastructure, including borrow pits;
- additional area for remote sumps;
- total estimated footprint required is 189.9 ha.

Phase 3:

- nineteen well pads with 83 well pairs, required to maintain the full production of 7,000 m3/day;
- access roads and infrastructure, including borrow pits;
- additional area for remote sumps;
- total estimated footprint required is 186.3 ha.

Economies of scale and integration of the required additional processing facilities for the Project into the existing CPF at Algar is anticipated to result in major economic improvements to Connacher's operating costs and will provide significant benefits to the Wood Buffalo region, Alberta and Canada as a whole over the life of the Project. The Project provides an important contribution to the continuing development of Alberta's oil sands and to the replacement of declining conventional oil production in North America.

A.2 THE PROPONENT

Connacher is a publicly owned TSX-listed Calgary-based crude oil, bitumen and natural gas exploration, development, production and refining company. Connacher's principal asset is a 100 percent interest in the Pod One and Algar SAGD projects and it owns approximately 98,000 net acres of oil sands leases in the Athabasca oil sands fairway south of Fort McMurray. The company also operates and explores for conventional oil and gas in Alberta and Saskatchewan, owns and operates a 9,500 barrel per day heavy oil refinery in Great Falls, Montana and owns an approximate 20 percent interest in Petrolifera Petroleum Limited, a TSX-listed crude oil and natural gas company with operations in South America.

Connacher has adopted a modular, small scale approach for the efficient development of its oil sands reserves. This approach works to mitigate the risk of both time delays and cost pressures associated with traditional large scale oil sands projects. The size and scale of both Pod One and Algar have been designed to exploit the top-quartile bitumen reservoir of the company's oil sands leases, based upon drilling information and geological interpretations of the underlying bitumen resources available at the time of development. Exploiting the top-quartile oil sands reservoir is essential to ensure reliability of bitumen production over the project's 25 year plus reserve life and to minimize operating costs, determined by the amount of steam required to be injected into the reservoir to liberate the bitumen. Connacher has drilled and expects to continue to drill additional exploration and delineation wells to further understand the location and extent of the bitumen resources contained within its oil sands leases. However, the reservoir geology for these two projects is now well enough understood to pursue production expansion. Connacher's independent reserve evaluators, GLJ has assigned 471 million of 1P, 2P and 3P bitumen reserves to Great Divide as at December 31, 2009, which Connacher believes will support the proposed Project production targets.

Pod One is located in Sections 16 and 21, Township 82, Range 12, West of the 4th Meridian on oil sands lease No. 0747404010460 (OSL#60). Connacher received Energy Resources Conservation Board ("ERCB") regulatory approval for Pod One in July 2006 (Approval No. 10587). Construction of Pod One commenced in the fall of 2006 after receipt of Alberta Environment ("AENV) approval in July, 2006 (Approval No. 223216-00-00) and was completed in August 2007. Commissioning of the Pod One plant was completed in September 2007, at which point steam was injected into the first of Pod One's 15 SAGD well pairs. The initial bitumen production began in December 2007 and the project was declared commercial in March 2008. Production from Pod One is currently ramping up to the design capacity and approved limit of 1,600 m^3/d (10,000 bbl/d).

Algar is located in Sections 18 and 19, Township 82, Range 11, West of the 4th Meridian, on oil sands lease No.0747404010459 (OSL#59). The application for regulatory approval for development of Algar was submitted in June 2007. In November 2008, Connacher received approval by the ERCB and AENV Algar is currently approved for 1,600 m^3/d of bitumen (10,000 bbl/d). Major civil work at Algar was completed in February 2009. Project field construction and fabrication commenced on July 7, 2009. Drilling of the 17 SAGD well pairs at Algar and concurrent construction of the steam generation facility and oil processing plant were completed on April 16, 2010. Commissioning of the Algar plant commenced on April 19, 2010. It is anticipated the commissioning process will take up to 30 days Commissioning of the steam pipelines and SAGD well pads will follow.

Thereafter Connacher will commence sequential injection of steam into Algar's 17 SAGD well pairs. Connacher plans to steam the well pairs for approximately 90 days prior to the initial production of bitumen. The process will be closely monitored to determine the optimum production startup date, based on individual well response. As all wells will not be brought onstream simultaneously, the company anticipates ramping up bitumen production towards design capacity and approved limit of 1,600 m^3/d (10,000 bbl/d) by the second half 2011.

As the original Pod One and Algar volumes decline, additional SAGD well pairs and well pads are contemplated to keep the facilities at full utilization of capacity.

A.3 PROJECT NEED AND ALTERNATIVES

A.3.1 Project Need

Oil industry projections show that conventional crude production opportunities in Canada are declining. As such, the requirement for additional heavy oil production will increase to fill the gap. The Project will recover bitumen from the McMurray formation of the Athabasca oil sands deposit utilizing the in-situ SAGD process. The oil sands reserves in the Project area are currently believed to be sufficient to produce 7,000 m^3/day (44,000 bbl/d) of bitumen for 25 years. Additional exploration activity may identify additional reserves.

The Project will be a positive addition to the Alberta economy, both during construction and operations. Some of the Project highlights are as follows:

- the total project construction costs for the Project will be approximately $600 million;
- annual operating costs are estimated to be $88 million;
- annual municipal taxes are estimated to be $3.5 million;
- federal taxes are estimated to be $350 million;
- provincial taxes are estimated to be $175 million;
- royalties are estimated to be $370 million;

- the project will employ a full time work force of approximately 80 people increasing the site total to 215; and
- during construction, the Project will create direct on site employment of 700 person years and will create work an estimate 360 person-years of employment off site for construction workers in fabrication yards, primarily in the Edmonton and Calgary regions.

Development of the Project is needed to effectively extract and produce the bitumen resources located on Connacher's oil sands leases and to supply bitumen to the North American market. Not proceeding with the Project or a delay in proceeding with the Project in a timely fashion will result in:

- a loss in North American crude oil supply or delay in bringing oil supply to market;
- a loss or delay for the RMWB, the Government of Alberta and the Government of Canada in realizing economic benefits;
- a loss or delay for local area residents to take advantage of employment opportunities; and
- a loss in Connacher attaining production growth goals and major economic operating improvements due to the inability to expand the Algar facility.

Not proceeding with the Project will result in no material additional environmental impacts beyond those already incurred as a result of the existing Pod One and Algar operations. A delay in development of the Project would not materially change the forecasted environmental impacts as described in Part D of this Application.

Not proceeding with the Project or a delay in proceeding with the Project in a timely fashion would result in socio-economic impacts. For example, the opportunity to optimize operating costs at the facilities at Algar and Pod One projects would be foregone and result in subsequent socio-economic impacts over the operating life of these projects.

A.3.2 Alternatives

Connacher has two alternatives for its Great Divide lease block: (i) limit development to Pod One and Algar, or (ii) expand and optimize development within the Great Divide lease block. The first option is not viable if Connacher is to continue to be a supplier of reliable bitumen production to the marketplace and is not consistent with the company's growth and value accretion objectives. The second choice allows the company to realize the potential value of its oil sands reserves at Great Divide, to continue to supply the marketplace with a reliable source of bitumen production over the long term and to continue a positive economic contribution to the local, provincial and national economies. The second option is the only logical development alternative.

The integration of the Algar and Pod One projects and continued development of the respective operating leases as one entity, known as the Great Divide SAGD Expansion Project, is the preferred project development alternative. These oil sands reserves are favourably situated with respect to proximity to the Company's nearby bitumen processing infrastructure. In addition, the existing workforce can continue to reside and commute to work without being relocated.

The production capacity of the Algar plant can be increased without increasing the plant site footprint. The expansion can also integrate a considerable amount of the infrastructure which is effective and cost efficient.

A.3.2.1 Bitumen Recovery Technology Alternatives

The bitumen that saturates the oil sands is a thick tar-like substance that is essentially immobile and cannot be recovered using conventional oil extraction technologies. Two different types of recovery methods are typically used for bitumen extraction:

- surface mining; and
- in-situ.

Surface Mining

Surface mining recovery techniques are typically used when the bitumen resource is shallow. For example, bitumen recovery by surface mining methods is feasible when the bitumen resource is no greater than 100 metres in depth from surface. The prevalent surface mining system currently used by oil sands operators is the conventional truck and shovel system.

For the Project, the depth of the bitumen resource is approximately 450 metres from surface thus prohibiting the feasibility of using surface mining methods for resource extraction.

In-situ Resource Extraction

In-situ methods are used to recover bitumen from deposits that are too deep to be mined in open pits.

In-situ resource extraction is ingenious in its simplicity. Steam is injected into the oil sands reservoir, which upon condensing into water, releases its heat and effectively melts the bitumen so that it can flow, be extracted from the sand matrix it resides in and pumped to surface for processing. Two major in-situ techniques are used commercially in Alberta's oil sands:

- Cyclic Steam Stimulation ("CSS"); and
- Steam Assisted Gravity Drainage ("SAGD").

Other techniques such as Toe to Heel Air Injection ("THAI"), Solvent Injection Process and Electro-Thermal Dynamic Stripping Process ("ET-DSP") are in various stages of research and trial development.

Cyclic Steam Stimulation (CSS)

CSS was commercialized in the mid 1980's to extract bitumen from Imperial Oil's Cold Lake oil sands leases (Lebel and Moriyama, 1997). CSS consists of three stages, injection, soaking and production. Steam is first injected at high pressure, high temperature (about 350^{o}C) into a well to heat the bitumen in the reservoir. The pressure of the steam injection fractures the oil sand, while the heat of the steam melts the bitumen to a temperature at which it flows. Then the steam is left to "soak" or lessen the oil's viscosity. The oil is then produced out of the same well, at first by natural flow because the steam injection has increased the reservoir pressure and then by artificial lift. Production decreases as the oil cools down. Once production reaches an economically determined level, the process is repeated again in the oil-bearing formation. It can take between 120 days and two years to complete a steam stimulation cycle. The process can be quite effective, especially in the first few cycles. However, CSS is typically only able to recover approximately 20% of the Original Oil in Place ("OOIP").

Steam Assisted Gravity Drainage (SAGD)

SAGD is the most popular and current generation of enhanced crude oil recovery technology. SAGD was developed in 1986 for use in conventional crude oil applications and has been applied in oil sands operations since 2000. Typically SAGD is able to recover approximately 50% or more of the OOIP due to the fact that, unlike CSS, SAGD is a continuous recovery process. In addition, due to the absence of

heating and cooling cycles, the SAGD process is an improvement over the CSS process since it also results in less thermal stress on the well bores and because SAGD is used primarily in horizontal well applications, contacting more of the oil sands reservoir than the primarily vertical well CSS process. An estimated one trillion barrels of bitumen in the Athabasca oil sands deposits are potentially recoverable with the present SAGD technology (Source: Innovation Alberta, 2008).

SAGD technology requires the drilling of two parallel horizontal wells, typically five to six metres apart, through the bitumen-bearing formation. Into the upper well, steam is continually injected creating a high-temperature steam chamber. As the steam condenses, the bitumen is liberated from the formation sands causing it to flow downward, by gravity, to the lower second horizontal well. An emulsion of condensed water and bitumen is then pumped to the surface via the second horizontal, or production well. The SAGD process is not entirely without drawbacks. The major drawback of a pure steam-based exploitation process is the high-energy intensity required to create steam. In SAGD, the measure of the energy intensity is the SOR or barrels of steam (cold water equivalent) needed per barrel of bitumen recovered. In terms of energy values, approximately one MMcf of natural gas is required to be burned to create the steam needed to produce one barrel of bitumen. Many innovative technologies have been explored to improve the energy efficiency. For example, cogeneration, where steam is produced as a part of the electricity generation scheme, has been applied. Cogeneration will be used at Algar and in the Project. To reduce the dependence on the natural gas supply, steam generation using alternative fuels such as produced bitumen and coal is being investigated. Submersible pumps are used at Pod One and may be used at Algar to reduce the SOR thereby reducing the amount of natural gas required to be consumed to produce one barrel of bitumen. Another drawback to SAGD is the amount of water and large water re-cycling facilities that are needed for the steam generation process. The source water for Algar is a subsurface non-potable aquifer. Algar is designed to recycle over 90 percent of the water used in the SAGD process.

SAGD also requires comparatively thick and homogeneous reservoirs. With production from a single SAGD well averaging 500 bbl/d or better, the land disturbance is similar to or less than the land disturbance of a typical Western Canadian crude oil operation, although average well productivity is much lower.

Future Potential Extraction Processes

Recognizing the aforementioned impacts associated with the SAGD process, industry is investigating other potential extraction technologies. Several of these technologies are currently in the pilot stage to determine their economic viability. Until such time that these technologies are proven, Connacher believes that utilization of the SAGD technology for the Project is the appropriate bitumen resource extraction technology. It is Connacher's intention to continue to monitor trial technological processes so that they may be incorporated, where appropriate and subject to regulatory approval, into future Company developments. Examples of some of the trial technology processes currently being evaluated include:

Toe to Heal Air Injection (THAI)

THAI technology is proprietary technology owned by Petrobank and is currently being tested on a pilot basis for application in the oil sands. It is a method of thermal recovery in which fire is created inside the reservoir by injecting and igniting oxygen. It is a new combustion process that combines a vertical air injection well with a horizontal production well. During the process a combustion front is created where part of the oil in the reservoir is burned, generating heat which reduces the viscosity of the remaining bitumen allowing it to flow by gravity to the horizontal production well. The combustion front sweeps the bitumen from the toe to the heel of the horizontal producing well, potentially recovering an estimated 80 percent of the original oil-in-place (Source: The Oil Drum, 2008). According to Petrobank, if the process can be proven effective for oil sands deposits, THAI offers many potential advantages over

SAGD, including higher resource recovery of the original oil in place, lower production and capital costs, minimal usage of natural gas and fresh water, a partially upgraded crude oil product, reduced diluent requirements for transportation and significantly lower greenhouse gas emissions (Source: Oil Sands Recovery Center, 2008).

Solvent Injection

This process is another developing technology that is similar to SAGD, only it uses solvents instead of steam to displace bitumen and reduce its viscosity. It also remains in the non-commercial pilot stage. The injection of vapourized solvents, such as propane, help create a vapor-chamber through which the bitumen flows due to gravity drainage. The key benefits may be significantly lower energy costs, potential for *in situ* upgrading and application to thin reservoirs (Source: Oil Sands Recovery Center, 2008). The cost of solvent is a significant economic consideration for VAPEX operations (Source: Calgary Center for Innovative Technology, 2008).

Electro Thermal Dynamic Stripping Process (ET-DSP)

ET-DSP – a third emergent energy technology uses electricity to heat the bitumen deposits to mobilize the bitumen, allowing production using simple vertical wells (Source: Wikipedia, 2008). Test trials are ongoing to determine the benefits and shortcomings of using ET-DSP technology. ET-DSP is more suited for shallow oil sands deposits and would not be cost effective for Connacher's oil sands properties, which are around 450 metres below surface.

A.3.2.2 Fuel Source Alternatives

Four fuel supply options were considered for the Project:

- using bitumen produced by the project is a potential fuel source alternative; this was rejected at this time due to high maintenance costs on the specialized boilers required to burn bitumen and the significant capital and operating costs associated with flue gas cleanup equipment that would be required to scrub pollutants from the generated exhaust gases. This will be continually evaluated.
- coal is abundant and a readily available economic fuel supply source. However, there are no nearby coal fields that could be developed. Upgrading existing infrastructure (e.g., rail) or the installation of new infrastructure (e.g., slurry pipeline, pneumatic pipeline, conveyor system) make the use of coal cost prohibitive as a fuel supply source. Coal is also a highly pollutive substance that would require significant capital investment to scrub and capture pollutants;
- petroleum coke - There are practically no available supplies of Petroleum Coke or other industrial processing by-products within the immediate vicinity of the Project that would make this fuel suitable as a fuel supply source. Similar to coal, upgrading or installation of infrastructure to accommodate this fuel supply make the use of this fuel uneconomic; and
- natural gas is the fuel source for the existing operations (Pod One and Algar) and has been selected for the Project. Natural gas is a clean burning fuel that emits less pollutants than coal. Existing infrastructure from a third-party pipeline system is already in place to provide this fuel supply to the CPF.

A.3.2.3 Water Supply Alternatives

In a SAGD operation, water will be supplied from subsurface source to the CPF. The water is used for a number of purposes, such as steam generation, utility services and domestic needs.

- Connacher currently uses water sourced from the Grand Rapids formation, a non-potable, non-saline subsurface aquifer, to supply the Pod One and Algar projects. The same formation is planned to be used for the Project.

A.3.2.4 Water Treatment Alternatives

In-situ recovery schemes with non-saline requirements of more than 500,000 m^3 must recycle produced water. Accordingly produced water resulting from the primary and secondary oil/water separation processes must be recycled for subsequent use in steam generation in Connacher's operations.

There are a number of different water treatment processes, but for the purposes of this Application only two alternatives were considered:

- Warm Lime Softening (WLS) - until recently, this alternative was considered the standard water treatment process usued for once through stream generators ("OTSG"). Lime softening is suited for water containing high levels of "temporary hardness" and silica. In the WLS process, the pH of the water being treated is raised by adding hydrated lime ($Ca(OH_2)$) to precipitate insoluble calcium carbonate. The precipitates, referred to as blowdown, are dewatered in a series of large settling ponds and sent to landfill for disposal.
- Evaporation / Crystallizers - this process is preferred over the traditional WLS process since it is much easier to operate, has less chemical handling requirements, better process reliability, significantly reduced environmental footprint and reduced maintenance needs. Unlike the WLS process, the Evaporation process can separate the residual organics along with removal of 99% of all dissolved solids to make BFW quality suitable for a drum type boiler. This is also the technology that is currently being used at the Pod One and Algar operations and will continue to be used for the Project.

A.4 APPLICATION FOR APPROVAL

Connacher is currently operating Pod One and is expected to commence circulation and subsequent steam injection at Algar in Q2 2010 (Figure A.1-1). Both facilities have a design capacity of approximately 1,600 m^3/day (10,000 barrels/day) of bitumen. Connacher plans to expand the productive capacity of operations in Great Divide by an additional 3,800 m^3/day (24,000 barrels/day) of bitumen production. The total production of the Great Divide area will increase to approximately 7,000 m^3/day (44,000 barrels/day).

Connacher plans to employ the same bitumen extracting and processing technology in all phases of the Project as are currently being used for the Pod One and Algar projects. The expansion will employ "more of the same" technology. The existing infrastructure, both internal and external, will be used and expanded as required.

A.4.1 Name of Applicant

The name of the applicant for the Project is Connacher Oil and Gas Limited.

The address of the applicant is:

Connacher Oil and Gas Limited
Suite 900 Centrium Place
332 – 6th Avenue S.W.
Calgary, Alberta T2P 0B2

Correspondence concerning this application should be directed to the above address to the attention of:

Name: Mr. Steve De Maio, Vice President Project Development
Phone: (403) 538-6201
Fax: (403) 538-6225
E-Mail: EIA@connacheroil.com

A.4.2 Existing Operations and Approvals

Operations began at the Great Divide SAGD Project in September 2007. Connacher has been successfully operating the facility and current production is approaching the design capacity. Connacher holds the following approvals for the Project:

- Great Divide EPEA Approval - No. 223216-00-00 (as amended);
- ERCB Scheme Approval - No. 10587;
- Water Act Licence - No. 00240458-00-00;

Operations at the Algar SAGD Project are scheduled to begin in the spring 2010. Connacher holds the following approvals for the Project:

- Algar EPEA 240008-00-00 (as amended);
- ERCB Scheme Approval - No. 11253 and 11253A (addition of the cogeneration unit);
- AUC Approval – ISD Order No. U2010-106; Power Plant Approval U2010-107; and
- Water Act Licence - No. 00240527-00-00.

Connacher holds numerous SRD and RMWB approvals for both existing projects. These are described further in Section D.13 of the Application.

A.4.3 Expansion Activities and Approvals/Amendments

ERCB

Connacher plans to maintain the two ERCB facility licences, for both the Great Divide (No. F36853) and Algar (No. F40209) central processing facilities (CPF). The Algar CPF will be expanded from the current production design (1,600 m^3 (10,000 barrels) bitumen per day) to a capacity of 5,400 m^3 (34,000 barrels) of bitumen per day. The total production capacity for the Great Divide area, after the expansion is completed is estimated to be 7,000 m^3 (44,000 barrels) of bitumen per day. The sulphur emissions at each facility are expected to be below one tonne per day. Sulphur control (as per ERCB Interim Directive ID 2001-3) will occur if either facility exceeds one tonne per day.

Connacher has an approved Project Area for both Great Divide and Algar. The locations of these are provided in Table A.4.3.1 and are shown on Figure A.4-1. Connacher plans to merge these two Project Areas into a single, larger Project Area that encompasses the entire Great Divide Lease Area. Connacher plans to extract the bitumen resource from the entire Project Area and process it at either the Great Divide or the expanded Algar plant.

Table A.4.3.1 Location of Great Divide, Algar and Expansion Project Areas

Project	Township	Range	Meridian	Section or Portions of
Great Divide	82	12	W4M	8, 9 10, 15, 16, 17, 20, 21, 22, 27, 28, 29, 32, 33, 34
Algar	82	12	W4M	13 (NE, LSD 6, 7, 8, 11, 14), 24 (SE, LSD 3, 6)
	82	11	W4M	18 (NE, LSD 5, 6, 7, 8), 19, 20, 29, 30, 31, 32
Expansion	81	11	W4M	27, 28, 29, 30, 31, 32, 33, 34
	82	11	W4M	3, 4, 5, 6, 7, 8, 17, 18, 19, 20, 29, 30, 31, 32
	82	12	W4M	8, 9, 10, 11, 12 ,13, 14, 15, 16, 17, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 32, 33, 34, 35, 36
	82	13	W4M	2, 3, 4, 9, 10, 11, 14, 15, 23, 26, 35

Connacher is seeking the following approvals from ERCB:

- amend ERCB Scheme Approval - No. 11253 and 11253A to expand the Algar CPF by an additional 3,800 m^3 (24,000 barrels) of bitumen per day, pursuant to Sections 10 and 11 of the Oil Sands Conservation Act and Sections 3 and 33 of the Oil Sands Conservation Regulations;
- amend ERCB Scheme Approval - No. 10587 (Great Divide) and 11253 (Algar) to amalgamate the bitumen recovery Project Areas to include the entire Great Divide Lease area as shown in Table A.4.3.1 that includes 40 well pads and infrastructure encompassing approximately 521 ha over three phases of development;
- construct and operate additional distribution and gathering pipeline systems within the Project Area, pursuant to Section 4 of the Pipeline Act; and
- amend ERCB Scheme Approval - No. 11253A to construct and operate an additional cogeneration unit which requires approval from the Alberta Utilities Commission (AUC), pursuant to Section 4 of the Hydro and Electric Energy Act.

AENV

Connacher plans to merge the Great Divide and Algar EPEA approvals into a single approval. It is preferable to merge the Great Divide Approval (No. 223216-00-00) into the Algar Approval (No. 240008-00-00). The combined approval could then be amended to include the Great Divide SAGD Expansion Project, that includes the Algar CPF expansion, 40 well pads and infrastructure encompassing approximately 521 ha over three phases of development.

Connacher would like to merge the two Water Act Licences (allocations) into one and amend the combined Licence for the additional water required for the Project. The Licence for Algar (No. 00240527-00-00) could be merged with the Licence for Great Divide (No. 00240458-00-00).

Connacher is seeking the following from AENV:

- approval, pursuant to Part 2, Division 2 and Section 66 of the Alberta Environmental Enhancement and Protection Act, to construct and operate the project including facilities to recover and treat bitumen and processed water;

- conservation and reclamation approval, pursuant to Part 2, Division 2 and Part 6 of the Alberta Environmental Enhancement and Protection Act, to develop, operate and reclaim the various components of the Project;
- Project approval for additional water supply (480,000 m^3 annually) pursuant to the Water Act; and
- Connacher submits the Project Environmental Impact Assessment Report (the "Report") to the Director for his review, pursuant to Section 50 of the Environmental Protection and Enhancement Act ("EPEA") and for a decision, in due course, by the Director that the Report is complete pursuant to Section 53 of EPEA.

A.4.4 Additional Approvals Associated with the Application

Connacher will file separate applications for those parts of the project that are legislated under various other statutes. Provincial application and approval requirements applicable to the project which will be submitted under separate cover are:

- surface rights requirements pursuant to the Public Lands Act;
- site surface disturbance clearance pursuant to the Historical Resources Act;
- production and injection well drilling licenses issued pursuant to the Oil and Gas Conservation Act;
- Development Permit issued pursuant to the Municipal Government Act, Part 17, from the Regional Municipality of Wood Buffalo for construction and operation of the Project and related infrastructure; and
- electrical power interconnections issued pursuant to the Electrical Utilities Act.

Connacher is not aware of any federal permit applications or approvals that are required for the Project. In the event approval from federal agencies is subsequently required, Connacher will make separate application directly to the appropriate regulatory authorities.

A.4.5 Application Guide and Description

The application for approval to the ERCB and AENV has been integrated in accordance with the guidelines to facilitate an efficient review of the application by the regulatory review agencies and the public. This application for the Project is presented in two volumes that consist of the following components:

Volume 1:

- Part A – Project Introduction;
- Part B – Project Description;
- Part C – EIA Methodology
- Part D – Environmental Impact Assessment;
- Part E – Conceptual Conservation and Reclamation Plan;
- Part F – Stakeholder Consultation;
- Part G – EPEA Application;
- Part H – Water Act Application;
- Appendix 1 – Terms of Reference and Concordance Table;
- Appendix 2 – Project Team;
- Appendix 3 – Glossary and Acronyms;

- Appendix 4 – References;
- Appendix 5 – Public Consultation;
- Appendix 6 – Existing Approvals;
- Appendix 7 – Traditional Land Use;
- Appendix 8 – Geological X-Sections.

Volume 2:

- Consultant Report #1 – Air Quality;
- Consultant Report #2 – Aquatic Resources;
- Consultant Report #3 – Groundwater;
- Consultant Report #4 – Historical Resources;
- Consultant Report #5 – Human Health;
- Consultant Report #6 – Hydrology;
- Consultant Report #7 – Noise;
- Consultant Report #8 – Socio-economic;
- Consultant Report #9 – Soils;
- Consultant Report #10 – Vegetation and Wetlands;
- Consultant Report #11 – Wildlife;
  - CD Rom with Appendices from Consultant Reports.

A.5 REGIONAL SETTING

The Project is located on both sides of Highway 63, approximately 70 km southeast of Fort McMurray (Figure A.1-1 and A.1-2) within Townships 81 to 83, Range 11 to 12, W4M. The nearest residence to the proposed development is located in the Hamlet of Mariana Lake, which is 25 km south-west of the Project. According to the 2006 census, nine people reside in the community.

The Project is located in the Christina and Horse River watersheds and lies within the Wabasca Lowland Ecoregion, which is part of the Boreal Plains Ecozone. The Project is located in the Central Mixedwood Natural Subregion of the Boreal Forest Natural Region within the Northern Alberta Uplands Physiographic Region. The dominant soil types in the region are Organic, Gray Luvisols, Brunisols, and Gleysols, with some Cryosols (Beckingham and Archibald 1996). The whole region slopes gently and drains northward toward the Athabasca Clearwater Rivers. The vegetation of the region supports a variety of characteristic wildlife including moose, black bear, caribou, wolf, lynx, snowshoe hare, waterfowl, ruffed grouse, and other birds.

There is an extensive history of fire in the area (1980, 1981, 1982, and 1995); wildfires burned a large proportion of the area, and thus much of the vegetation is in early successional stages.

There are four traplines in the Project Area that are active:

- TPA #1842, Jason McKenzie, 03, 04, 09,10,13 to 16; 35-083-12W4M
- TPA # 2277, Donald Huppie, 29 to 32-082-11W4M; 25 to 29; 32 to 36-082-12W4M; 02,11,14, 23-083-12W4M
- TPA # 2867, Norman Dube, 08,16,17,21-082-12W4M (W/HWY 63); 0-082-12W4M

- TPA # 2945, Romeo Gauthier, 27 to 34; 081-11W4M; 03 to 08-082-11W4M; 08, 16, 17, 21-082-12W4M (E/HWY 63);09 to 15-082-12W4M

There are a number of conventional oil and gas companies operating within the Project Area who are actively developing the resource. These are described in greater detail in Section D.13 of the Application.

A.6 DEVELOPMENT PLAN

Connacher plans to employ the same bitumen extracting and processing technology in all phases of the Project as are currently being used for the Great Divide and Algar Projects. The expansion will employ "more of the same" technology. The existing infrastructure, both internal and external, will be used and expanded as required. The three phases of development are described below and the schedule is shown in Table A.6.0.1:

Phase 1:

- expansion of the CPF by 3,800 m^3/day which will occur entirely within the existing Algar CPF footprint;
- additional lay down area adjacent to the CPF will be required;
- additional area for remote sumps will be required;
- nine well pads with 59 well pairs, required to increase production by 3,800 m^3/day;
- access roads and infrastructure, including borrow pits;
- total estimated footprint required is 145.5 ha.

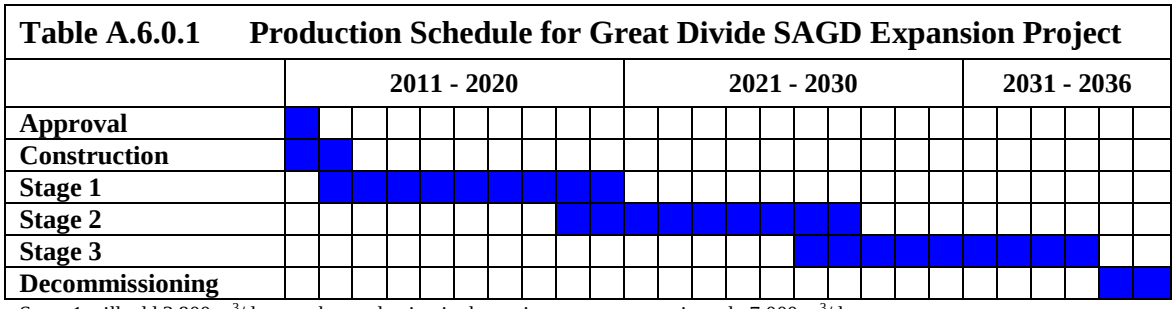
Phase 2:

- twelve well pads with 73 well pairs, required to maintain the full production of 7,000 m3/day;
- access roads and infrastructure, including borrow pits;
- additional area for remote sumps;
- total estimated footprint required is 189.9 ha.

Phase 3:

- nineteen well pads with 83 well pairs, required to maintain the full production of 7,000 m3/day;
- access roads and infrastructure, including borrow pits;
- additional area for remote sumps;
- total estimated footprint required is 186.3 ha.

Table A.6.0.1 Production Schedule for Great Divide SAGD Expansion Project



Stage 1 will add 3,800 m^3/day to take production in the project area to approximately 7,000 m^3/day.
Stage 2 will hold the production profile flat at 7,000 m^3/day as Stage 1 wells are depleted.
Stage 3 will hold the production profile flat at 7,000 m^3/day as Stage 2 wells are depleted.

A.7 SUMMARY STAKEHOLDER CONSULTATION

A.7.1 Stakeholder Consultation

Connacher believes that all interested stakeholders who may be potentially affected by the company's development plans should be consulted, informed or notified of the company's plans and activities. Connacher started developing its relationship with potentially affected communities to its SAGD operation in 2004 prior to planning and building the first phase of its operation at Great Divide (Pod One), 80km south of Fort McMurray, on Highway 63. In 2008 Connacher built on these relationships and set out a consultation policy using the following steps:

- identified the potentially affected communities through discussions with the Government of Alberta, the Rural Municipality of Wood Buffalo, and with Aboriginal communities close to the Pod One site. Connacher also talked to other companies and organizations who had previously worked in the area;
- developed a list of communities, individuals, groups, agencies and companies based on the information received; and
- developed a strategy that met the following criteria:
    - Connacher would develop long term, transparent relationships that would begin with exploration and last through to reclamation;
    - relationships would provide a basis for two way communication from which Connacher could listen to, document and incorporate the information gleaned, as appropriate, to its plans and operations;
    - ensure that the relationship developed did not only involve matters on a business perspective but on a personal basis were appropriate (put some faces to the names); and
    - use the method acceptable with the identified community for consultation, information or notification.

Consultation with Aboriginal communities included timely, open dialogue between company decision makers and community members, leadership and staff. The objective was to provide understandable information on the Project while listening to and collecting input from community members and their advisors. The input received was recorded and considered by Connacher. Many ideas and suggestions provided by community members were incorporated into the plans for the Project.

Connacher intends to continue this proactive relationship and consultation through to closure and final reclamation of the Project.

Connacher initiated discussions directed at the use of the land, the environment, education, training, employment and economic development as appropriate to the size of the Project. Results of these discussions provided Connacher and the Aboriginal communities with information that will enable them to design and implement programs and policies that will positively impact the communities' experience with industry into the future.

Connacher continued to follow its consultation process with its Aboriginal neighbours established through initial consultation with these communities. The following principles govern this ongoing consultation process:

- recognition that each First Nation or Métis community has its own manner of doing business and therefore Connacher will develop jointly with each Aboriginal community a process designed to address the needs of that community;

- consultation and the resultant programs and policies will be based on a long term, mutually beneficial relationship that will be encouraged until closure and final reclamation of the Project;
- consultation is to be undertaken and completed in a timely manner, recognizing the busy schedules of all the Aboriginal communities, their members and advisors. Information provided will be understandable;
- records of meetings, open houses and informal discussions will be compiled and input received from Aboriginal communities will be fairly considered and where appropriate will be incorporated into Connacher's development plans;
- Traditional Land Use (TLU) information that is gathered during consultation and is proprietary will be treated as such. TLU information gathered and used by Connacher is done so with the permission of the appropriate community; and
- consultation with the Aboriginal communities will meet or exceed all consultation guidelines as outlined by the Province of Alberta.

A.7.2 Consultation Activities

A.7.2.1 First Nation Communities

Connacher has consulted with the following First Nation communities:

- Fort McMurray #468 First Nation;
- Chipewyan Prairie Dene First Nation; and
- Heart Lake First Nation.

Connacher representatives have participated in planning meetings, community events, social gatherings and has assisted with training programs when requested by the community.

A.7.2.2 Métis Communities

Connacher has consulted with the following Métis communities:

- Willow Lake Métis Local 780;
- Fort McMurray Métis Local 1935;
- Chard Métis Local 214; and
- Métis Nation of Alberta Region One.

Connacher representatives have participated in planning meetings, community events, social gatherings and has assisted with training programs when requested by the community.

A.7.2.3 Trappers

Connacher has consulted with the Aboriginal and non-Aboriginal trappers who have interests in the Project Area (Jason McKenzie, Donald Huppie, Norman Dube, and Romeo Gauthier).

Connacher has participated in various discussions and field visits with the trappers.

A.7.2.4 Other Stakeholders

Connacher has approached other stakeholders including Keyano College, RMWB, various government agencies and industrial neighbours.

Contact ranged from notification to meetings with these groups. Connacher has extended an invitation to meet with each group as required.

A.7.3 General Information

Through the many meetings that Connacher has had with Aboriginal communities there were a number of concerns that have been consistently raised which are not Project specific.

- Employment – All communities raised concerns about members of their communities not being able to find and maintain meaningful employment within the oil sands industry. Identified barriers to securing employment included: education, appropriate training, discrimination, distances, day care, transportation and addictions.
- Lack of capacity – All communities identified a lack of capacity to address the demands of resource development and associated regulatory processes. The communities indicated that their leadership struggles to meet the expectations of industry, government and their own community members. Additional funding and resources to address this capacity issue was identified as an immediate and future need. Lack of adequate housing was also identified as a barrier to securing adequate human resources to support the community and to more fully engage in review and consultation relating to resource development proposals.
- Access to land – The issue of access to land was raised repeatedly in various community meetings with two distinct and conflicting concerns. Community members expressed concern that oil sands development opened up areas of the boreal forest previously inaccessible to the general public and that access through roads and cut lines increased interference with caribou in caribou calving areas. Others expressed concern that barriers are erected across old trails and pathways, limiting community members unencumbered access to areas in the bush where they could previously access without interruption from developers.

A.7.4 TEK and TLU

A number of site visits and verification meetings were held with each Aboriginal group during the process to collect traditional information. A description of the activities that took place during meetings and the knowledge shared and concerns expressed specific to each community are provided in more detail in Appendix 7.

A.8 SUMMARY OF ENVIRONMENTAL, HISTORICAL RESOURCES AND SOCIO-ECONOMIC IMPACT ASSESSMENT

Environmental Impact Assessment (EIA) is a process, and not a document or report. An environmental impact assessment report is only one part of the EIA process. Beanlands and Duinker (1983) define an environmental impact assessment as a *"process or set of activities designed to contribute pertinent environmental information to project or program decision-making. In doing so, it attempts to predict or measure the environmental effects of specific human activities or do both, and to investigate and propose means of ameliorating those effects."*

Three phases within the environmental impact assessment are recognized:

- the environmental baseline study phase;
- the interpretive, predictive and evaluative phase (*i.e.*, the preparation and review of an environmental impact assessment report); and
- the post-construction assessment phase (*i.e.*, monitoring).

For the Project, the environmental impact assessment process is currently in the midst of the second stage of the EIA. Baseline environmental studies for the Project have been completed. This application forms the initial stages of the second phase of the EIA process, that is, the preparation of the EIA report. Upcoming government and public review of this application will complete the second phase of the EIA process. Should the proposed project be approved, environmental monitoring during SAGD development operations will constitute the third stage of the EIA.

The Application and EIA has been prepared to fulfill the requirements specified in the Terms of Reference, as well as the environmental information requirements prescribed under the EPEA and Regulations, the Oil Sands Conservation Act (OSCA) and federal legislation which applies to the Project. However, consistent with the iterative nature of environmental assessment, this Application also addresses issues identified by government review agencies and directly-affected stakeholders during the collection of baseline environmental information and preparation of the EIA report.

The scope of the Project for the purposes of the EIA includes all phases (construction, operation, decommissioning and reclamation) of the in situ SAGD oil extraction operations and the associated facilities and infrastructure required to carry out these activities.

The Project EIA report has addressed impact concerns by identifying Valued Environmental Components (VECs). VECs for the Project are those environmental attributes associated with the proposed project development, which have been identified to be of concern either by directly-affected stakeholders, government or the professional community. VECs have been identified within each of the following disciplines:

- Air Quality;
- Aquatics;
- Groundwater;
- Historical Resources;
- Human and Wildlife Health;
- Hydrology;
- Noise;
- Socio-economic;
- Soils;
- Vegetation and Wetlands;
- Wildlife;
- Greenhouse Gases; and
- Land and Resource Use.

The EIA Terms of Reference for the Project states “The Study Area for the EIA report shall include the Project Area as well as, the spatial and temporal limits of individual environmental components outside the Project Area boundaries where an effect can be reasonably expected. The Study Area includes both the Local and Regional Study Areas.”

Spatial boundaries are established based on the zone of the Project influence, beyond which the potential environmental, cultural and socio-economic effects of the Project are expected to be non-detectable. VEC-specific boundaries are established for both a Local Study Area (LSA), for Project-specific effects, and a Regional Study Area (RSA), for cumulative effects.

The Project EIA considers the following assessment scenarios:

- **Baseline Case**, which includes existing environmental conditions and existing projects or "approved" activities;
- **Application Case**, which includes the Baseline Case plus the Project; and
- **Planned Development Case (Cumulative Effects)**, which includes the "Application Case" combined with past studies, existing and anticipated future environmental conditions, existing projects or activities, plus other "planned" projects or activities.

Based on the methodology included in Part C, the EIA for the Project focused on the effects that the Project would have on the identified VECs in combination with other activities in the region over the anticipated 25 year economic life of the Project.

Based on the input received during the public consultation program, advice from regulatory agencies, and the professional community participants that worked on the Project, Connacher is confident that the methodology and approach used to conduct the EIA has enabled a comprehensive and accurate assessment of the effects of the Project.

A summary of the EIA has been provided in this section along with Connacher's commitments for mitigation and monitoring.

A.8.1 Air Quality

The potential effects of the Project on air quality at nearby receptors are discussed in Section D.1 and Consultants Report #1 (CR #1).

The local (LSA) and regional study (RSA) areas were chosen based on the location of major regional industrial emission sources and the expected spread of project concentration and deposition contours. For the Project, maximum concentrations are expected to occur within 5km of the main emission sources and decrease with increasing distance beyond this point. The LSA is a 30 km by 30 km square centred approximately on Connacher's existing Algar and Great Divide operations. The RSA is about 220 km by 330 km and includes the mining areas in the northern oil sands, down to the Air Weapons Range in the south.

Natural gas will be the prime fuel source for the Project. Some produced gas from the reservoir will be recovered and burned with the natural gas. Continuous emission sources at the proposed facility include five steam boilers, a utility boiler, a glycol heater, and a cogeneration unit. Flare stacks are used for emergency only.

A number of potential Valued Environmental Components (VECs) were identified as they relate to potential human or ecosystem health effects:

- nitrogen oxides (NO_2), sulphur dioxide (SO_2), hydrogen sulphide (H_2S), carbon monoxide (CO), specific volatile organic carbons (VOCs) and polycyclic aromatic hydrocarbons (PAHs);
- potential acid input (PAI) and eutrophication (nitrogen deposition);
- greenhouse gas (GHG) emissions; and
- ozone (O3).

In accordance with recent modelling practice, the CALMET and CALPUFF models were used in the air quality assessment as recommended models by AENV (2009a). Results of the air quality modelling indicate that there are no exceedances of the AENV Alberta ambient air quality objectives (AAAQOs) for

sulphur dioxide, nitrogen oxides and carbon monoxide predicted at any locations for the three assessment scenarios. For particulate matter (PM2.5) there were no exceedances of the Canada Wide Standard at the local MPOI but there are exceedances at the regional MPOI for all assessment scenarios. There are also some exceedances of the AAAQO at regional and local MPOIs the latter due to assumptions used for traffic on Highway 63.

Modelling results for potential acid input indicates that the project does not contribute to an area above the CASA critical load and monitoring load. There is a small increase in area (approximately 6 ha) above the monitoring load in the LSA for the PDC scenario. The Project contribution to regional nitrogen deposition levels is negligible. There were also no predicted exceedances of AAAQOs of any COPC at the local MPOIs or at any of the cabin/camp receptors but there were predicted hourly exceedances at the regional MPOI for benzene, H2S, toluene, and xylenes. There were also predicted daily exceedances at the regional MPOI for H2S, toluene, and xylenes. For most COPCs the contribution of the Project at any location was negligible and for others the absolute contribution of the Project is small. The Project contributes to a 0.5% increase in regional NO_x emissions and therefore the contribution to regional ozone would be approximately 0.035%, which is a negligible increase.

Dispersion modelling of the emergency flaring scenario resulted in SO_2 and NO_2 below the AAAQO. The worst case upset scenario for the Project is not expected to contribute significantly to ground-level SO_2 and NO_2 concentrations.

With mitigation, the effects of the Project on air quality VECs are considered insignificant.

Connacher will utilize the following mitigation measures to reduce potential impacts of the Project on air quality:

- sulphur recovery, if required, will meet ERCB requirements;
- there will be no continuous flaring other than pilot and purge gas;
- the emergency flare system will include liquid knockout facilities, pilot/purge gas, continuous monitoring and burner management;
- vapour recovery systems will be installed;
- the selection of low NO_x emissions technology as required by the CCME National Emission Guideline for Commercial / Industrial Boilers and Heaters;
- the use of process designs that reduce VOC emissions;
- plant-wide fugitive emissions identification and control using the protocol recommended by the CCME guideline “Environmental Code of Practice for the Measurement and Control of Fugitive Emissions from Equipment Leaks” (CCME 1993);
- a vapour recovery unit (VRU) to condense and recover emissions;
- floating roofs on storage tanks, where appropriate;
- ultra-low sulphur diesel fuel will be used for tanker trucks hauling bitumen from the plant site;
- U.S. EPA Tier 4 standards will apply to haul trucks; and
- watering of any unpaved portions of the haul truck route to prevent dust emissions.

In order to verify that the mitigation measures have been effective Connacher will conduct the following source monitoring:

- produced gas will be tested for H2S content and SO2 emissions will be estimated from the produced gas flow rate;

- produced gas composition and fuel use will be monitored to determine GHG emissions;
- NOx emissions from one of the Project steam boilers and the cogen will be tested within six months of project start-up, and thereafter surveyed annually; and
- continue to operate the existing air monitoring trailer at the Algar site for six months each year. Monitored parameters will include wind speed and direction, SO2, NOx and H2S. Measurements of SO2 and NOx could be used to provide input to estimation of acid deposition.

A.8.2 Aquatic Resources

The potential effects of the Project on aquatic resources are discussed in Section D.2 and Consultants Report #2 (CR #2).

The LSA encompasses portions of the Horse River watershed and the Christina River watershed within approximately 1 km of the RDA and the downstream portion of the watercourses, within approximately 4 km to the nearest confluence with a larger watercourse.

The RSA includes the watercourses of the LSA and the main stem of the Christina and Horse rivers downstream to their confluence to a major watercourse. The Christina River flows into the Clearwater River and the Horse River flows into the Athabasca River.

The VECs evaluated in the aquatic resource assessment include surface water quality and fisheries resources.

The aquatic resources Baseline Case consists of a description of surface water quality, fish resources, physical aquatic habitat, sediment quality, and benthic invertebrate communities, first for the watercourses within the LSA, followed by the lakes within the LSA, and then the watercourses that comprise the RSA.

The surface aquatic resource issues considered in the assessment of the Application and Planned Development Cases include:

- changes in surface water quality;
- changes in fish health and fish tissue, including fish tainting; and
- alteration/loss of fish resources and aquatic habitat.

With strict implementation of the proposed mitigation measures, potential impacts to aquatic resources through changes in surface water quality and surface water flow rates are predicted to be insignificant.

Improved access and increased workforce in the area as a result of the Project could increase fishing pressure and fish harvest in local fish-bearing waterbodies and watercourses.

While many fish populations in the region are sensitive to angling pressure, and while the workforce may potentially catch additional fish, it is expected that with mitigation these effects of increased angling on LSA fish populations will be insignificant.

With implementation of the mitigation measures to address potential sedimentation of surface waters, as well as any releases of process-affected water and accidental spills of contaminants to surface waters) potential impacts to fish health through potential changes in water quality are predicted to be insignificant.

For Baseline and Application cases, predicted PAI values at all lakes are significantly below Alberta's Clean Air Strategic Alliance (CASA) target level of 0.25 keq H^+/ha/yr. The residual (after mitigation) effects of the Project in the Application Case on surface aquatic resources through acidifying emissions are assessed as Insignificant for both the Air Quality LSA and Air Quality RSA. Because the residual effects of the Project on surface aquatic resources from changes in acidifying emissions are assessed as Insignificant for both the LSA and RSA, these effects are not assessed for the PDC.

Connacher will utilize the following measures to mitigate potential impacts to aquatic resources:

- earthworks contractors will be required to submit a sediment control plan;
- sediment control measures as those described in the Alberta Code of Practice for Watercourse Crossings (AENV 2000a) will be implemented for earthworks which take place within or in close proximity to watercourses;
- whenever possible, surface disturbance activities in close proximity to watercourses will be carried out during periods of relatively low surface runoff in late fall, winter and early spring (from October to April);
- a 30 m buffer (vegetation) strip will be left between disturbance sites and watercourses except at stream crossings and diversions;
- the time interval between clearing/grubbing and subsequent earthworks will be minimized, particularly at or in the vicinity of watercourses or in areas susceptible to erosion;
- when required, slope grading and stabilization techniques will be adopted in order to reduce erosion risk;
- as required, surface runoff collection and treatment systems will be used to direct surface runoff from both disturbed areas and constructed areas (well pads and roads) into settling impoundments/sumps for removal of settleable solids;
- progressive disturbance and reclamation will be undertaken to reduce the amount of disturbed area at any given time;
- where necessary, interim erosion/sediment control measures will be utilized until long-term protection can be effectively implemented;
- all watercourse crossings will be designed and constructed in compliance with the Alberta Code of Practice for Watercourse Crossings (AENV 2000a) and associated guidelines;
- the existence and location of a defined stream channel at well pad 106 (Phase 3 development) has not been confirmed through either aquatic resources or hydrology fieldwork. The nature of the stream should be assessed prior to well pad construction and where possible, construction works should aim to avoid direct impact to the watercourse and provide a minimum 30 m buffer from the edge of the stream bank;
- surface water run-off from the plant site will be directed to a storm water retention pond and returned to the central processing facility (CPF) for use as plant makeup water. However, it is anticipated that occasionally, depending upon site and operating conditions, the surface runoff collected in the pond may be released into the surrounding watershed receiving waters;
- retention pond water will always be tested prior to discharge and will only be released in accordance with the terms and conditions of the operating approval;
- additionally, an Environmental Health and Safety Management Plan which will describe the contingency plans for responses to accidental releases;
- diverting runoff from disturbed areas into the natural environment, away from the existing stream networks;
- phasing reclamation activities such that they commence before the entire Project is developed;

- returning the Project area to a natural state when the Project is completed; and
- discouraging fishing by Project employees within the Project Area.

In order to verify that the mitigation measures have been effective Connacher will:

- routinely monitor suspended sediments will be (upstream and downstream) during construction periods for all in-stream construction activities; and
- monitor at specific locations in specific drainages in accordance with the terms and conditions of the EPEA approval.

A.8.3 Groundwater

The potential effects of the Project on groundwater are discussed in Section D.3 and Consultants Report #3 (CR #3).

Experience with projects of this type has shown that impacts on the hydrogeological regime do not go beyond the lease boundaries. With this in mind, this assessment does not distinguish between regional and local study areas. The hydrogeological study area was the Connacher lease boundary.

Groundwater VECs for the Project are those environmental attributes associated with the proposed project development, which have been identified to be of concern either by directly-affected stakeholders, government or the professional community. The Project VECs and potential impacts of the project include:

- effects of the water supply wells on groundwater quantity and levels;
- effects of the surface facilities on groundwater quality;
- effects of the production/injection wells on groundwater quality; and
- effects of the disposal wells on groundwater quality; and
- groundwater – surface water interaction.

The lower portion of the Grand Rapids Formation (Grand Rapids) is intended to be used as an initial, and perhaps permanent, water source for the Project. There are approved groundwater diversions from the lower Grand Rapids Formation of 0.29 million cubic metres per year from three wells for the Great Divide Project and 0.33 million cubic metres per year from four wells for the Algar Project, totalling 0.62 million cubic metres per year. There are no other users of the lower Grand Rapids Formation within the study area. The Project will require an additional 0.48 million cubic metres per year from a well field located in the vicinity of the Algar Plant. The drawdown of water levels (drawdown) in the Grand Rapids was modelled. A net maximum drawdown of 11 m is predicted around the active well field. The drawdown outside of the Connacher lease resulting from the Project is a maximum of 4.5 m on the east side. Given that the non-pumping hydraulic head is approximately 60 m above the top of the lower Grand Rapids, these predicted drawdowns are less than 8 percent of the available hydraulic head. The groundwater production from the Grand Rapids Formation should have no significant impact on the quantity of water in other formations, the surface water resources or on vegetation.

In consideration of the facility design and material handling methods (Part B), the surface facilities should have no effects on groundwater quality under normal operating conditions. Upset conditions, specifically spills or leaks of fluids, may allow small amounts of fluids to seep into the shallow groundwater. A groundwater monitoring network has been established and monitoring is occurring and will continue throughout the life of the Project. The mitigation measures to be implemented should be effective in preventing or minimizing any fluids from adversely affecting the shallow groundwater. In the event that a

impact on groundwater quality is detected, a groundwater response plan will be implemented. The response plan will be effective at avoiding a significant effect on groundwater quality, preventing impacted groundwater from reaching surface water bodies and restoring groundwater quality. As a result, any spills or leaks should have no significant impact on the groundwater and surface water resources.

The Project design and monitoring plan in conjunction with the hydrogeological characteristics of the area means that the operation of the production and injection wells should not have any effect on the chemical quality of the groundwater in potable aquifers. Therefore, the impact is not significant.

Disposal wells are not planned for the Project, therefore there will be no effects.

It was shown that the hydraulic gradient is downward with 250 m of head loss in the approximately 350 m of depth to the lower Grand Rapids. It was also shown that pumping of the lower Grand Rapids may reduce the hydraulic head an approximate average of 7 m over the area of influence. This would have the effect of increasing the existing gradients by no more than 2 %. This would not cause a significant impact on surface water or any non-saline aquifers.

In addition to the facilities design and operation details discussed in Part B, Connacher will undertake the following mitigation to reduce the potential for impacts to the groundwater resource:

- utilize standard material handling methods in accordance with current regulations;
- utilize industry-standard operating practices of preparedness for upset conditions and appropriate management of upset conditions;
- utilize facility design and operating procedures as discussed in Part B such as cemented surface casing and cemented production casing to preventing casing failures and annular leakage from occurring; and
- utilize instrumentation that will detect a casing failure cause automatic shutdown of wells.

In order to verify that the mitigation measures have been effective Connacher's monitoring program will include:

- continuation of existing groundwater monitoring programs, in place as required in the EPEA approvals, for the Great Divide and Algar Projects; and
- evaluation of the performance of the water supply wells in the Grand Rapids in accordance with requirements of the Water Act licence.

A.8.4 Historical Resources

The potential effects of the Project on Historical Resources are discussed in Section D.4 and Consultants Report #4 (CR #4).

This LSA for the Historical Resource Assessment includes the entire Connacher lease. The RSA for historical resources has been defined as an area that includes the LSA and encompasses a larger area within which cultural continuity is expected in the archaeological and historic record. The RSA is based on the borden block designation system.

HRIA studies have effectively been completed for a significant portion of the Great Divide Expansion Project as a result of previous historical resources studies. No precontact period archaeological sites were identified during these studies. As part of the previous studies, a model of archaeological potential was developed in order to determine the relative ranking of terrain features in terms of the potential to identify

precontact archaeological sites. Overall the potential of the area is low to moderate, although some areas of high potential are present within the LSA.

Although the Project Area is largely of low to moderate archaeological potential, some areas of moderate to high potential do exist, based on the model of archaeological potential and on in-field observations. In addition, sites of significance are on record within the RSA, including one site of significance within proximity of the lease. Assessment conducted within the general Phase 1 area has not resulted in the identification of historical resources sites; no further study is recommended for the Phase 1 footprint relative to historical resources.

To mitigate potential impacts to historical resources Connacher will:

- apply to ACCS for clearance to develop new facilities, as required;
- undertake mitigation as recommended by ACCS; and
- notify ACCS if a historic resource not previously identified is encountered during construction of Project facilities.

A.8.5 Human and Wildlife Health

The potential effects of the Project on human and wildlife health are discussed in Section D.5 and Consultants Report #5 (CR #5a & 5b).

The Human Health Risk Assessment (HHRA) describes the nature and significance of potential short-term (i.e., acute) and long-term (i.e., chronic) health risks to humans associated with exposure to the Chemicals of Potential Concern (COPC) emitted or released from the Project. The HHRA examines the potential health risks attributable to the Project in combination with existing and planned emission sources in the region. The screening level wildlife risk assessment (SLWRA) addresses the same components with respect to effects on wildlife.

The COPCs for the Project were identified through the development of a comprehensive inventory of chemicals that could be emitted or released by the Project and to which people or wildlife might be exposed. The COPCs that were included in the HHRA and the SLWRA include:

- criteria air contaminants (CAC);
- carcinogenic polycyclic aromatic carbons (PAHs);
- petroleum hydrocarbon (PHC) fractions;
- volatile organic compounds (VOCs); and
- total reduced sulphur (TRS) compounds.

The HHRA was structured to characterize the potential health risks to area residents who reside in the area over the long-term. In the SLWRA the potential risks to wildlife species were not assessed for individual species, but instead, predicted COPC concentrations were compared to toxicity data and generic soil and water quality guidelines considered protective of all wildlife species.

The following exposure pathways were included, as applicable, in the HHRA:

- inhalation of air;
- inhalation of dust;
- ingestion of soil (inadvertent);

- ingestion of water;
- ingestion of local above-ground plants (including fruit and vegetables);
- ingestion of local below-ground plants (root vegetables);
- ingestion of local fish;
- ingestion of local wild game;
- dermal contact with water; and
- dermal contact with soil.

In the SLWRA the ingestion and inhalation exposure pathways were assessed.

The chemical emissions from the Project are not expected to result in adverse health effects in the region. For most of the COPCs, the magnitude of the differences in predicted health risks between the Baseline and Application Cases is negligible. The key findings of the HHRA are as follows:

- Acute Inhalation Assessment - The potential short-term health risks associated with the Project and other emissions sources were evaluated through the comparison of predicted air concentrations (10-minute, 1-hour, 8-hour or 24-hour) against health-based criteria (i.e., exposure limits). Overall, there were minimal changes between the Baseline and Application Cases, indicating that the Project emissions are not anticipated to have an impact on human health in the area.
- Chronic Inhalation Assessment - Predicted risks associated with continuous, long-term inhalation of the COPCs were evaluated through the comparison of predicted annual average air concentrations with health-based exposure limits. No exceedances of health-based exposure limits were predicted in the chronic inhalation assessment. All incremental lifetime cancer risks associated with continuous air inhalation were predicted to be less than one in 100,000, which is the benchmark considered to be essentially negligible by Health Canada (2009a).
- Chronic Multiple Pathway Assessment - The potential long-term health risks associated with exposure to the COPCs via multiple pathways of exposure were evaluated for permanent and seasonal residents in the area. In all instances, potential risks were determined to be negligible. All incremental lifetime cancer risks associated with exposure via multiple pathways of exposure were predicted to be less than one in 100,000, suggesting that the cancer risks associated with the Project are negligible.

The results of the SLWRA indicate that the overall risks posed to wildlife health will be negligible. Therefore, no impacts to wildlife populations are expected based on estimated wildlife exposures to predicted maximum acute and chronic air concentrations and predicted maximum soil and surface water concentrations.

Mitigation of potential health effects due to the project relies on appropriate mitigation of impacts to Air Quality (Section A.8.1) and Surface Water Quality (Section A.8.2).

Connacher currently monitors air and surface water quality in the area. If any issues arise from existing monitoring programs or concerns raised from local stakeholders Connacher will initiate the appropriate mitigation measures to ensure operations do not pose additional risk to human or wildlife health.

A.8.6 Hydrology

The potential effects of the Project on hydrology are discussed in Section D.6 and Consultants Report #6 (CR #6).

The Project lies within an area of the Lower Boreal Highlands, in the headwaters of two major streams – the Christina River and the Horse River. This area of the Lower Boreal Highlands drains into the surrounding lower Central Mixedwood Subregion.

The LSA used for the hydrology assessment includes the lease area and surrounding areas which may be affected by direct runoff from the Project. The RSA focuses on four watersheds, two draining into the Horse River basin and two draining into the Christina River.

Three VECs related to hydrology have the potential to be impacted by the Project including:

- runoff volumes and streamflows could be affected by changes to runoff volume, peak flows, and low flows;
- water levels and surface areas could be affected by changes in water levels and surface area due to streamflow changes; and
- channel morphology and sediment concentrations could be affected by changes in channel shape and sediment conc. due to flow changes and crossing construction.

The effect of the development on water levels and corresponding surface areas was found to be small. Peak water levels and surface areas in streams are not anticipated to change.

Channel morphology and sediment concentrations will not change due to the application development case because changes to the flow regime are small, and because road and utility corridor stream crossings will be designed to minimize the disturbance to the channels.

The effects of the project will be mitigated by design and by reclamation.

Connacher will undertake the following mitigation measures to reduce potential hydrological impacts from the Project:

- reclaim the landscape to be similar hydrologically to the pre-existing conditions;
- design stream crossings to avoid or minimize any impact on stream channels and erosion of channel banks;
- release water from stormwater runoff pond into natural environment away from streams;
- construct stream crossings in accordance with the Code of Practice for Watercourse Crossings (2007);
- maintain drainage disturbances so that runoff is not directed from one watershed into another; and
- maintain adequate buffers between stream channels and facility development.

In order to verify that the mitigation measures have been effective Connacher will:

- conduct monitoring as required in the EPEA approval;
- monitor water prior to release from the stormwater runoff pond; and
- conduct sediment monitoring during construction of watercourse crossings.

A.8.7 Noise

The potential effects of the Project on noise levels at nearby receptors are discussed in Section D.7 and Consultants Report #7 (CR #7).

The ERCB Directive 038 specifies that noise impact assessments are to be carried out to evaluate project impacts on the nearest dwelling. The nearest known dwelling is a Trapper's Cabin, which is located in between the existing Great Divide (Pod One) and Algar facilities. The Directive further specifies that, in the event the nearest dwelling is greater than a 1.5 km distance from the Project, new facilities must meet a permissible sound night time level of 40 dBA 1.5 km from the facility fence-line.

The results of the noise modeling indicated night-time noise levels below the ERCB Directive 038 permissible sound levels of 45 dBA at the nearby Trapper's Cabin and 40 dBA for all surrounding 1,500 m receptors. Further, the dBC – dBA sound levels indicated minimal likelihood of low frequency tonal components.

Although results of the noise modeling indicated that no specific additional noise mitigation measures are required for project equipment Connacher will utilize the following mitigation measures, where possible, to reduce the potential impacts associated with noise from the project:

- construction activity will be conducted between the hours of 07:00 and 22:00;
- internal combustion engines will be fitted with appropriate muffler systems; and
- respond to any noise related issues raised by stakeholders.

A.8.8 Socio-Economic

The potential effects of the Project on socio-economic resources are discussed in Section D.8 and Consultants Report #8 (CR #8).

The socio-economic impact assessment (SEIA) addresses the human environment with and without the Project. The key socio-economic issues considered in the analysis fall into the following categories:

- employment effects;
- regional and provincial economic benefits;
- population effects;
- effects on regional infrastructure and services;
- traditional land use effects; and
- transportation effects.

The focus of the analysis of employment, income, population, and infrastructure effects is on the Edmonton Census Metropolitan Area (CMA). Transportation issues are analyzed with special attention to the corridor along Highway 63 between the Project and the City of Edmonton and effects on police, emergency, and health services focus on the Urban Services Area of the Regional Municipality of Wood Buffalo (Fort McMurray).

Once fully operational, the Project is expected to increase the total operations workforce for the Algar and Pod One projects by 80 positions, from 125 to 215 persons. An estimated two-thirds of these full-time positions are expected to be direct employees of Connacher, with the balance consisting of contractors.

The company will continue to promote employment, contractor and supply opportunities for local and especially aboriginal contractors through efforts such as:

- procurement policies that consider degree of aboriginal participation;
- breakdown of the contract size for selected procurement items to reflect the size and capabilities of RMWB-based contractors; and

- use of the procurement promotion systems within RED Link and NAABA, as well as other RSA-based advertisements.

Economic benefits of the Project will include:

- construction capital expenditures estimated at approximately $600 million;
- sustaining capital outlays beginning in 2013 and are an average of approximately $21 million per year;
- operations costs of the Project (excluding gas and electrical costs) are estimated to average $88 million per year;
- property taxes to the RMWB;
- oil sands royalties to the provincial government; and
- corporate taxes to the provincial and federal government.

Through operations of its Pod One CPF and the construction of its Algar CPF, Connacher has developed a number of relationships with contractors in the regional area. Connacher intends to continue working with regionally based contractors to increase the share of local contractors in Project work.

The Project's population effect and the associated effect on service providers in the RSA is expected to be small. The Project will use on-site operations and construction camps and institute worker commute systems, using private vehicles, busses, and a fly-in/fly-out program utilizing the Fort McMurray airport.

Connacher is committed to hiring locally whenever possible and to fully use available local and provincial workforce. The residency patterns of the current Connacher workforce and the inclusion of a permanent on-site operations camp suggests that the majority of operations workers will live outside the Wood Buffalo region. The same holds for the temporary construction workforce.

Connacher will utilize the following mitigation measures in order to reduce potential impacts to socio-economic resources:

- utilize a camp to house construction and operations personnel;
- continue to evaluate constructing a pipeline to link Pod One, Algar, and the Project by pipeline to the Edmonton-area thereby offset product trucking;
- support the collection of traditional ecological knowledge on medicinal plants, wildlife and spiritual and cultural sites on Connacher leases prior to their development;
- work through the OSDG Aboriginal Affairs committee and with the IRCs to support cultural retention and other initiatives, where appropriate;
- implement a policy not allowing employees and contractors working on the Project site to access adjacent land or bring recreational vehicles with them to the camp;
- continue to build upon the practices and relationship developed for the Great Divide and Algar projects; and
- negotiate and consult with Aboriginal communities in the region and, where possible, use Aboriginal contractors that qualify on merit and are cost competitive for some products and services related to both the construction and operations of the Project.

Connacher will continue with periodic consultations with its main stakeholders. These consultations will include discussions about Project impacts. No formal monitoring program beyond these periodic stakeholder engagements is proposed.

A.8.9 Soil Resources

The potential effects of the Project on soil resources are discussed in Section D.9 and Consultants Report #9 (CR #9).

Project activities that have the potential to impact soil quality, quantity and biodiversity include:

- soil salvage and handling;
- soil stockpiling;
- construction of infrastructure;
- operational activities; and
- reclamation activities.

Baseline soil data was collected in order to determine the potential environmental effects that the Project may have on soil resources, and to assist in preparation of a conceptual Conservation and Reclamation Plan with appropriate site mitigation and monitoring activities designed to achieve reclamation success.

Soil survey guidelines were based on accepted methodologies used in Canada for baseline soil survey (MSWG 1981). A survey intensity level (SIL) 2 was completed over the majority of the LSA, with one inspection point for every 5 to 15 ha, and a SIL 1 for the Phase 1 footprint with one inspection for every 1 to 5 ha. A total of 977 inspection points were recorded. Samples of one or more soil horizons were collected from 98 inspection points and analyzed for the specific chemical parameters required to determine reclamation suitability.

Baseline soil characteristics were identified for each map unit and include:

- thickness of soil layers;
- forest soil capability classification;
- reclamation suitability;
- baseline erosion risk; and
- soil sensitivity to acidification.

The main goal for the reclamation program is to achieve forested land capability equivalent to pre-disturbance conditions. By undertaking the practices and procedures discussed in the conservation and reclamation plan (Part E) the impacts to the soil resource are expected to be insignificant.

Connacher will utilize the following measures to mitigate potential impacts to soil resources:

- utilize best management practices to salvage upland soils;
- supervision of soil salvage and placement by a qualified individual;
- salvage organic soil material in select areas for later use in reclamation;
- in areas where organic soils were padded over with clay fill, the clay fill is to be removed for final reclamation;
- topsoil stockpiles will be stored in a manner to minimize soil loss or degradation;
- seed topsoil stockpiles utilized as long term storage with a seed mix that establishes quickly;
- contour stockpiles to a gentle slope (less than or equal to 3:1) and contour with small ridges perpendicular to slope direction;
- de-compact replaced soil profiles;

- vegetate all reclaimed lands upon completion of soil placement;
- utilize erosion control in areas of increased potential for erosion by wind or water;
- reclaim soil landscape patterns similar to pre-disturbance conditions;
- implement measures for proper handling and containment of contaminating substances for the Projects various operating processes; and
- re-contour and reclaim landscapes to provide appropriate surface drainage, blend in with the adjacent undisturbed terrain (i.e. drainage, aspect) and remain stable.

In order to verify that the mitigation measures have been effective Connacher's monitoring program will include:

- assessing landscape characteristics and features to ensure appropriate drainage is maintained;
- monitoring for potential soil erosion issues of stockpiled or recently replaced soil material;
- assessing reclaimed areas for topsoil quality (i.e. admixing) and quantity (depths); and
- assessing establishment of vegetation communities, after reclamation, to ensure stable sites that are capable of ecological succession exist.

A.8.10 Vegetation, Wetlands and Rare Plants

The potential effects of the Project on vegetation, wetlands and rare plants are discussed in Section D.10 and Consultants Report #10 (CR #10).

The LSA used for the vegetation assessment includes the Connacher lease boundaries. The physical extent of the LSA is sufficient in size to capture potential project effects to VECs that will result from direct disturbance and also, changes to vegetation outside the Project footprint as a result of alterations to physical components such as water quantity (wetlands).

The RSA includes a 5 km buffer around the LSA. The RSA was defined to ensure that it captured the furthest extent that project-specific effects are anticipated to act in combination with effects from other past, existing and anticipated future projects and activities.

The assessment of Project effects on vegetation and wetland resources was based on six valued environmental components including:

- terrestrial vegetation (ecosites, rare plants, forest resources);
- wetlands;
- old growth forests;
- non-native and invasive species; and
- traditionally used plants, and biodiversity.

The potential Project effects to vegetation and wetland resources are related to clearing natural vegetation and soils for Project facilities and infrastructure. Clearing natural vegetation will impact vegetation indicators directly through the reduction of communities and indirectly through changes to undisturbed vegetation and wetland resources resulting from changes to hydrology and habitat fragmentation. Other indirect effects considered in the assessment are effects to vegetation resulting from predicted climate change, natural disturbance (fire) and potential acid input (PAI). The potential effects of the Project have been assessed relative to each of the VECs.

Environmental effects on terrestrial vegetation, wetland resources, old growth forests, non-native and invasive species, traditionally used plants, and biodiversity were assessed after accounting for relevant mitigation measures. In all components the effects were reversible over the long term and, with mitigation, the effect of the Project on the valued environmental component was insignificant.

In order to minimize the potential impacts to vegetation resources Connacher will undertake the following:

- develop revegetation plans that will promote the long term establishment of healthy ecosystems and ingress of native species;
- preserve adjacent habitat by minimizing the area required for construction and operation of the Project;
- when possible, utilize coarse woody debris to amend soils to provide mycorrhizal and microbial inoculum;
- conduct re-vegetation according to the reclamation guidelines prepared by the Oil Sands Vegetation Reclamation Committee (OSVRC, 1998), CEMA, or updates;
- report the findings of rare and unranked species to ANHIC for updating provincial All Element Lists;
- salvage all merchantable timber;
- plant pine and white and black spruce seedlings in select areas 2 to 4 years after seeding reclaimed lands;
- where possible, plant aspen and white spruce to increase the diversity of ecosite phases, versus the standard planting of mainly pine.
- maintain drainage patterns and preserve the integrity of wetland areas outside the Project footprint;
- create wetland “transition areas” between reclaimed sites and natural uplands and wetlands;
- when possible, remove fill material placed over organics to reestablish wetlands;
- where possible, reclaim borrow areas to wetlands,
- when possible, direct place salvaged surface material;
- plant mixed species, including some aspen, particularly if post-reclamation observations do not detect natural aspen ingress from adjacent habitat or establishment from replaced stockpiled topsoil; and
- where suitable, introduce woody species typical of b1, b2, c1, d1, and g1 ecosite phases.
- minimize areas of bare ground during Project construction and operation;
- use a non-invasive seed-mix for erosion control, and use approved revegetation species that are compatible with the intended end land use; and
- implement a weed control program during construction, operations and reclamation.

In order to verify that the mitigation measures have been effective Connacher will undertake the following activities:

- monitor reclaimed sites to assess the development of healthy ecosystems that will support natural vegetation and be capable of ecological succession;
- monitor timber harvesting activities to ensure all merchantable timber is salvaged;
- perform survival, growth and health assessments to monitor the success of revegetation efforts;
- conduct a rare plant survey on any new development areas not previously assessed;

- monitor and maintain drainage control structures regularly to ensure water flow and flow patterns are maintained during the construction, operation, and closure phases of the Project;
- monitor reclaimed wetlands after closure to ensure healthy wetlands are being created; and
- conduct regular site inspections during the life of the Project to identify if invasive species are becoming established.

A.8.11 Wildlife

The potential effects of the Project on wildlife are discussed in Section D.11 and Consultants Report #11 (CR #11).

The LSA used for the wildlife baseline data collection and assessment included the Connacher lease area. The RSA was defined as the land within 5 km of the LSA, which represents the approximate diameter of a moose range in north-eastern Alberta. The RSA overlaps both the Egg-Pony and Algar Caribou Management Zones. With the exception of caribou, cumulative effects on habitat availability for all VECs were assessed at the scale of the RSA. Cumulative effects for caribou were assessed at the scale of the East Side of the Athabasca River caribou range. This large area was considered most appropriate for caribou because management typically occurs at the range level.

The wildlife assessment focused on eight species selected as VECs including:

- bird species - Northern goshawk, Cape May warbler, Sandhill crane;
- ungulates - woodland caribou and moose;
- beaver; and
- predators - Canada lynx and Fisher.

An additional 33 special status species whose ranges overlap with the Project, and for which there was suitable habitat, were also considered.

Project development has the potential to interact with wildlife in different ways. The Project may alter wildlife habitat availability and connectivity, movement, as well as wildlife health and mortality rates, all of which may affect the abundance of wildlife in the LSA and beyond.

Ecosite phases for the LSA were grouped into broader wildlife habitat classes based on their vegetation species composition, moisture regime, topographic position, and general value to wildlife. Because of the varying importance of young and mature/old forests for wildlife, stand age was also incorporated into the habitat classes. Young mixed coniferous and young shrubby bog/fen habitats were the most abundant, representing 30.9% and 25.1% of the LSA, respectively. Deciduous forest, marsh and waterbody habitat types were relatively uncommon in the LSA. Habitat types with high biodiversity, were relatively uncommon in the LSA under existing conditions. This likely reflects the early seral stage of most of the LSA.

With mitigation the Project effects on wildlife habitat availability, wildlife movement, wildlife health and mortality, wildlife abundance for the VECs are insignificant.

Connacher will undertake the following mitigation measures in order to reduce the potential impacts to wildlife:

- vegetation clearing will follow the “early-in, early-out” principle;
- clearing will be timed, where practicable, to avoid disruption of nesting birds and the sensitive calving period for caribou;

- the footprint will avoid mature and old forest, as much as possible, to minimize impacts on species dependent on this habitat, including woodland caribou and old-growth forest birds;
- development in riparian areas and waterbodies will be avoided, where possible, to preserve habitat for amphibians, waterbirds and many other species, as well as to reduce the chance of contaminating waterbodies;
- treed buffers will be retained around watercourses and waterbodies;
- development of an Access and Recreation Management Plan within the LSA;
- participation in the Alberta Biodiversity Monitoring Initiative (ABMI) to assist with monitoring regional cumulative effects on biological resources;
- development of a Waste Management Plan to minimize the attraction of bears and other predators to the area;
- adherence to the Best Management Practices for Camps, Fences and Barriers as described in the BearSmart: Best Management Practices for Camps;
- development of an Emergency Spill Response Plan;
- restriction of fuel storage and use to designated areas at least 100 m from waterbodies and watercourses;
- installation of wildlife crossing structures to facilitate wildlife movement through the LSA;
- marking of wildlife crossings to prevent wildlife-vehicular collisions, and winter plowing or grading will be conducted in a manner that does not result in creation of snow berms at wildlife crossings;
- monitoring of the wildlife crossing structures using remote cameras and snow tracking for up to 10 years following construction, and undertaking further mitigation measures if monitoring results indicate they are required; and
- becoming a member of the Alberta Caribou Committee, and will provide the ACC with any pertinent data collected during the monitoring program.

In order to verify that the mitigation measures have been effective Connacher's monitoring program will include:

- a continuation of the existing on-going pre-disturbance long-term wildlife monitoring program for the Project (which is described in detail in CR #11, Section 4.2.1) including:
  - at least 33 cameras with ten of these shared with the Algar Monitoring Program.
  - monitoring for the first five years of each Phase of the Project, including the construction period associated with each Phase.
- installation of all wildlife cameras at wildlife crossings associated with active Phases; and
- conduct winter snow tracking surveys and use remote cameras to determine the response of wildlife to the above-ground pipeline and crossing structures.

A.8.12 Greenhouse Gas

The potential effects of the Project on greenhouse gas and climate change are discussed in Section D.12 and Consultants Report #12 (CR #12).

A greenhouse gas (GHG) is any gas that contributes to potential climate change. Common GHGs include carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O). GHGs absorb heat radiated by the earth and subsequently warm the atmosphere, leading to what is commonly known as the greenhouse effect.

At full operation, the entire Connacher operation will be generating 1.27 MT/yr of CO_2e, with the Project contributing 0.72 Mt/yr. Based on an estimated project life of 25 years, total greenhouse gas emissions for the Project alone is an estimated 17.9 Mt. The expansion will contribute 0.29% to the total provincial and 0.10% to the total national GHG emissions on an annual basis.

Connacher's business success is contingent on responsible resource development which requires dedicated stewardship of air issues and air emissions. Connacher is committed to responsible environmental management and continues to do their part to minimize potential impact. Connacher will continue to develop effective management and operational approaches to comply with regulations designed to reduce GHG emissions. Connacher's greenhouse gas emission goals are:

- to continually improve efficiencies in energy use, thus reducing the GHG footprint; and
- to deliver on a long term plan that meets industry standards.

Connacher believes that execution of their GHG management programs can be achieved with proactive preparation, planning and continued cooperation with industry regulators and in the communities where they operate.

Connacher's long-term GHG management options fall into four broad categories. These are:

- continuous improvement in technologies (particularly combustion technologies) during the operational phase;
- carbon injection and storage;
- trading of GHG offsets; and
- contribution to the Climate Change and Emissions Management Fund.

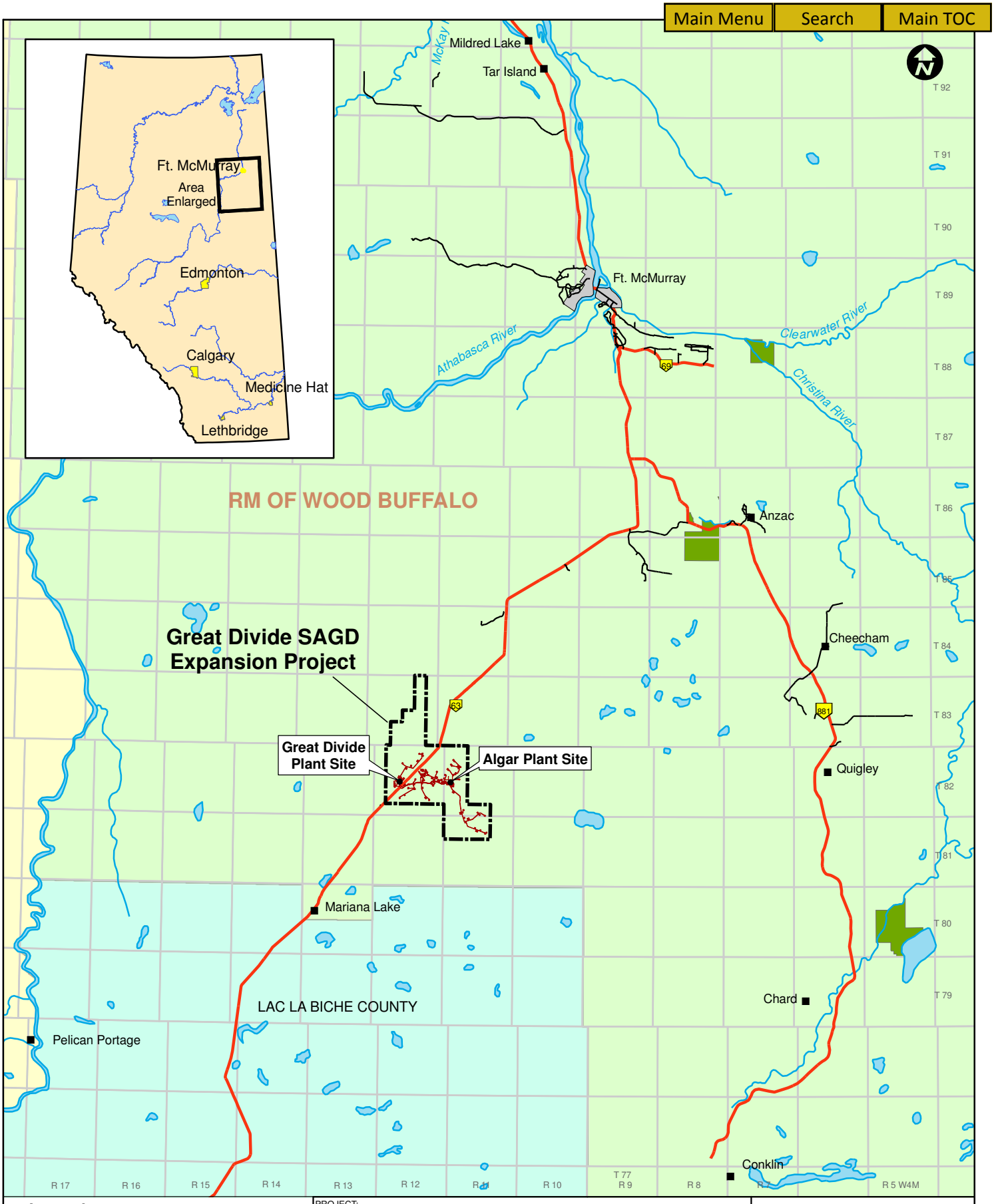
A.8.13 Land and Resource Use

The potential effects of the Project on land and resource use are discussed in Section D.13.

Connacher has identified other surface and subsurface land and resource users located within their lease area. Land and resource uses within the Connacher lease area include:

- surface dispositions and subsurface leases associated with petroleum and natural gas development;
- surface dispositions associated with development of forest resources;
- surface dispositions associated with public utilities;
- surface dispositions associated with public roadways;
- government holdings and miscellaneous dispositions;
- surface dispositions associated with sand and gravel development; and
- traditional use and trapping areas.

The Project will have an insignificant impact on land and resource use. Connacher has identified potential land and resource users within the LSA area and through their ongoing Stakeholder Consultation Program will ensure impacts to these users are minimized. Connacher will work cooperatively and jointly with other land use resource users to minimize and mitigate any land use conflicts.



Legend

- Lease Boundary/Study Area
- Project Footprint
- First Nations Land

0 5 10 20
Kilometres

REF: D. Loucks Consulting Drifter Projects Ltd. EIA Master Plan Rev 5, 27Oct09.

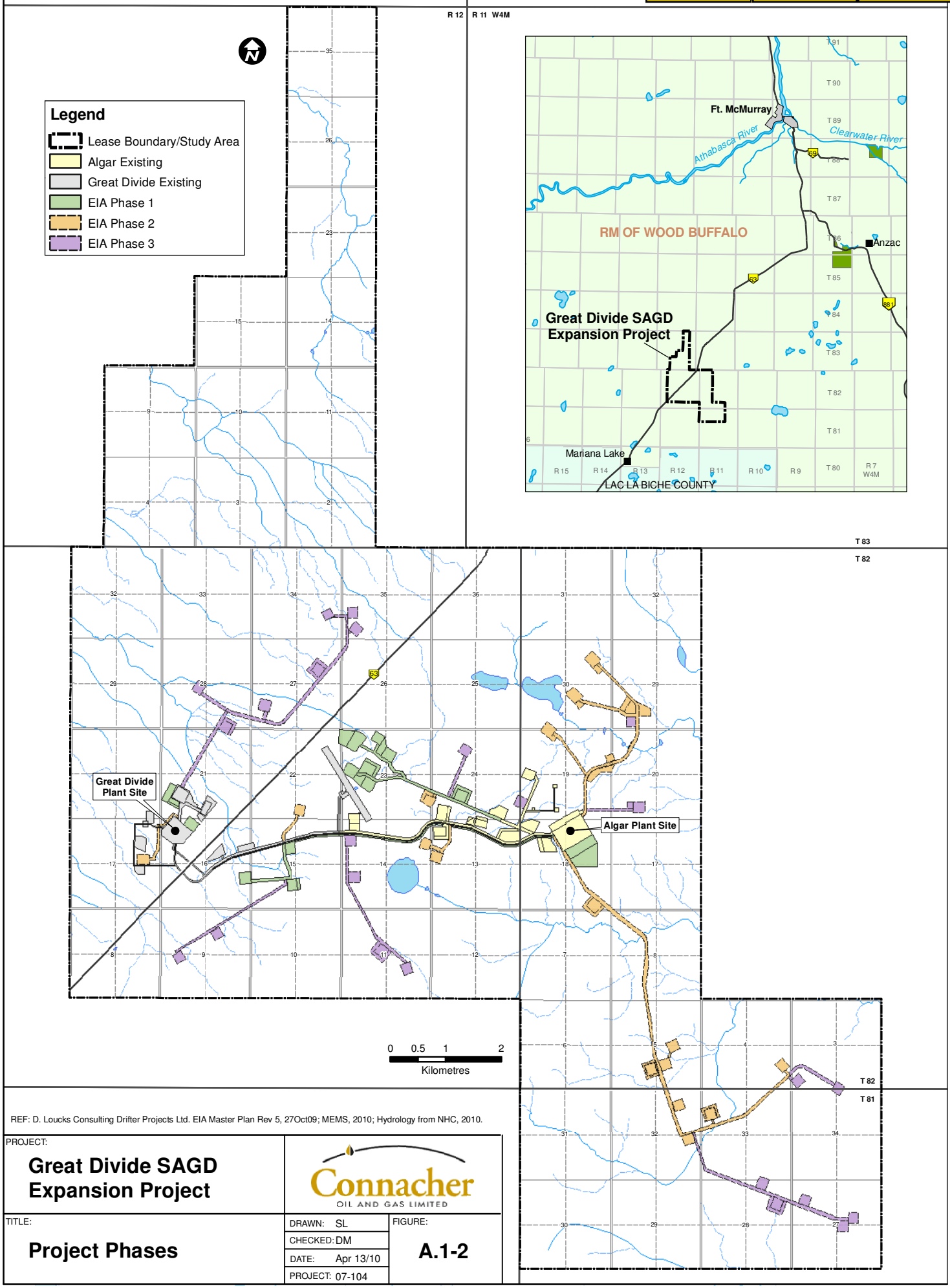
PROJECT:
Great Divide SAGD Expansion Project

TITLE:
Project Location Map

Connacher OIL AND GAS LIMITED

DRAWN:	SL
CHECKED:	DM
DATE:	Apr 12/10
PROJECT:	07-104

FIGURE: **A.1-1**



REF: D. Loucks Consulting Drifter Projects Ltd. EIA Master Plan Rev 5, 27Oct09; MEMS, 2010; Hydrology from NHC, 2010.

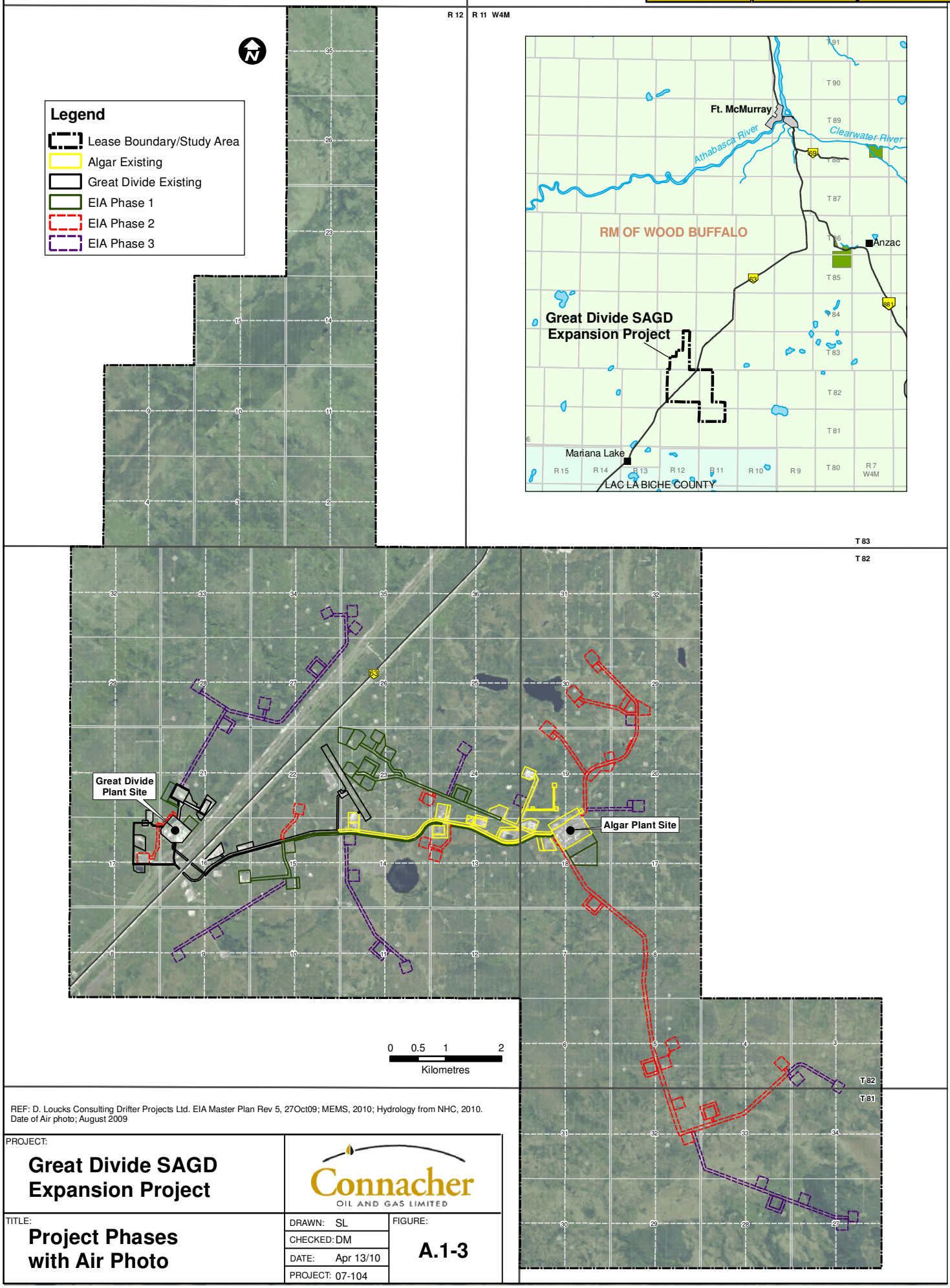
PROJECT:
Great Divide SAGD Expansion Project

Connacher OIL AND GAS LIMITED

TITLE:
Project Phases

DRAWN:	SL
CHECKED:	DM
DATE:	Apr 13/10
PROJECT:	07-104

FIGURE:
A.1-2



REF: D. Loucks Consulting Drifter Projects Ltd. EIA Master Plan Rev 5, 27Oct09; MEMS, 2010; Hydrology from NHC, 2010. Date of Air photo; August 2009

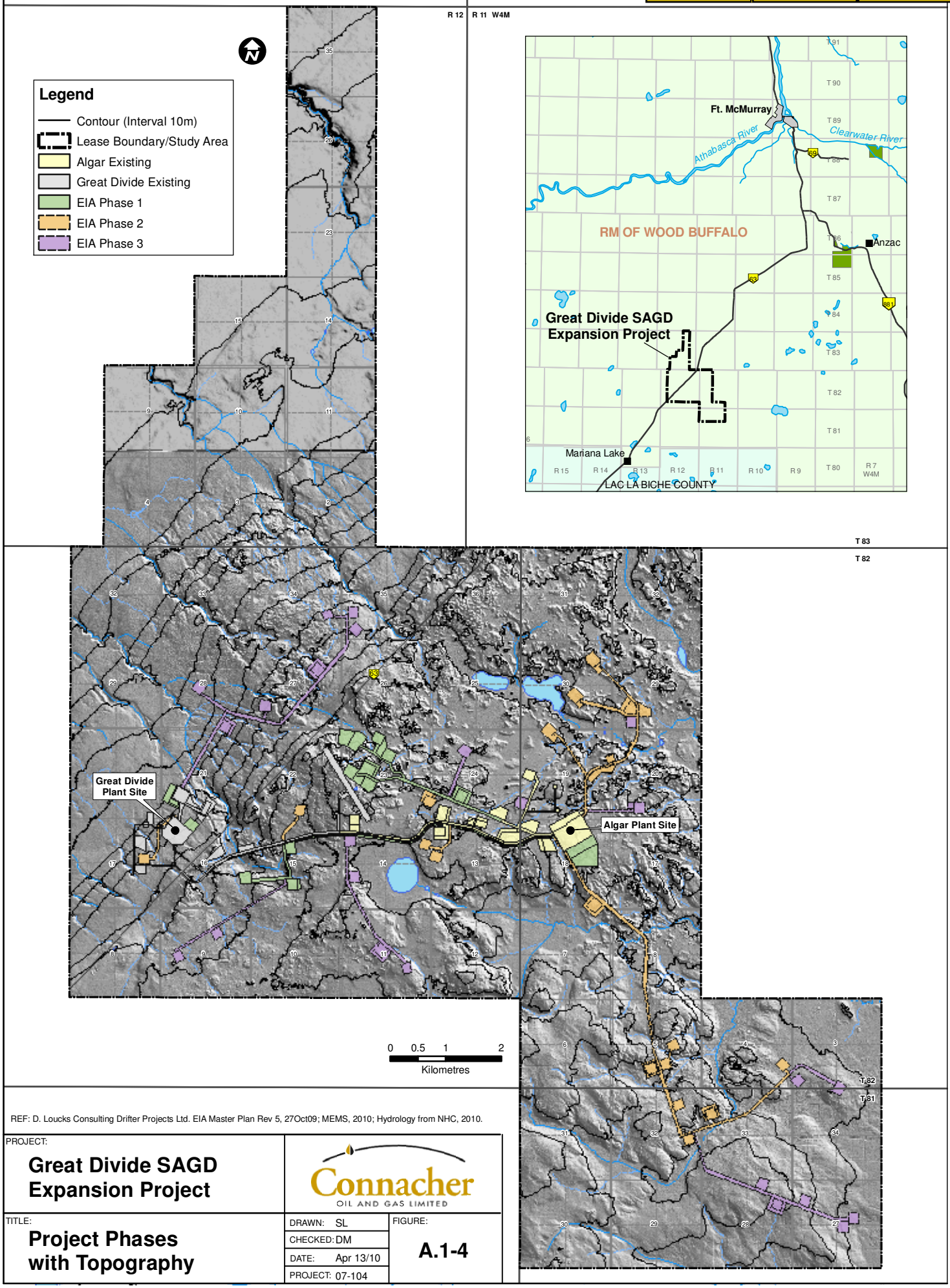
PROJECT:
Great Divide SAGD Expansion Project

Connacher OIL AND GAS LIMITED

TITLE:
Project Phases with Air Photo

DRAWN:	SL
CHECKED:	DM
DATE:	Apr 13/10
PROJECT:	07-104

FIGURE:
A.1-3



REF: D. Loucks Consulting Drifter Projects Ltd. EIA Master Plan Rev 5, 27Oct09; MEMS, 2010; Hydrology from NHC, 2010.

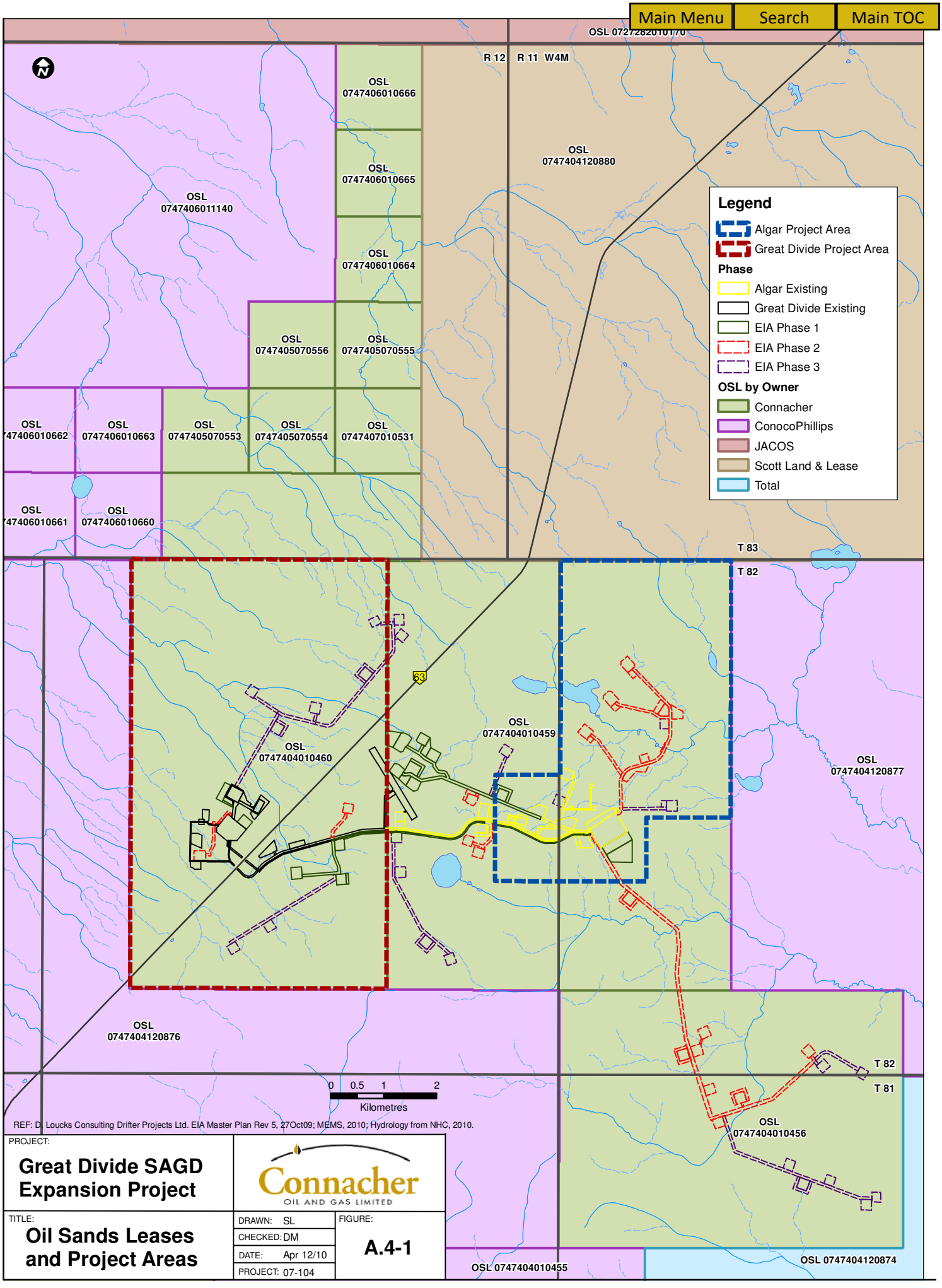
PROJECT:
Great Divide SAGD Expansion Project

Connacher OIL AND GAS LIMITED

TITLE:
Project Phases with Topography

DRAWN:	SL
CHECKED:	DM
DATE:	Apr 13/10
PROJECT:	07-104

FIGURE:
A.1-4



REF: D. Loucks Consulting Drifter Projects Ltd. EIA Master Plan Rev 5, 27Oct09; MEMS, 2010; Hydrology from NHC, 2010.

PROJECT:
Great Divide SAGD Expansion Project

Connacher OIL AND GAS LIMITED

TITLE:
Oil Sands Leases and Project Areas

DRAWN:	SL
CHECKED:	DM
DATE:	Apr 12/10
PROJECT:	07-104

FIGURE:
A.4-1