PTTEP Canada Limited (PTTEPCA) is the wholly owned subsidiary of PTT Exploration and Production Public Company Limited (PTTEP), which is headquartered in Bangkok, Thailand. PTTEP is a leading Asian exploration and production company emphasizing value creation and sustainable growth through operations excellence, strategic investments and our agility to change. In 2011, PTTEPCA acquired a 40% working interest in the Kai Kos Dehseh (KKD) Oil Sands Partnership, to jointly develop the KKD project in partnership with Statoil Canada Ltd. (SCL). The KKD Partnership was comprised of the following leases:

- Leismer
- Corner
- Thornbury
- Hangingstone
- South Leismer

In 2014, PTTEPCA and SCL agreed that the two companies would divide their respective interests in the KKD assets, with each company owning and operating specific areas at 100% ownership. The Thornbury, Hangingstone and South Leismer oil sands lease areas are now 100% owned and operated by PTTEPCA, with the remainder, Leismer and Corner, owned by SCL. This transaction was finalized effective May 28, 2014.
The PTTEPCA leases are now known collectively as the Mariana Oil Sands Project (MOSP). For the first stage of development of MOSP, PTTEPCA is proposing to construct and operate a 20,000 bbl/day Steam-Assisted Gravity Drainage (SAGD) in situ oil sands project, the Mariana Thornbury Project. The Mariana Thornbury Project is located in the southeast corner of the Thornbury lease in Townships 79 and 80, Ranges 11 and 12 west of the 4th Meridian in Lac La Biche County, approximately 90 km south of Fort McMurray and 118 km north of Lac La Biche. Thornbury is a high-quality reservoir and an excellent candidate for in situ thermal recovery production using the SAGD recovery process. The Thornbury reservoir quality, depth and cap rock are similar to the Statoil Leismer Project, which is the initial phase of the KKD Project currently in operation using SAGD.

SAGD is proven and widely-used in the Alberta Oil Sands and uses horizontal wells drilled directionally through the reservoir. The production well is drilled near the base of the reservoir and the steam injection well is drilled approximately 5 m above and parallel to the production well. Steam is injected into both wells until the two wells are thermally connected. Thereafter, steam continues to be injected only into the upper well and rises through the reservoir, heating the bitumen. The heated bitumen flows down to the production well, along with the condensed water. The collected bitumen and water are carried to the surface by the production well.

PTTEPCA expects that the initial development area will require 28 well pairs drilled directionally from four well pads, with 219 well pairs from 32 well pads, over the life of the project.
project. Flowlines will transport the produced bitumen and condensed water to the Central Processing Facility (CPF) where the water will be treated and recycled back to the steam production process. The bitumen will be sent to market by third party pipeline. The project footprint also includes a natural gas line that will tie into existing infrastructure in the region.

The bitumen resource at the Mariana Thornbury Project is estimated to be between 250 and 300 million barrels. This supports the proposed production capacity of 20 000 bbls/day for at least 50 years. It is expected that additional projects will be applied for in other areas of the broader Thornbury lease and on the nearby Hangingstone and South Leismer leases in the future to exploit the bitumen resource.

Ancillary infrastructure that will be required for the Mariana Thornbury Project includes the following:

- Connection to existing crude pipelines to deliver product to markets
- A diluent pipeline
- A power transmission line to connect to the existing regional electrical grid
- Fiber optic lines for telecommunications
- An access road off of Highway 63 to the Mariana Thornbury Project area

The preceding infrastructure is outside of the current application and is expected to be permitted, and constructed by third parties under separate regulatory applications.
The environmental footprint of the Mariana Thornbury Project was included as part of the KKD Project, for which an Environmental Impact Assessment (EIA) has been previously conducted and deemed complete. In May, 2014, PTTEPCA was informed by Alberta Environment and Sustainable Resource Development (AESRD) that pursuant to Section 44(3) of the Alberta Environmental Protection and Enhancement Act (EPEA), no further impact assessment will be required for the Mariana Thornbury Project (i.e., an EIA report will not be required). However, the Mariana Thornbury Project will require certain amendments and approvals under EPEA and the Water Act. A licence will also be required from the Alberta Energy Regulator (AER) under the Oil Sands Conservation Act.

PTTEPCA has begun preliminary work to support the AER Licence Application and the EPEA Amendment Application, including the following:

- Initial engineering design
- A 2014/2015 Winter Drilling Campaign (WDC) to refine the reserves delineation
- Seasonal environmental field studies (e.g., including wildlife, soils, vegetation, air, hydrology and hydrogeology) and associated modelling
- Consultation with aboriginal communities and other stakeholders

PTTEPCA filed the Mariana Thornbury Project Application on May 29, 2015.
As with any industrial development, there are anticipated short-term and long-term impacts that may be associated with the project. The EIA, reviewed and accepted by the regulators, identified the potential environmental impacts and proposed mitigations for the KKD project. PTTEPCA is undertaking additional project specific studies to confirm those EIA results and refine the mitigations.

The Mariana Thornbury Project is an in situ oil sands development which is quite different from traditional oil sands mining. There will be no tailings pond and no large-scale land disturbance, which are negative environmental impacts commonly associated with oil sands mining.

A general discussion of project impacts and mitigation follows.

Minimizing Land Disturbances

Land disturbance for the in situ development area will affect an area of approximately 450 Ha and will include a CPF, well pads, source water wells, water disposal well, service roads, pipelines, borrow pits and a camp. The use of horizontal drilling technology and the multi-well pad locations for SAGD means that less than 16% of the lease area will be disturbed during the life of the development and that well pads can be reclaimed on an ongoing basis (progressive reclamation). A number of environmental factors were considered when siting the project facilities and footprint. Based upon the available drilling results and the interpreted seismic data, PTTEPCA has carried out an extensive review of options for well placement with respect to the following:

PTTEPCA is committed to working in an open and inclusive manner with the communities near where we operate. PTTEPCA is, and will continue, consulting with all stakeholders throughout the life of the Mariana Thornbury Project.

PTTEPCA recognizes the history, uniqueness and diversity of the Canadian Aboriginal Peoples and is committed to supporting, building and maintaining lasting relationships based on trust and common interests with Aboriginal communities impacted by our business. PTTEPCA is keenly aware of the connection that Aboriginal people have to the land and the environment. With this in mind, PTTEPCA plans to work with our Aboriginal neighbours to collect additional Traditional Ecological Knowledge (TEK) and Traditional Land Use (TLU) information, which will be incorporated into the Project development where appropriate.

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Stakeholder Involvement and Aboriginal Consultation

Minimizing Land Disturbances

As with any industrial development, there are anticipated short-term and long-term impacts that may be associated with the project. The EIA, reviewed and accepted by the regulators, identified the potential environmental impacts and proposed mitigations for the KKD project. As part of the Mariana Thornbury Project, PTTEPCA is undertaking additional project specific studies to confirm those EIA results and refine the mitigations.

The Mariana Thornbury Project is an in situ oil sands development which is quite different from traditional oil sands mining. There will be no tailings pond and no large-scale land disturbance, which are negative environmental impacts commonly associated with oil sands mining.

A general discussion of project impacts and mitigation follows.
Maximize resource recovery
Minimize well pad footprint
Work with topographic features
Avoid open water bodies
Avoid defined water course channels (i.e., having defined bed and bank material) and
Avoid areas of potential historical resource value.

Wherever possible, infrastructure will be placed in upland areas to reduce impacts to wetlands. A 100 m buffer zone will be placed around all open waterbodies and unless unavoidable, infrastructure will be located outside of this area. It is expected that some of the well pads and access roads will have minor impacts on drainages and small, intermittent streams. PTTEPCA will construct culverts, where necessary, and will use industry best practices to minimize impacts to waterbodies.

The Mariana Thornbury Project is in an area with existing and planned resource developments and will use existing infrastructure and common corridors, as much as possible, to minimize land disturbance and forest fragmentation in the area. PTTEP is working closely with other land users, such as the current Petroleum Natural Gas (PNG) leaseholders, Forest Management Area (FMA) holders, other oil sands leaseholders, pipeline companies and others to share infrastructure and manage impacts on the local environment. As an example, PTTEPCA is currently in discussions with the FMA holder to share access into the Mariana Thornbury Project and manage timing of project execution to coincide with timber harvesting to minimize long-term impacts.

Water Use

The Mariana Thornbury Project will use Once-Through Steam Generators (OTSGs) to produce the steam required for the SAGD operations. The maximum make-up water usage for the Mariana Thornbury Project will be up to 1950 m³/day with average use at 1421 m³/day. The Project will use non-saline groundwater from the Lower Grand Rapids Formation and has designed the recycle rate for produced water to meet or exceed regulatory requirements outlined in AER Directive 081.

Air/Emissions

The majority of the Mariana Thornbury Project air emissions, including Nitrogen Oxides (NOx), Sulphur Dioxide (SO2), and Carbon Dioxide (CO2) are products of combustion from the burning of natural gas as an energy source for the production of bitumen. In addition, off-gases from bitumen production will be collected from process equipment and tanks, and will be burned as fuel to supplement the energy production from natural gas. The Mariana Thornbury Project will also have an appropriately sized flaring system for handling emergency and upset operating conditions. All emission sources will be designed to comply with the applicable regulatory limits.

The Project design will incorporate best available technology to ensure that the Mariana Thornbury Project meets or exceeds applicable requirements, including the following:

- Use of natural gas, a clean burning fuel that minimizes emissions, for energy generation
- Minimization of NOx emissions through use of low NOx burners
- Development and implementation of a Fugitive Emissions/Leak Detection and Repair (LDAR) Program to minimize fugitive emissions from small leaks, etc.
- Design of the Project to incorporate the appropriate odour abatement technologies, including vapour recovery on tanks and appropriate process equipment

Waste Management

Various waste streams will be generated by the Mariana Thornbury Project including produced water, process sludge, drilling wastes, used lubricants, construction and domestic waste and other oilfield wastes. Produced water will be recycled and reused to meet current regulatory requirements and the remaining wastewater will be sent by pipeline to a proposed disposal well.

Drilling wastes will be recycled, as much as possible to recover and reuse the drilling fluids, and the remaining solids will be disposed of as per regulatory requirements throughout the lifetime of the Mariana Thornbury Project. PTTEPCA will develop recycling programs for
other waste streams, where recycling is an available option, (i.e., oil, filters, rags, etc). The remaining waste streams are expected to be suitable for disposal at a Class II industrial landfill.

Wildlife

Activities during construction and operations may have impacts on wildlife such as habitat loss, the creation of partial or temporary barriers to animal movements or increased animal-human encounters. PTTEPCA is proposing mitigation to address these issues. Some examples of proposed mitigation include, but are not limited to the following:

▪ Optimizing the project footprint and avoiding sensitive areas (i.e., Waterbodies, wetlands, etc. where possible)
▪ Integrate the project developments with other existing and/or proposed land use activities in the area to minimize new disturbance
▪ Reducing new disturbances during sensitive wildlife timing windows (i.e., caribou calving periods, migratory bird nesting periods, etc.)
▪ Provide safe access through the project area (i.e., appropriate spacing of surface pipelines and construction windrows, wildlife crossing structures and use of semi-submerged culverts for aquatic wildlife)
▪ Enforcing a no hunting/fishing policy for all PTTEPCA employees and contractors
▪ Instituting a wildlife sighting and monitoring program

The Mariana Thornbury Project is located within the East Side Athabasca Caribou Range. PTTEPCA maintains an approved Caribou Protection Plan for all work in the area. This plan will be continually updated as development moves forward.

Socio-Economic Impact

Over the life of the Mariana Thornbury project, PTTEPCA expects to pay over $2 billion in royalties in Alberta and $680 million in Federal and Provincial taxes. During construction, the Mariana Thornbury Project will have a workforce of approximately 500 people. During operations, the full-time workforce is expected to be approximately 110. PTTEPCA will maximize efforts to secure services from local providers and Aboriginal businesses.

Contact Information

For further information regarding the Mariana Thornbury Project, please contact:

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Privacy Policy

PTTEPCA will maintain all information collected with respect to the Mariana Thornbury Project, in accordance with its privacy policy. For information, please contact Jeremy Hrdlicka, Director, Regulatory Affairs.

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