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2.0 PROJECT DESCRIPTION

2.1 Introduction

Korea National Oil Corporation (KNOC) proposes to increase production of the BlackGold Project, an in-situ oil sands Steam Assisted Gravity Drainage (SAGD) project near Conklin, Alberta (Figure 2.1-1). The project will use SAGD technology to recover bitumen resources from two Alberta oil sands leases, owned 100% by KNOC and located in Twp 76, Rge 7, W4M. KNOC estimates 83 million cubic metres (521 million barrels) of bitumen (oil in place) are present in the McMurray and Wabiskaw Formations in these oil sands leases.

In March 2008, KNOC submitted a joint application for the BlackGold Initial Project to the Energy Resources Conservation Board (ERCB) and Alberta Environment (AENV) requesting approval to produce 1 590 m³/d (10 000 b/d) of bitumen from the McMurray formation, using conventional SAGD technology. Approval of the Initial Project development is anticipated in early 2010. Assuming regulatory approval, KNOC anticipates that it will begin construction on the Initial Project in 2010 with production commencing in 2012.

The project area is located in Sections 1, 2, 3, 10, 11, 12, 13, 14, 15, 22, 23 and 24 of Twp 76, Rge 7, W4M. The facilities to be developed will include steam generation, oil treatment, water treatment and recycle facilities, as well as well pads, roads, pipelines and off-site facilities required to support the proposed operation.

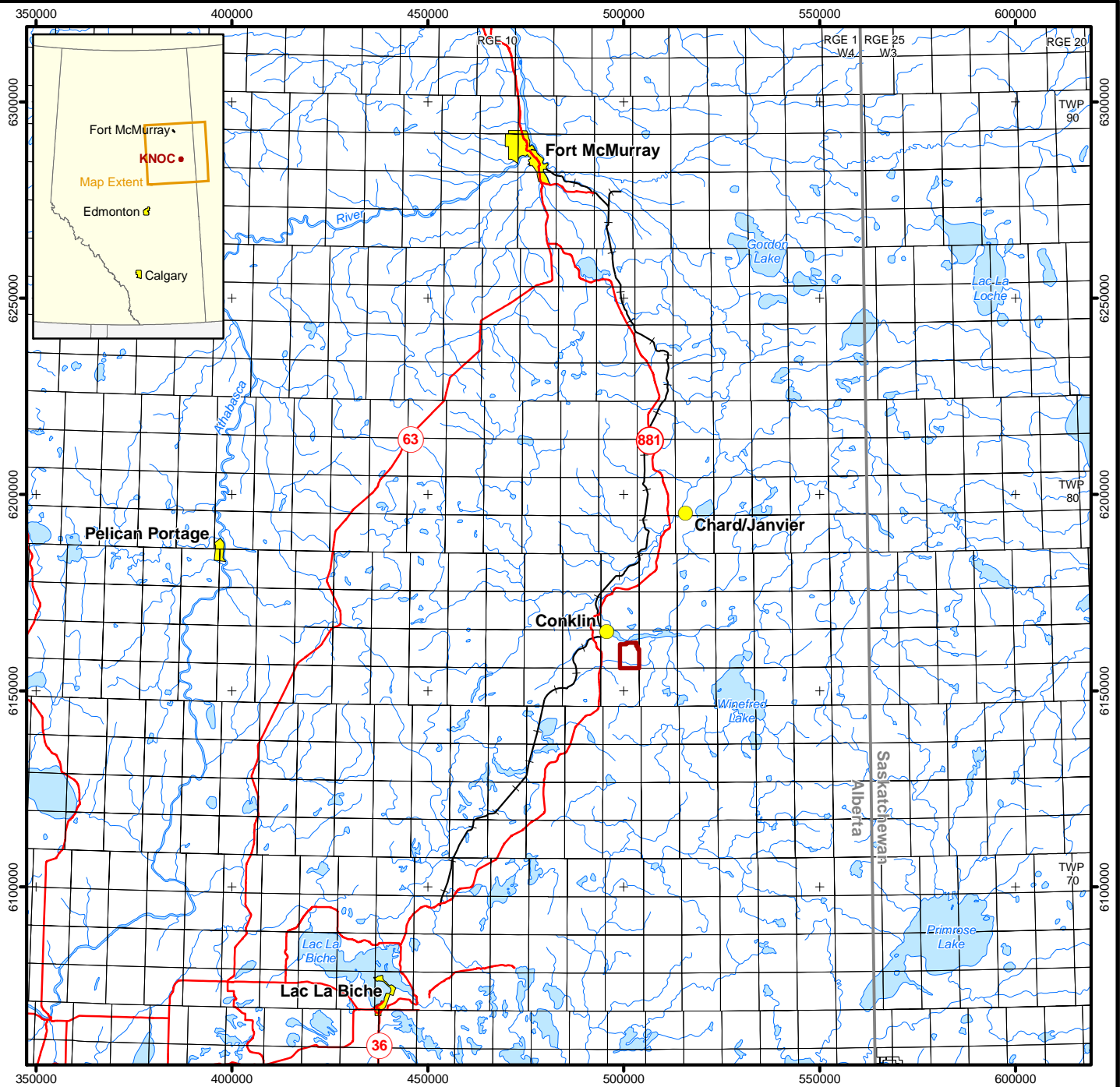
The project will be developed to produce 3 180 m³/d (20 000 b/d) of bitumen over a period of approximately 25 years. The development plan is designed so that production takes place sequentially on 27 well pads. Initially, 28 SAGD well pairs will be drilled from 3 surface well pads, and associated infrastructure to facilitate bitumen recovery and its export by pipeline. Over the life of the project, up to 200 additional well pairs will be drilled from an additional 24 well pads to maintain production.

2.2 Reservoir Recovery Process

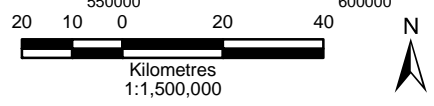
SAGD is the proposed recovery process for the project. Selection of this process was based on successes experienced with SAGD projects in the McMurray reservoir in terms of production rates, recovery factors and Steam to Oil Ratios (SORs).

SAGD is a thermal recovery process developed in Alberta, circa 1981. It is a dual horizontal well technology in which two wells are drilled, one directly on top of the other with a vertical separation of approximately 5 m. There is a brief steam soak period, ranging from six weeks to several months, during which time steam is injected into both wells in order to establish communication. Once communication has been established steam is injected into the upper well at pressures lower than the fracture pressure of the reservoir, while bitumen and steam condensate are produced from the lower well. The injected steam rises until it reaches the bitumen where it cools and condenses, in turn reducing the bitumen viscosity.

S:\Gis\Projects\CE\KNOC_BlackGold\CE03745_EIA\ArcGIS\Projects\Application Report Figures\Section 02 - Volume 02\Fig02.01-01 Prj Loc Ft McM.mxd



- Legend**
- Project Area
 - Open Water
 - Watercourse



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**Korea
National Oil Corporation**

BlackGold Expansion Project

Project Location

DATE: December 2009	Figure 2.1-1
PROJECT: CE03745/410	Fig02.01-01 Prj Loc Ft McM 09-12-04
ANALYST: KW	DRAWN BY: AMEC
PROJECTION/DATUM: UTM Zone 12 NAD83	PREPARED BY: AMEC

The warm bitumen and the condensate drain to the lower well and are pumped up to the surface. In this manner a steam chamber is created within the reservoir. As the chamber rises to the top of the reservoir, production rates will increase as the gravity or hydraulic head of the draining bitumen has been increased. Once the chamber has reached the top of the reservoir, it spreads horizontally. The effective gravity head begins to decrease over time and the heat losses to the overburden increase, resulting in an increasing SOR. To optimize economic recovery of bitumen, instantaneous SOR may be managed in the last five years of the production cycle by a combination of rate reduction and pressure maintenance with non-condensable gas injection to recover heat stored in the reservoir rock.

2.3 Schedule

The overall schedule is shown in [Figure 2.3-1](#). The chart shows well pair drilling and facility construction taking place throughout 2012 and 2013 pending corporate and regulatory approval. First production of oil is targeted to take place in early 2015. Production is expected to take place over approximately 25 years of operation, followed by a period of final reclamation.

2.4 Project Components

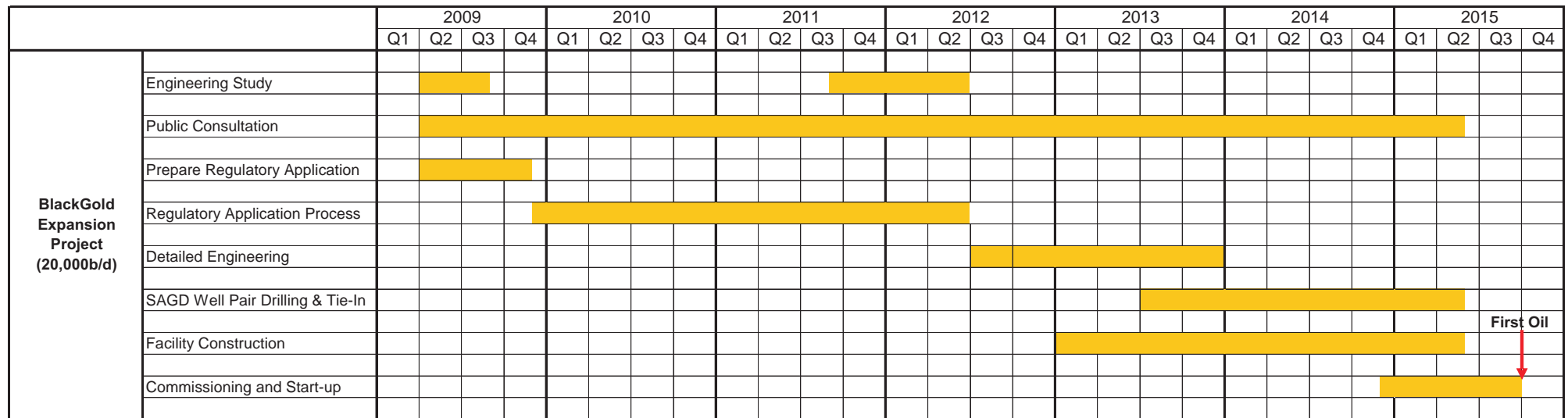
The project consists of two major components—the well pads and the off-site facilities that connect the pads. Distribution of the components throughout the project area is shown on [Figure 2.4-1](#). Additional infrastructure includes the access roads, electrical power supply line, product handling and natural gas supply line. The project will reduce surface disturbance through use of central corridors of pipelines and access roads connecting pads to the CPF, and by integrating pre-existing infrastructure of the Initial project. Within the project area, existing forest clearings and linear developments will be used wherever feasible to reduce new land disturbance. The design layout will avoid, as much as practical, sensitive environmental and historical areas/sites identified through the EIA process. In all instances project design seeks to reduce surface disturbance, spatially and temporally, in order to reduce environmental impacts while optimizing resource recovery.

There is to be limited disturbance to natural drainage patterns throughout the project area. Facilities are to be sited and routed to avoid surface water areas such as wetlands, stream crossings will be limited in number and runoff from all developed surfaces will be controlled, to inhibit the transport of sediments and other materials and to maintain water quality in receiving waters. Total surface disturbance over the life of the project will occupy 228 ha.

2.4.1 Well Pads

Each single well pad will occupy approximately 5 ha, and double pads will occupy approximately 7 ha. Over the life of the project, 27 well pads will occupy a total of 143 ha.

Development Schedule



First Oil
↓



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BlackGold Expansion Project

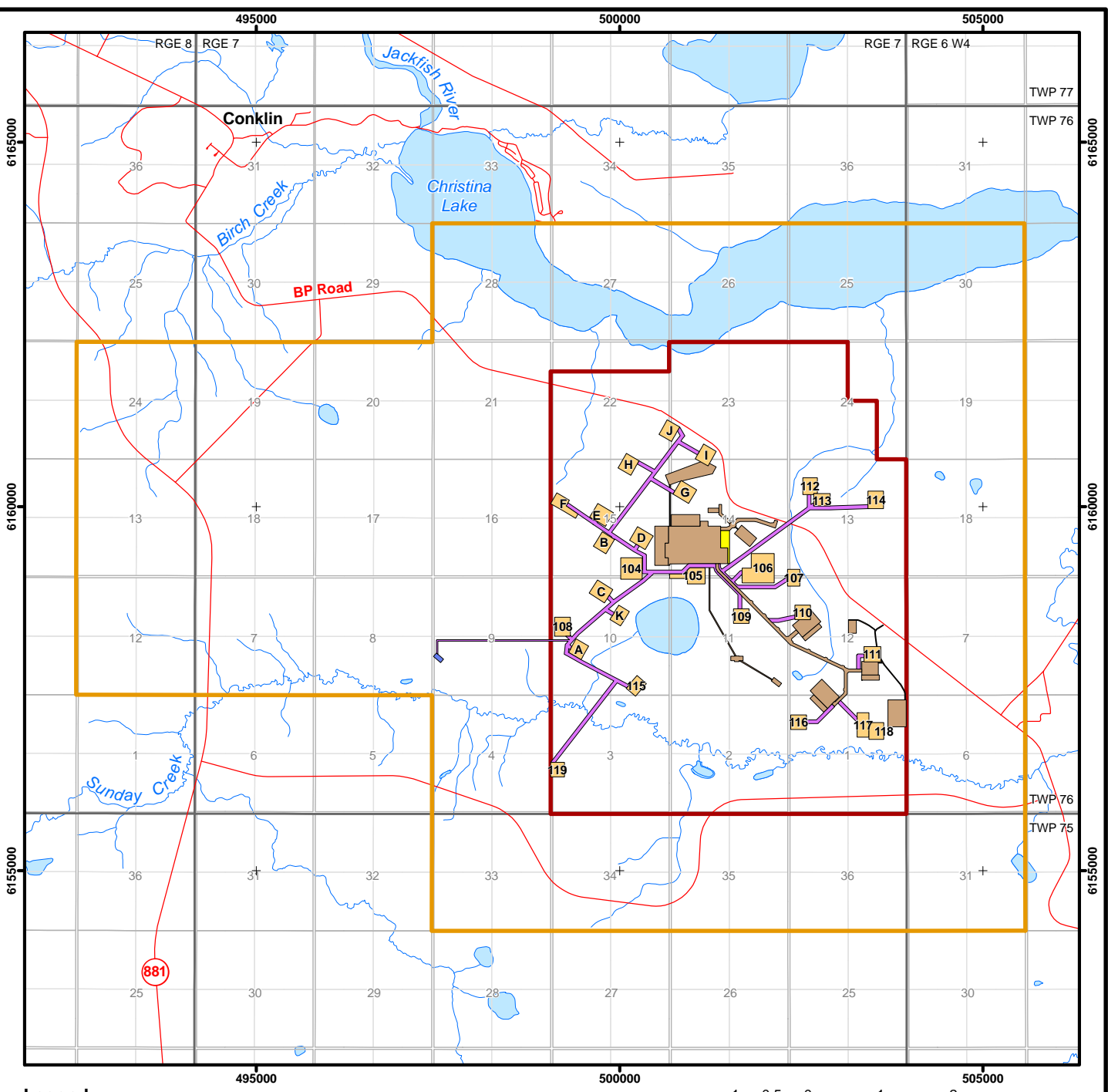
Development Schedule

DATE: December 2009				Fig02.03-01 Develop Sched 09-12-14			
PROJECT: CE03745/100				DRAWN BY: AMEC			
ANALYST: KW		QA/QC: KW DR DR		PREPARED BY: KNOCC			

**Figure
2.3-1**

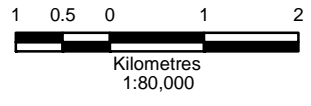
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S:\GIS\Projects\CE\KNOG - BlackGold\CE03745 - EIA\ArcGIS\Projects\Application Report\Figures\Section 02 - Volume 02\Fig02.04-01 Project Area.mxd



Legend

- Terrestrial Local Study Area
- Project Area
- Open Water
- Watercourse
- BlackGold Expansion Project Layout**
- Temporary Construction Laydown Area
- Project ROW
- Source Water Well
- Well Pad
- Baseline Disturbance**
- BlackGold Initial Project



Sources: GeoBase®, KNOG, Spatial Data Warehouse Ltd.

Korea National Oil Corporation
BlackGold Expansion Project

Project Area

DATE: December 2009	Figure 2.4-1
PROJECT: CE03745/100	Fig02.04-01 Project Area 09-12-15
ANALYST: KW KW DR DR	DRAWN BY: AMEC
PROJECTION/DATUM: UTM Zone 12 NAD83	PREPARED BY: AMEC

The typical layout of a single well pad is shown in [Figure 2.4-2](#) and a double well pad in [Figure 2.4-3](#). [Figure 2.4-4](#) illustrates a cross-section of a utility corridor which includes the access road, power and pipelines leading to the well pads. Facilities at each pad will include production and injection wellheads, production and injection manifold headers, produced fluids separation, metering and pumping facilities. As well, there will be an electrical transformer and Motor Control Centre (MCC).

The life of a single well pair will average 8 to 10 years, longevity being determined by the quality of the target resource. Construction of additional pads will take place as well pairs become depleted and corresponding well pairs are drilled to maintain production. The cumulative effect will be a progressive well pad layout as close as possible to the project access road and conservative in its spatial distribution. Advances in drilling technology, environmental management practices and resource recovery success will determine the precise number and location of future pads and well pairs. Once operations are under way and new pads are developed, those that have ceased production will be subject to approved reclamation procedures, based on pre-disturbance assessments. Wherever possible, reclaimed well pad facilities will be reused and additional pads will be developed along existing utility corridors in order to manage surface disturbance in the project area.

Observation wells may be drilled to monitor performance of the SAGD process. Initial design has one observation well per pad. The number of observation wells required in future development may decrease as operating experience is gained. Observation wells will be designed to reduce surface disturbance.

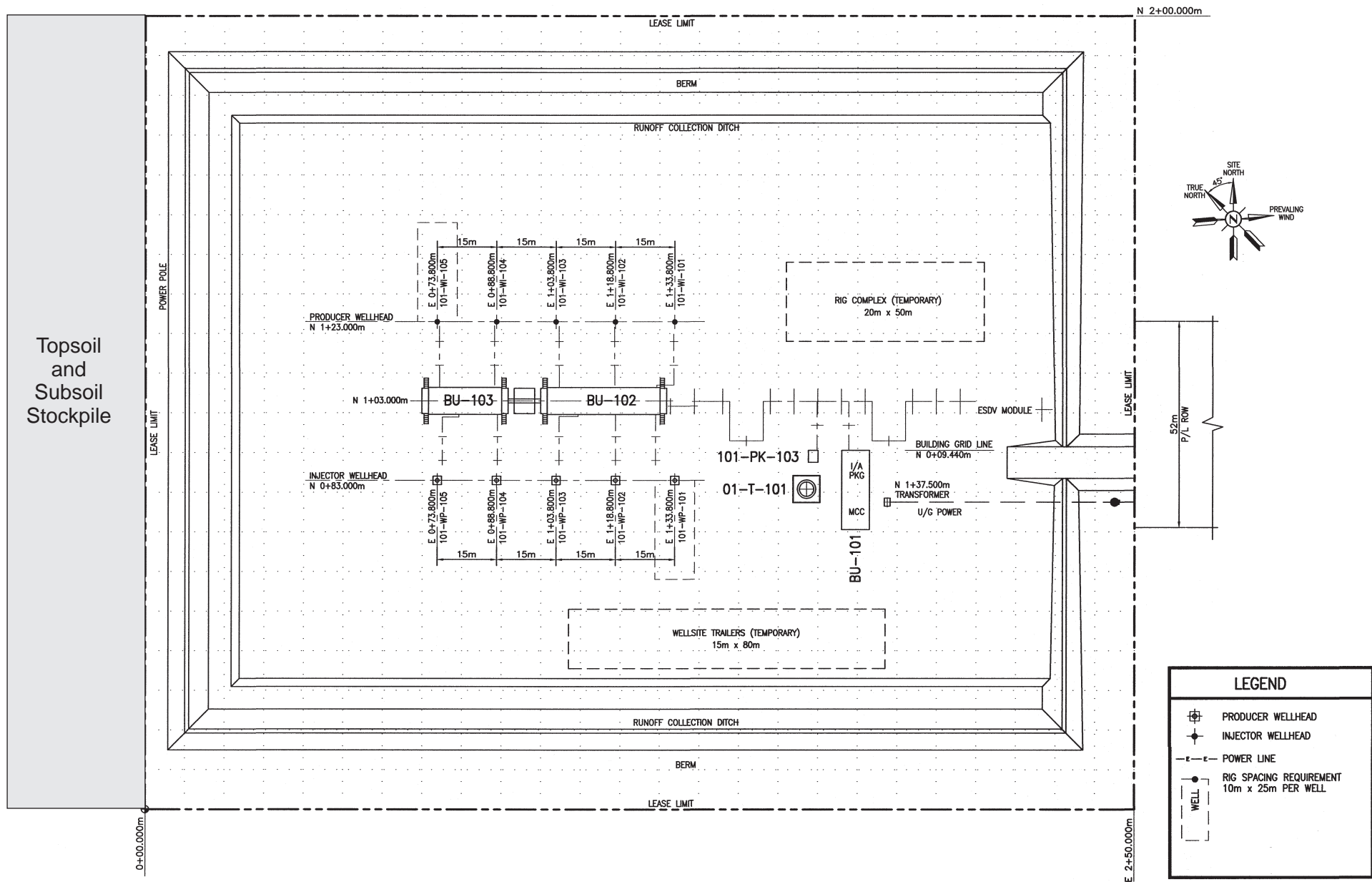
2.4.2 Central Processing Facility

Additional facilities will be added to the CPF developed for the Initial Project including steam generation, oil treatment, water treatment and associated utility facilities.

The CPF will be expanded to continue to process the following basic streams:

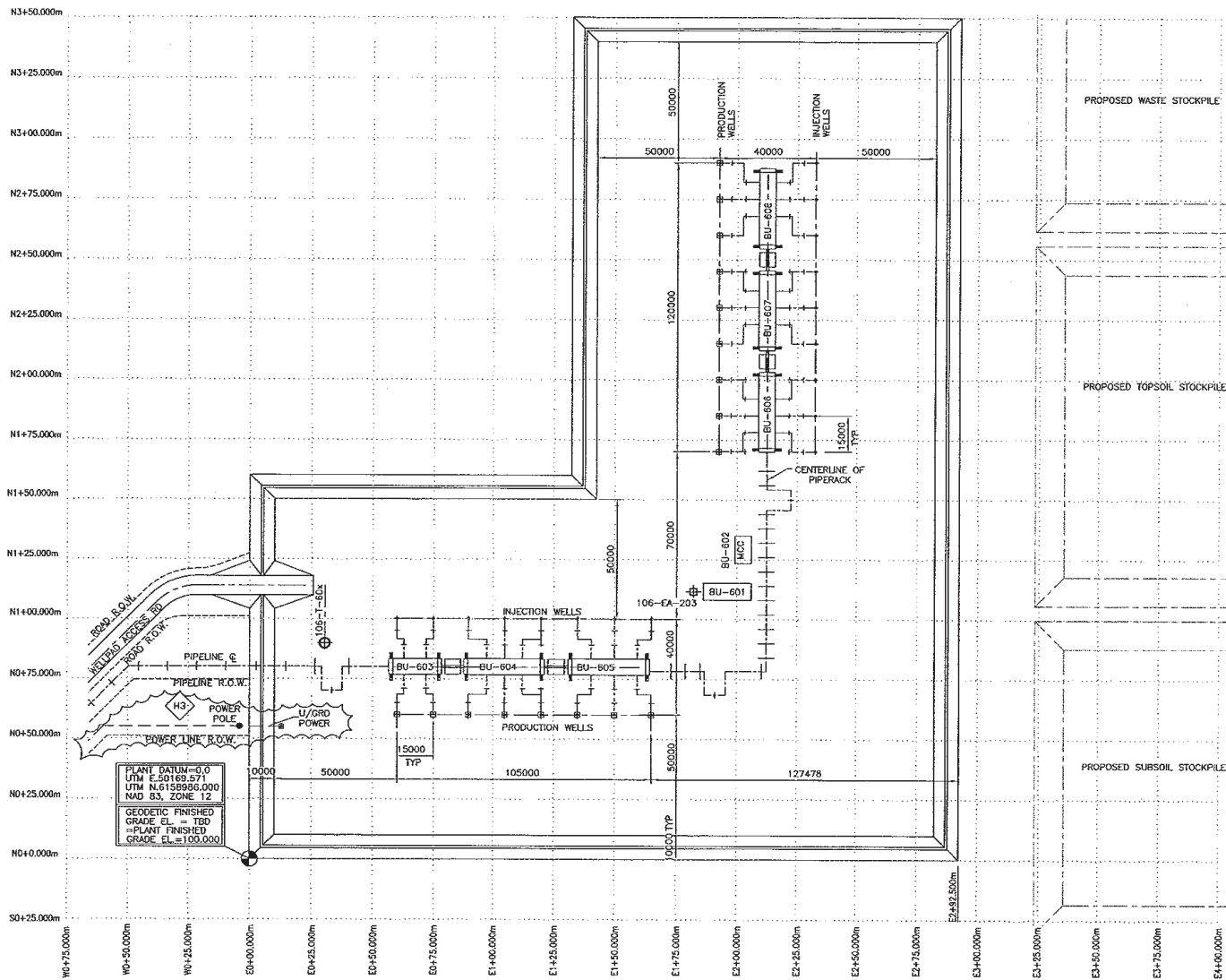
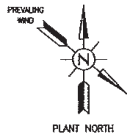
- the bitumen emulsion will undergo a separation process to meet the pipeline specifications;
- water will be de-oiled and treated to allow for reuse in steam generation;
- solution gas will be removed from the emulsion and used to supplement the fuel source for the steam generators; and
- steam for injection will be created in steam generators.

The existing on-site construction camp will be required during the Expansion Project, together with temporary construction offices, shops and warehouses. The existing permanent camp for operations will also be used.



LEGEND	
	PRODUCER WELLHEAD
	INJECTOR WELLHEAD
	POWER LINE
	RIG SPACING REQUIREMENT 10m x 25m PER WELL

DATE: December 2009	Fig02.04-02 TWell Pad BW 09-12-03
PROJECT: CE03745/100	DRAWN BY: AMEC
ANALYST: KW	PREPARED BY: WorleyParsons
QA/QC: KW DH DR	



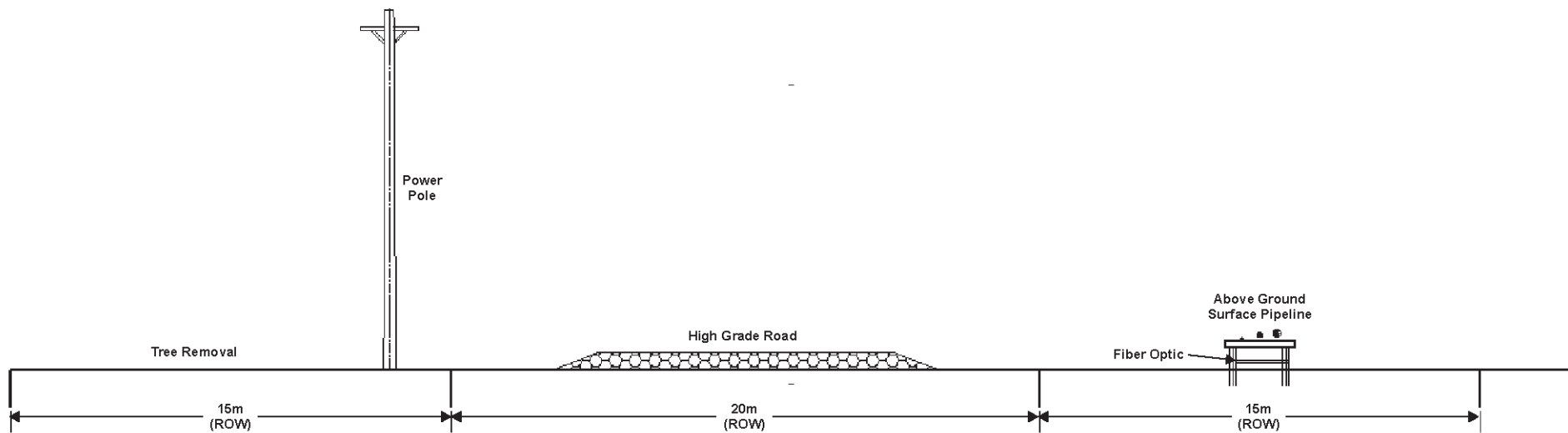
Korea National Oil Corporation
BlackGold Expansion Project

Typical Double Well Pad Layout

DATE: December 2009		Fig02.04-03 Well Pad BW 09-12-03	
PROJECT: CE03745/100		DRAWN BY: AMEC	
ANALYST: KW	QA/QC: KW DH DR	PREPARED BY: WorleyParsons	

Figure 2.4-3

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Korea National Oil Corporation
BlackGold Expansion Project

Typical Well Pad Access/Utility Corridor Cross-section (Single Pipeline)

DATE: December 2009		Fig02.04-04 TROW X-Sec BW 09-12-03	
PROJECT: CE03745/100		DRAWN BY: AMEC	
ANALYST: KW	QA/QC: KW DH DR	PREPARED BY: WorleyParsons	

Figure 2.4-4

2.4.3 Off-site Facilities

Off-site facilities will occupy an estimated 81 ha over the life of the project. These are the facilities that connect the well pads to the CPF. Wherever feasible these linear features are bundled, forming main stem connections between sets of well pads and the CPF. Utility and road corridors will range be 35 m and pipeline corridors will be 17 m wide. The steam distribution and production gathering pipelines for the project are to be placed above ground, facilitating thermal expansion and allowing for inspection and maintenance.

The development plan is arranged so as to limit new stream crossings to two across two unnamed creeks, and one clear span bridge or open bottom culvert across Sunday Creek. Setbacks of 100 m will be maintained on all watercourses.

Specific off-site facilities include:

- surface pipelines including production emulsion, steam distribution, gas blanket to well pads and steam condensate recovery from the well pads to the CPF;
- power distribution lines;
- water supply connecting pipelines;
- observation wells; and
- access roads.

2.5 Monitoring and Environmental Management

KNOC is committed to conducting its activities in a manner that safeguards the health and safety of the company's employees, contractors and the public, while sustaining quality of the environment for benefit of future generations. KNOC recognizes that management, employees and contractors share responsibility for providing leadership to effectively manage plans and programs arising from this commitment.

Environmental management systems have been developed and continue to evolve in response to this corporate commitment. The project is subject to application of these systems in a manner applicable to all KNOC properties and operations. Modifications to KNOC's corporate environmental management systems for the project will be introduced as appropriate, to reflect regulatory requirements, technical innovation and best management practices applied to environment and community alike. Monitoring will be an integral component of environmental management systems application.