

11.0 Infrastructure, Offsites and Utilities

11.1 ROADS AND TRANSPORTATION UPGRADES

Regional access to the JACOS Expansion Project is currently via Highway 63. The existing JACOS access road (LOC 831007), that runs from the highway to the water disposal wells for the JACOS Demonstration Project, will be extended to provide access to the new central processing facility (CPF). About 900 m of new road construction will be required. Both the access road and Highway 63 approach will be upgraded to accommodate construction traffic increases, as per Alberta Transportation (AT) guidelines, and widened for oversized equipment loads. Existing infrastructure is shown in Figure 11-1.

The access road will be extended along the trunk of the gathering system to form a main utility corridor. The combined right-of-way (ROW) will be about 55 m wide so that electric power distribution lines and surface pipe rack can be placed adjacent to the roads and minimize surface disturbance. Figure 1-4 in Volume 1, Section 1 shows the proposed upgrades including access roads to the plant and wellpads, pipeline corridors and the required Highway 63 crossing. See Volume 1, Section 10.2 for a discussion on roads for field facilities.

The Alberta Government plans to expand Highway 63 from a two lane un-partitioned highway to a four-lane divided highway. JACOS met with AT in May 2006, March 2009 and October 2009 to discuss potential impacts from the Expansion Project's timing and construction on the expansion plans for Highway 63, and existing government transportation infrastructure.

As no new highway intersections will be required, the Expansion Project does not substantially affect engineering designs that have already been completed for the expansion. Although it will be necessary to upgrade the intersection to accommodate additional traffic during construction and, to a lesser extent, operations, it was agreed that the upgrade will meet all design requirements of the highway in place. The opportunity to coordinate road construction with AT was also discussed and will be considered once a definite construction schedule for this segment of Highway 63 becomes available. A traffic impact assessment (TIA) will be executed prior to any roadway construction as per AT's request. A TIA at this stage may not accurately reflect the traffic at the time of construction due to additional usage from other area industry users and the public. A TIA will be conducted as JACOS approaches the start of construction during the next phase of engineering when manpower estimates are further developed.

11.2 TRAFFIC IMPACTS

Potential impacts to traffic volumes on Highway 63 were reviewed as part of the socio-economic impact assessment (see Volume 2, Part C, Section 20). Highway 63 is the primary link between Fort McMurray and population centres to the south. Secondary Highway 881, which intersects with Highway 63 roughly 20 km south of Fort McMurray, serves as the other highway connection to destinations south of the Regional Municipality of Wood Buffalo (RMWB).

The Expansion Project will contribute to increased traffic on Highway 63 north to Fort McMurray and Anzac, and south out of the RMWB. The effects are expected to be greatest during the peak construction phase, between the third quarter of 2013 and the second quarter of 2014. About 100 additional daily vehicle movements are expected during peak construction, which represents a 1% increase over Baseline Case traffic volumes anticipated on Highway 63 near the project access road. The estimated traffic volume on Highway 63 of 6600 vehicle movements near the intersection of Secondary Highway 881, including project activity, is below the volume of 8810 average annual daily traffic experienced in 2008 on the single-lane segment of Highway 63 north of Syncrude.

Based on all of the projects included in the Planned Development Case, traffic volumes on Highway 63 south of the Highway 881 intersection are expected to rise at an average rate of 7% annually. Volumes south of the intersection with Secondary Highway 881 could reach 8500 vehicles per day by 2018. This level of average daily traffic volume would still be within the carrying capacity of the highway at its current level of service, but daily and weekly commuting would see higher volume peaks. As volumes increase on Highway 63 and Secondary Highway 881, the need for cooperation between oil sands developers on coordinating shift and over-dimensional load movements will continue.

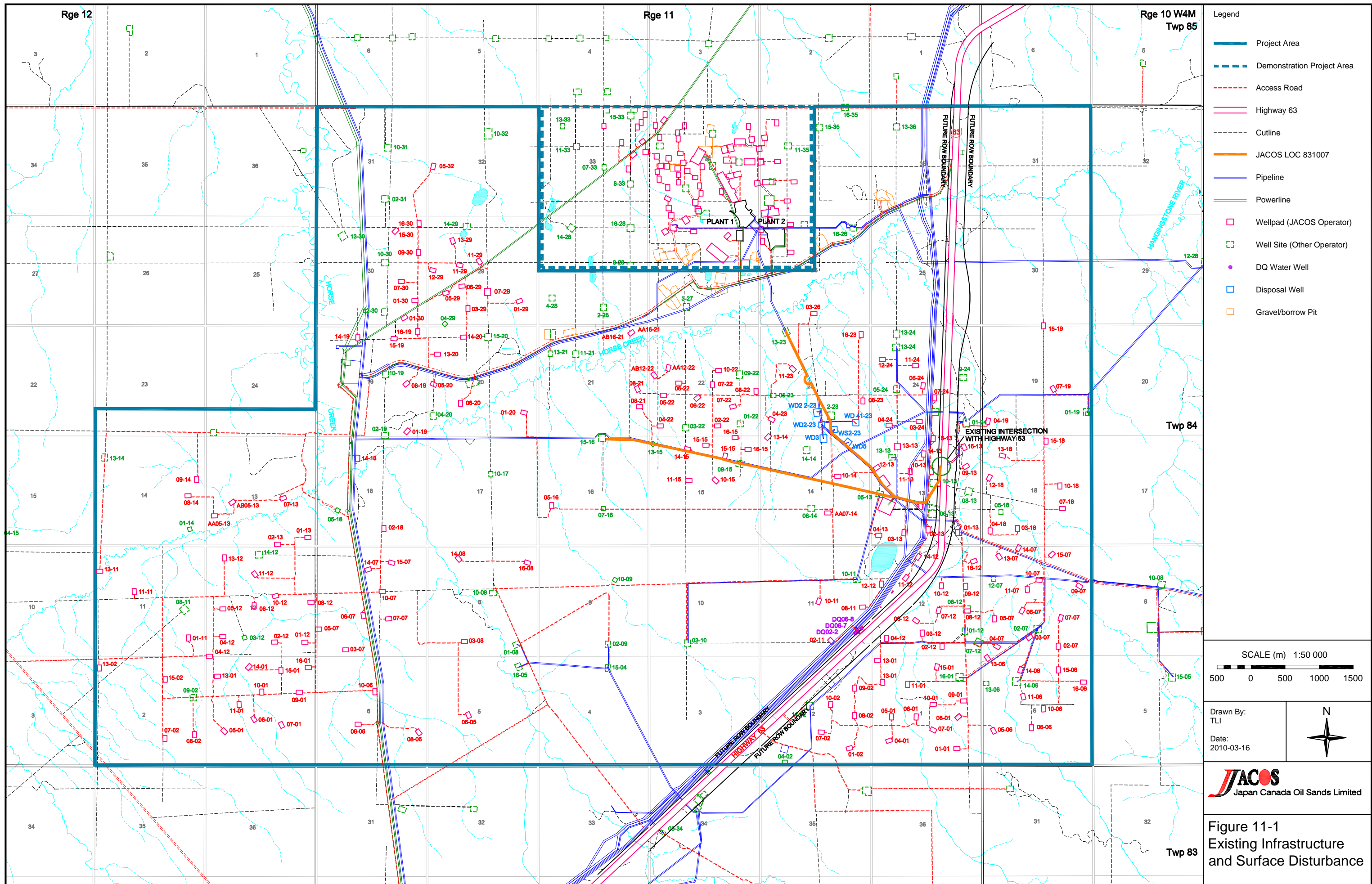
The twinning of Highway 63 will see sufficient increase in the roadway's capacity to handle the expected growth in traffic volumes. JACOS will coordinate construction of project access road connections to Highway 63 with the planned twinning to minimize traffic flow disruption. JACOS will continue to cooperate with the RCMP, other developers and community stakeholders to monitor the traffic situation along southern segments of Highway 63. As required, the Company will implement mitigation strategies, such as off-peak scheduling of over-dimensional sized loads and encouraging car and truck ridesharing.

11.3 DEVELOPMENT ACROSS HIGHWAY – CONCEPTUAL HIGHWAY CROSSING, SURFACE EFFECTS

As part of the initial development, the horizontal sections of a number of well pairs will extend beneath portions of Highway 63 to recover the resource located at a depth of about 300 m below ground. Accordingly, JACOS has considered the surface effects that will result from this development.

An engineering study on the effects of subsurface operations at the Demonstration Project was conducted in November 2006 to forecast a worst-case scenario of differential displacement (slope) due to heave over the Demonstration Project development area. The study predicted surface heave of up to 40 cm over a ten-year period and an increase in slope of 0.12% (1 m rise over 830 m distance), which is within normal structural design tolerances for surface facilities at the Demonstration Project.

The effects of surface heave were reviewed with AT in meetings in May 2006 and October 2009, and no concerns for the structural integrity of the highway were expressed. Although JACOS does not expect any issues to arise, it will pay for additional highway maintenance should there be any effects. Actual data gathered at the Demonstration Project over the past ten years shows that heave effect is within the magnitude predicted. Maximum heave was 23.9 cm and slope increased 0.043% (1 m rise over 2300 m).



- Legend**
- Project Area
 - - - Demonstration Project Area
 - - - - - Access Road
 - Highway 63
 - - - - - Contour
 - JACOS LOC 831007
 - Pipeline
 - Powerline
 - Wellpad (JACOS Operator)
 - Well Site (Other Operator)
 - DQ Water Well
 - Disposal Well
 - Gravel/borrow Pit

SCALE (m) 1:50 000
 500 0 500 1000 1500

Drawn By:
TLI

Date:
2010-03-16



JACOS
Japan Canada Oil Sands Limited

Figure 11-1
Existing Infrastructure
and Surface Disturbance

A cap rock integrity study was conducted as part of this application (see Volume 1, Section 6.12) to predict surface heave effects and site-specific failure conditions. Computer modelling and rock mechanical properties from cores collected in the Project Area were used. A mini-frac test was also conducted to confirm the cap rock fracture pressure. The mini-frac test confirmed the operating pressure at the Expansion Project will be well within the cap rock fracture pressure, confirming cap rock integrity will not be compromised.

As future development moves southeast of the initial development (see Volume 1, Section 4, Figure 4-1), it will become necessary to cross Highway 63 with distribution and gathering lines to connect wellpads on the east side of the Highway to the new CPF on the west side. All lines crossing the highway will be underground and will be registered with AT under the Application Procedures for Placement of Underground Oil and High Pressure Gas Pipeline in the Vicinity of Transportation Facilities under the Jurisdiction of Alberta Transportation procedures.

The crossing design will meet all safety requirements for pipeline road crossings that fall under the jurisdiction of AT and Canadian Standards Association (CSA) Z662 Oil and Gas Pipeline Systems. Because high-pressure steam line crossings of major roadways are not specifically addressed in CSA Z662, AT will be consulted in developing the final engineering designs for steam and production line crossings. Conceptually, a location in the SE1/4 of 13-84-11-W4M would facilitate such a crossing.

The engineering design will ensure:

- positive slope within the pipeline road crossing to prevent any pipeline low points or pockets – this will prevent accumulation of condensation within the steam pipeline due to condensation occurring during start-ups, shutdowns or from heat loss during normal operations, thereby avoiding conditions that may lead to water hammer, internal corrosion or multiphase flow problems
- surface grading, swales, sumps/pumps and/or buried stormwater lines will be installed, as required, to remove any groundwater that may collect around the crossing
- pipes will run linearly through the crossing with no elbows or bends that may cause fluid pockets
- pipeline anchor and thermal expansion loops will be located a safe distance away from the crossing
- carriers or casing support will facilitate thermal expansion and contraction
- no flanged connections will be installed in the crossing to avoid leaks in any of the pipelines

11.4 ELECTRIC LOAD AND POWER SUPPLY

JACOS has initiated discussions with ATCO for electrical power supply. Preliminary indications are that capacity is available from the ATCO Algar substation located at LSD 11-19-84-11 W4M, about 6 km west of the Demonstration Project. The proposed installation would require new transformers and meters, along with a 25 kV powerline to feed the main CPF site and various wellpads in the Project Area. The total power load for the first phase of development is estimated at 20 MW.

11.5 OIL PRODUCT AND DILUENT HANDLING, TANKAGE, PIPELINE

11.5.1 Diluent

Diluent will be added to the bitumen to facilitate the oil treatment process and meet product specifications for the sales pipeline. Discussions are ongoing to bring diluent to the CPF via a 168 mm-diameter (6" nominal size) pipeline from the Enbridge Cheecham terminal. The pipeline will be designed for continuous use at a pressure of 9930 kPa. Estimated length is about 49 km. When details are finalized, this pipeline will be the subject of a separate regulatory application. An 11 760 m³ tank will be installed at the inlet of the CPF to provide storage capacity for about two days.

11.5.2 Sales Oil

Sales oil will be delivered to markets in the form of dilbit (a diluent-bitumen blend about 30% diluent and 70% bitumen). One option is shipping the product to the Enbridge Cheecham terminal via a 323.9 mm-diameter (nominal 12" size) pipeline installed in a common ditch with the diluent pipeline. The pipeline will be designed for continuous use and have a design pressure of 9930 kPa. If built, this pipeline will be the subject of a separate application. Two 10 760 m³ tanks will be installed in the CPF for treated bitumen to provide storage capacity for about two days.

See Volume 1, Section 3.3.1 for a discussion of the future possibility of shipping hot bitumen from the Demonstration Project to the Expansion Project for common delivery into the sales oil pipeline. This concept would require a new 5 km pipeline along with pumps and other equipment at the Demonstration Project, and would be the subject of a separate regulatory application if pursued.

11.5.3 Metering

A lease automated custody transfer (LACT) unit will be installed at the CPF to meter incoming diluent, and pump and meter the dilbit product for delivery into the sales pipeline. It is anticipated this pipeline will be owned and operated by others.

11.6 NATURAL GAS

Discussions are on-going with TransCanada Pipelines to install a tie-in point and metering station on the existing 406.4 mm-diameter (nominal 16" size) Pelican lateral, located in the pipeline corridor west of the Project Area to supply the Expansion Project's fuel gas needs. From there, a new 8 km pipeline will be required to supply the estimated 1423 x 10³ m³/d of natural gas to the CPF. Preliminary sizing calls for a 273 mm-diameter (nominal 10" size) pipeline with a design pressure of 9930 kPa.

11.7 WATER SOURCE

The only new water source infrastructure required for the Expansion Project will be a new pipeline connecting the CPF to JACOS's existing water wells located approximately 1 km due south. Further specifics as it relates the existing water well infrastructure is provided in Section 12.5.