CRISP AOSA

COMPREHENSIVE REGIONAL INFRASTRUCTURE SUSTAINABILITY PLAN
FOR THE **ATHABASCA OIL SANDS AREA**

Government of Alberta

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OVERVIEW

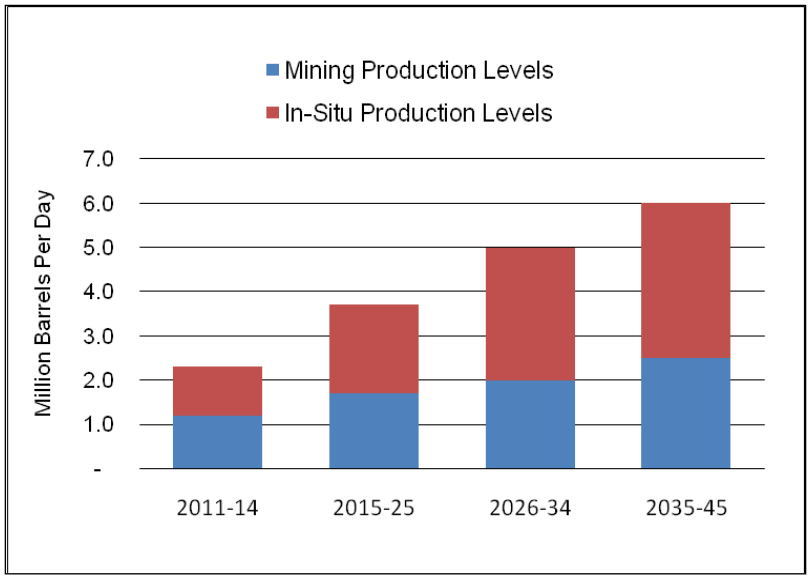
Government of Alberta

CRISP: Overview and Context

The Comprehensive Regional Infrastructure Sustainability Plan (CRISP) is a guideline for long-term infrastructure development in the Athabasca Oil Sands Area (AOSA) and supports *Responsible Actions*, the Alberta government's strategic plan for development of its oil sands resource. The CRISP focuses on community development and identifies infrastructure needs related to transportation, water and wastewater servicing, education (K-12) and health care[1].

Since 2007, over $1.6 billion dollars in funding approvals have been provided by the Government of Alberta to the Athabasca Oil Sands Area. Additional approvals for the CRISP will have to go through the Government's capital planning and budgetary processes, as the CRISP is not a funded initiative.

Alberta's remaining proven oil reserves are 172 billion barrels, representing 13 percent of total global oil reserves. Ninety-nine percent of the province's proven oil reserves (170 billion barrels) are in the oil sands. Oil sands serve as a key driver of the economy, creating jobs and opportunities for Albertans and Canadians. Efficient and reliable infrastructure is a strategic investment that is critical to the province's continued prosperity.



The Bitumen Production Levels chart (Figure 1) shows estimated oil sands production levels.

In three years, the data indicates that production levels will reach 2.3 million barrels per day. This level is 77 percent higher than production levels achieved in 2008.

Estimated production levels for all four phases of the CRISP can be found in Appendix A.

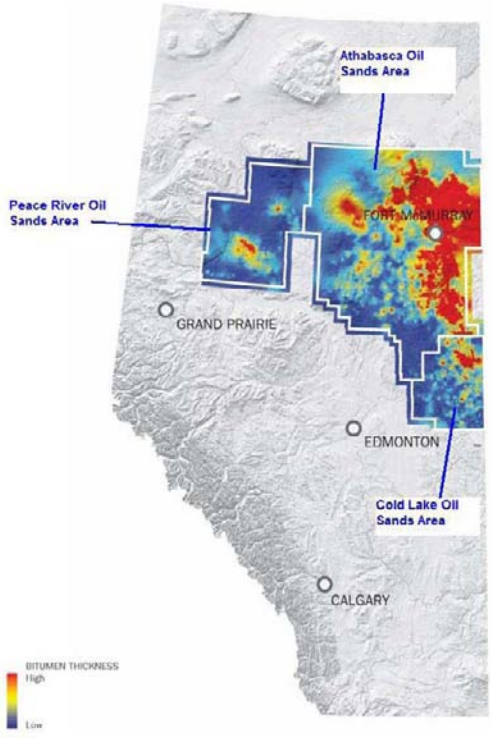
Figure 1: Bitumen Production Levels

[1] While the focus of the CRISP is on these infrastructure areas, it is noted that growing communities will also create demands for other types of hard and soft infrastructure, including emergency services, waste management facilities and recreation facilities.

Developing the Plan

The CRISP uses oil industry information to forecast oil sands production levels, review oil sands project start and completion dates, and produce estimates for population growth[2]. The data indicates that we can expect 6.0 million barrels per day and a population of approximately 240,500 in the Athabasca Oil Sands Area by the year 2045. This information is fundamental in planning where and when infrastructure will be required.

Unlike other areas of the province where there are numerous factors that affect population growth and the associated demands for infrastructure -- oil sands development is the primary economic driver in the AOSA and population growth is clearly tied to the employment requirements of oil sands projects.



This map illustrates bitumen[3] deposits in Alberta's three oil sands areas (Athabasca, Peace River, and Cold Lake). The red areas indicate where bitumen production potential is highest and therefore where oil sands development and future employment growth is likely to occur.

Comprehensive Regional Infrastructure Sustainability Plans will also be developed for the Peace River and Cold Lake Oil Sands Areas.

Figure 2: Bitumen Deposits in Alberta's Oil Sands Areas

[2] Oil production levels are based on currently approved and announced oil sands projects outlined in the Canadian Energy Research Institute (CERI) database. Population forecasts are built on a model developed by the Regional Municipality of Wood Buffalo. Demographic information is derived from Statistics Canada publications, as well as publicly available industry data on current and future employment needs.

[3] Bitumen is a viscous form of oil combined with sand and water. The bitumen must be removed from the sand and water prior to being upgraded into crude oil and other petroleum products.

The CRISP – A Phased Plan

The CRISP offers a phased approach to infrastructure planning, with each phase linked to oil production levels and associated population growth. This measured approach to planning allows the Government of Alberta to monitor growth and identify short term needs within the context of a long term plan.

The CRISP is designed to be flexible and responsive to changes in production and population rates. A Monitoring Framework will be established to track indicators and provide a fact-based approach for recommending changes to the pace of infrastructure development. A list of CRISP Monitoring Framework indicators can be found in Appendix B.

Figure 3: Highway Upgrading Near Fort McMurray

The first phase of the plan includes transportation upgrades to Highways 63 and 881, as well as the start of construction of a ring road to the east of Fort McMurray. Population growth will be directed away from traditional work camps and towards existing communities, a new urban growth node north of Fort McKay and a planned work community south of Conklin.

Phases 2 through 4 continue to provide infrastructure that complements oil sands development as it continues out for the next 35 years. Maps and a list of infrastructure requirements for all four phases of the CRISP can be found in Appendix C.

Implementing the CRISP

Successful implementation of the CRISP will require extensive coordination across the various departments of the Government of Alberta, as well as between all levels of government and industry. The Government of Alberta will serve as the primary coordinating body for implementing the CRISP. Activities will include the following:

- Continued Planning
    - Develop regional transit strategy
    - Initiate new community study including siting, governance and servicing
    - First Nations/Métis labour workforce study
    - Integrate multi-use corridor planning into the CRISP
    - Initiate functional planning studies for Phase 1 transportation and servicing requirements

- Determination of potential funding mechanisms
    - Undertake discussions with all partners to explore innovative funding approaches
    - Ensure that CRISP priorities are reflected in the Province's capital planning, land release and oil sands application and approvals

- Begin coordinated implementation
    - Complete Urban Development Reserve project for timely release of Crown land
    - Integrate the CRISP with regional planning efforts under the Land-use Framework
    - Establish CRISP Monitoring Framework
    - Continue stakeholder engagement (formal First Nations consultations as required)

Industry will need to align its project planning with the CRISP: Industry roads and air facilities should, for example, be planned and developed to integrate with the broader CRISP transportation network, while worker accommodation practices should work in concert with growth solutions identified in the CRISP (e.g. planned work camp areas and urban growth nodes).

Municipalities in the AOSA will also need to ensure that local planning efforts, such as Municipal Development Plans and Area Structure Plans, align with and help to implement the overall vision of the CRISP.

A list of CRISP priority implementation actions can be found in Appendix D.

Conclusion

The long-term vision of the Athabasca Oils Sands Area is one where infrastructure keeps pace with oil sands development, where impediments to resource development are removed, and where sustainable, healthy, safe and vibrant communities thrive.

Population growth will be managed through natural growth in existing communities, a possible new community north of Fort McMurray and planned work camp communities in the Conklin and Wabasca areas. These communities will be connected through a robust, multi-modal transportation system that will include upgrades to existing roads, the creation of new roads, coordinated air transportation infrastructure, as well as new bus transit and commuter rail systems that provide quick access between communities and project sites, as well as locations outside of the AOSA.

Successful implementation and funding of the CRISP will require extensive coordination and alignment of priorities across various departments of the Government of Alberta, as well as between all levels of government and industry. Coordination will include integration with regional planning under the Land-use Framework, as well as exploration of alternative financing mechanisms, partnerships and innovative project delivery.

CRISP covers a period up to 2045. Over such a long horizon, there are likely to be many developments that could not be foreseen. Accordingly, CRISP will have to be flexible to events as they arise.

Appendices

Additional detailed work has been done by Applications Management, Nichols Applied Management, and the Government of Alberta. This work is attached as appendices for the review of those who wish greater detail:

A. Estimated Population and Production Level Increases
B. CRISP Monitoring Framework Indicators
C. Infrastructure Maps and Charts
D. CRISP Priority Implementation Actions
E. Objectives and Guiding Principles

Appendix A - Estimated Population and Production Level Increases

		Phase 1		***Phase 2***			***Phase 3***			***Phase 4***		
	2008	***2011-14***	***Increase from 2008***	***2015-25***	***Increase from previous phase***	***Increase from 2008***	***2026-34***	***Increase from previous phase***	***Increase from 2008***	***2035-45***	***Increase from previous phase***	***Increase from 2008***
Estimated Population	109,700	129,300	18%	165,400	28%	51%	199,200	20%	82%	240,500	21%	119%
Estimated Bitumen Production Levels (*million barrels per day*)	1.3	2.3	77%	3.7	61%	185%	5.0	35%	285%	6.0	20%	362%

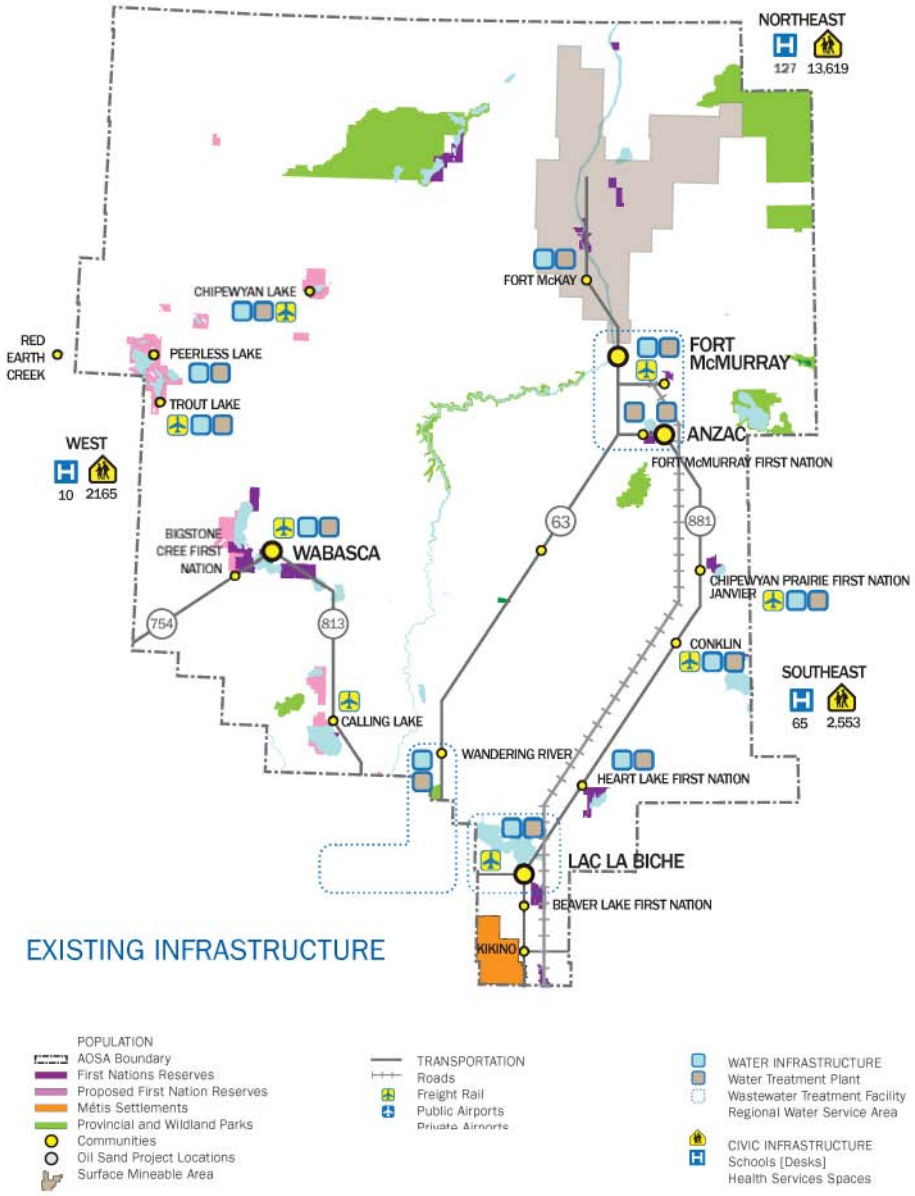
Appendix B – CRISP Monitoring Framework Indicators

INDICATOR	SOURCE	INTERPRETATION
Industry		
List of oil sands projects	Various sources: CERI, Oil Sands Developers Group (OSDG), Strategy West, Alberta Energy	An increase in the number of projects indicates vibrancy in the industry and the likelihood of higher bitumen output growth; project delays or cancellations suggest likely reduction in bitumen growth and associated population and infrastructure implications. The Canadian Association of Petroleum Producers (CAPP) produces an annual Canadian Crude Oil Forecast and Market Outlook, which can serve as a proxy indicator for the Monitoring Framework.
Oil sands project approval status	Energy Resources Conservation Board (ERCB), Alberta Utilities Commission, Alberta Environment, Alberta Sustainable Resource Development	Companies require provincial and, under certain circumstances, federal licenses to construct and operate oil sands facilities. The regulatory approval process starts with issuing a public disclosure document. Depending on the scope of the project, it may take between 2.5 and 5 years from the public disclosure to obtain the necessary licenses. It follows that the regulatory status of a project provides an early indication of the timing of its eventual population and infrastructure effects.
Bitumen production rates	Alberta Energy, ERCB	Actual bitumen production is less than the sum of production capacity of all projects in the AOSA due to scheduled and unscheduled maintenance as well as production challenges. Growth in actual bitumen production indicates the oil sands industry's level of success in obtaining the necessary licenses, constructing the facilities and bringing them on stream.
Population		
AOSA population count	Alberta Municipal Affairs Official Population List in combination with other relevant and timely population information	The Alberta Municipal Affairs Official Population List reflects the result of the most recent Statistics Canada Census or the most recent municipal census accepted by the Ministry. Municipalities tend to conduct their own censuses if population is increasing or if there is a substantial number of people in the region that are not counted by the federal census. This information needs to be considered alongside other relevant population data from various government, industry and private sources to ensure an up-to-date picture of population in the area is understood. Population growth in excess of the provincial average (2.04%) indicates a particular need for vigilance with respect to infrastructure needs. Population growth higher/lower than the growth assumed for the CRISP means advance/delay in infrastructure requirements.
Camp population counts	OSDG, Alberta Office of Statistics and Information (OSI)	Mobile workers in construction and operations camps can be a substantial portion of the total people in the region. High construction camp counts (>10,000) indicates near term permanent population pressures as the new projects come on stream.
Other		
Traffic Counts	Alberta Transportation, Industry	Traffic counts reflect actual road usage. Increases that are higher/lower than the growth assumed for the CRISP means advance/delay in road infrastructure requirements.

INDICATOR	SOURCE	INTERPRETATION
West Texas Intermediate (WTI) (US$) Western Canada Select (WCS) (Can$)	Alberta Energy Sproule	Current and future expected oil prices are a key determinant of project economics. Oil sands projects are very capital intensive and require West Texas Intermediate (WTI) benchmark oil prices in excess of US $75 $85/barrel to make them economical. Oil sands projects produce bitumen, which sells at a discount from WTI. WCS is more reflective of the actual price received at the plant gate. WTI oil prices that are substantially above the US $75-$85/barrel will increase the likelihood that proposed projects will be built and that new projects will come forward. As a result, high oil prices are likely to lead to more rapid population growth and expedited need for new infrastructure. WTI oil prices that are substantially below the US $75-$85/barrel will likely delay project development, and thereby delay infrastructure needs.
Cost of construction	CERA up and downstream construction cost index	Oil sands projects are highly capital intensive. Strong cost price inflation between 2004 and 2008 contributed to project delays and cancellations in 2008/09. Re-emergence of cost inflation (in excess of 2-4 per cent per year) will reduce project economics unless WTI oil prices are in excess of US $75-$85/barrel. Other things being equal, cost inflation will reduce the number of projects that are actually built.
Cost of carbon	To be determined	Currently the cost of greenhouse gas emissions is low or zero. This is likely to change in the CRISP planning horizon and may add to the operating costs of industry. Other things being equal, high carbon costs (e.g. in excess of CAN $30/tonne of CO2) may affect project economics and slow the rate of bitumen output growth.

The CRISP Monitoring Framework will track trends in bitumen production and population and employment growth over time so that any necessary adjustments can be made to the phasing and implementation of the CRISP.

Appendix C – Infrastructure Maps and Charts: Existing Infrastructure



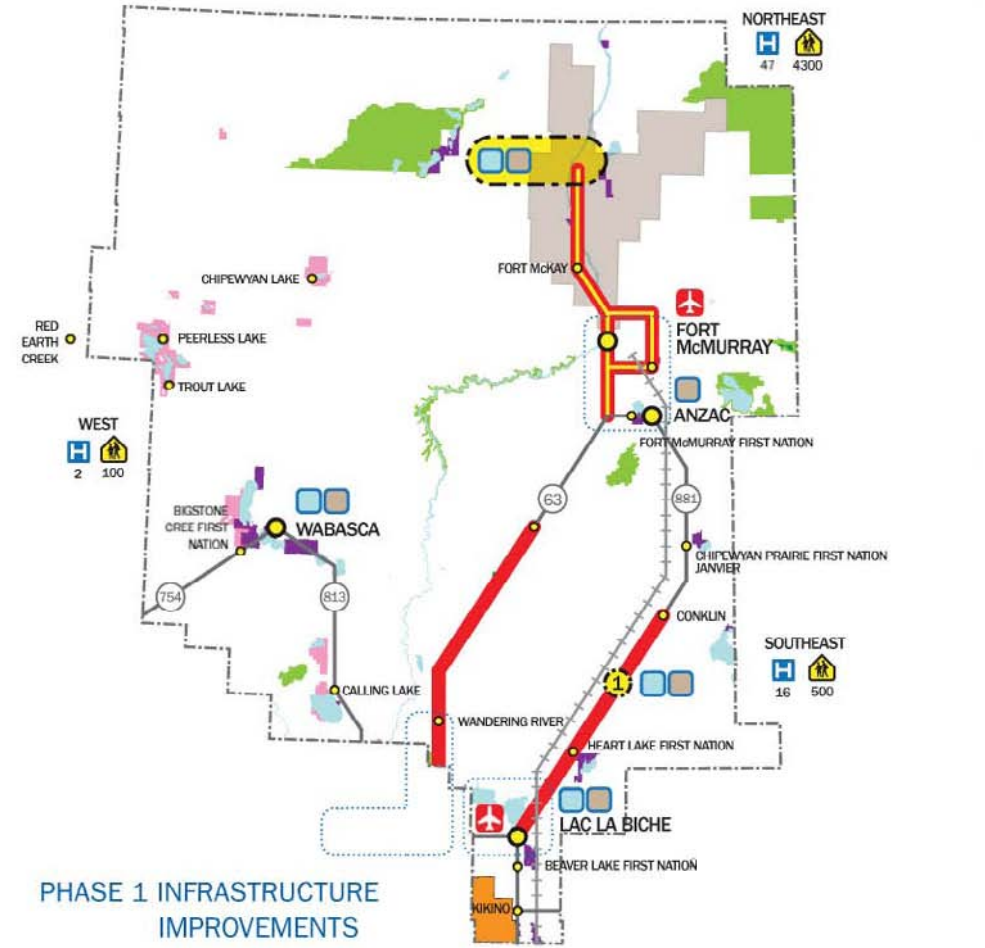
Bitumen Production: 1.3 million barrels per day
Regional Population: 109,700
Date: 2008

EXISTING INFRASTRUCTURE:

TRANSPORTATION	• Transportation infrastructure is dominated by two major highway corridors: Highways 63 and 881 • No paved, all-season east-west transportation infrastructure • No paved, all-season connections to the north or east • The primary public airport in the region is in Fort McMurray, with smaller public airports in Conklin, Lac La Biche and Wabasca. A number of private airfields exist across the region at various oil sands project sites • Freight rail service terminates just south of Fort McMurray. The movement of over-dimensional loads is constrained in some areas, particularly through Fort McMurray and south of Conklin
WATER/ WASTEWATER	• Water and wastewater servicing is provided primarily by separate treatment facilities in each community, with Fort McMurray providing regional water services to Anzac, and Lac La Biche providing regional services to some smaller communities in Lac La Biche County

Appendix C – Infrastructure Maps and Charts: CRISP Phase 1

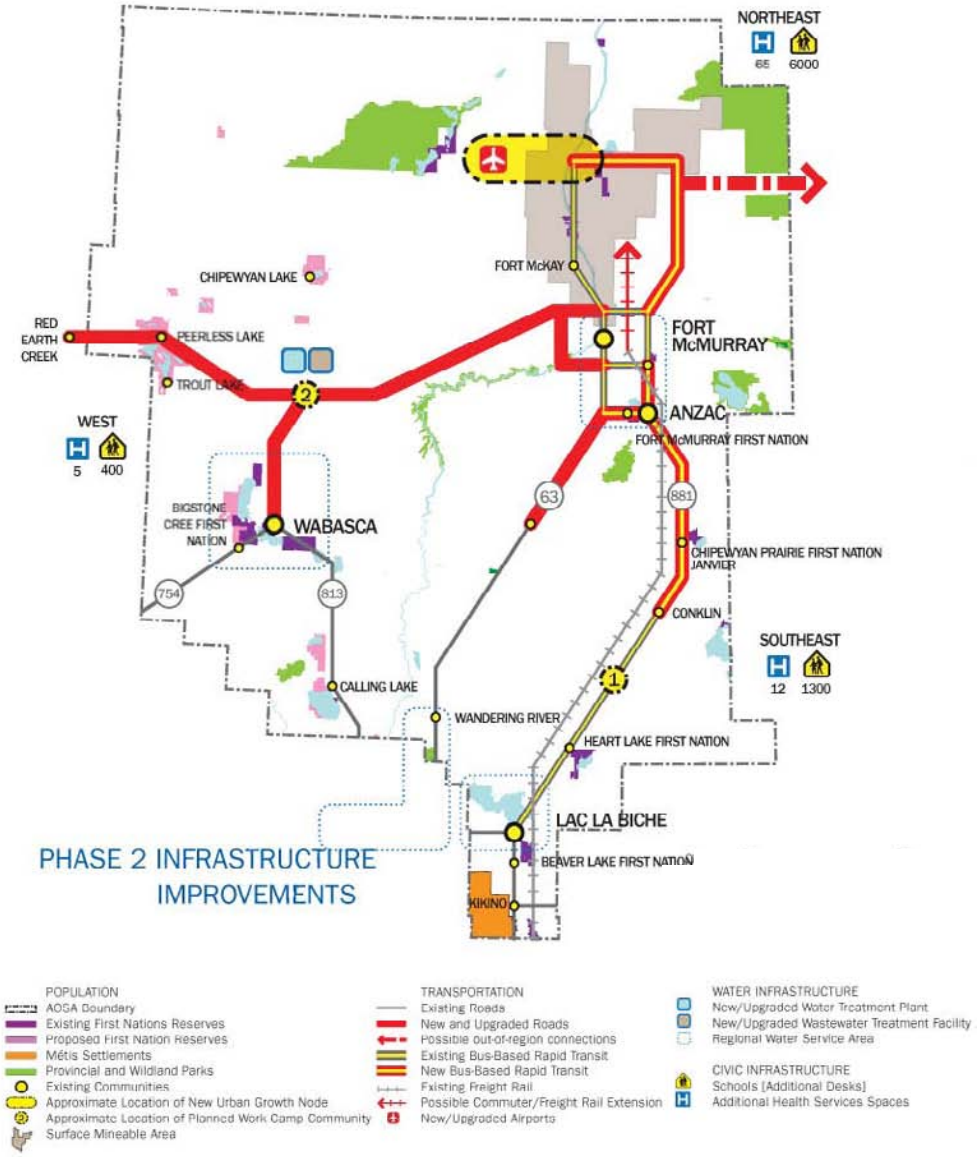
Estimated Bitumen Production: 2.3 million barrels per day
Estimated Regional Population: 129,300
Estimated Time Frame: 2010 - 2014



PHASE 1 HIGHLIGHTS OF INFRASTRUCTURE IMPROVEMENTS

GROWTH CENTRES	• Fort McMurray continues as the dominant centre in the region • Siting studies completed for new urban growth node north of Fort McMurray and new planned work camp community near Conklin, and population growth begins to occur in these areas
TRANSPORTATION	• Additional lane capacity on Highway 63 south of Mariana Lake and north of Fort McMurray • Upgrades to Highway 881 south of Conklin to improve movement of overdimensional loads • Eastern by-pass route around Fort McMurray • Implementation of bus-based rapid transit north of Fort McMurray and between Lac La Biche and project sites near Conklin • Upgrade Lac La Biche and Fort McMurray airports to accommodate increased demands
WATER / WASTEWATER	• New water and wastewater treatment facilities at the new urban growth node and planned work camp community near Conklin • Upgrades to treatment facilities in Lac La Biche, Wabasca and Anzac
EDUCATION	• Approximately 4,900 new spaces at elementary and secondary schools
HEALTH	• Approximately 65 new health care services spaces

Appendix C – Infrastructure Maps and Charts: CRISP Phase 2



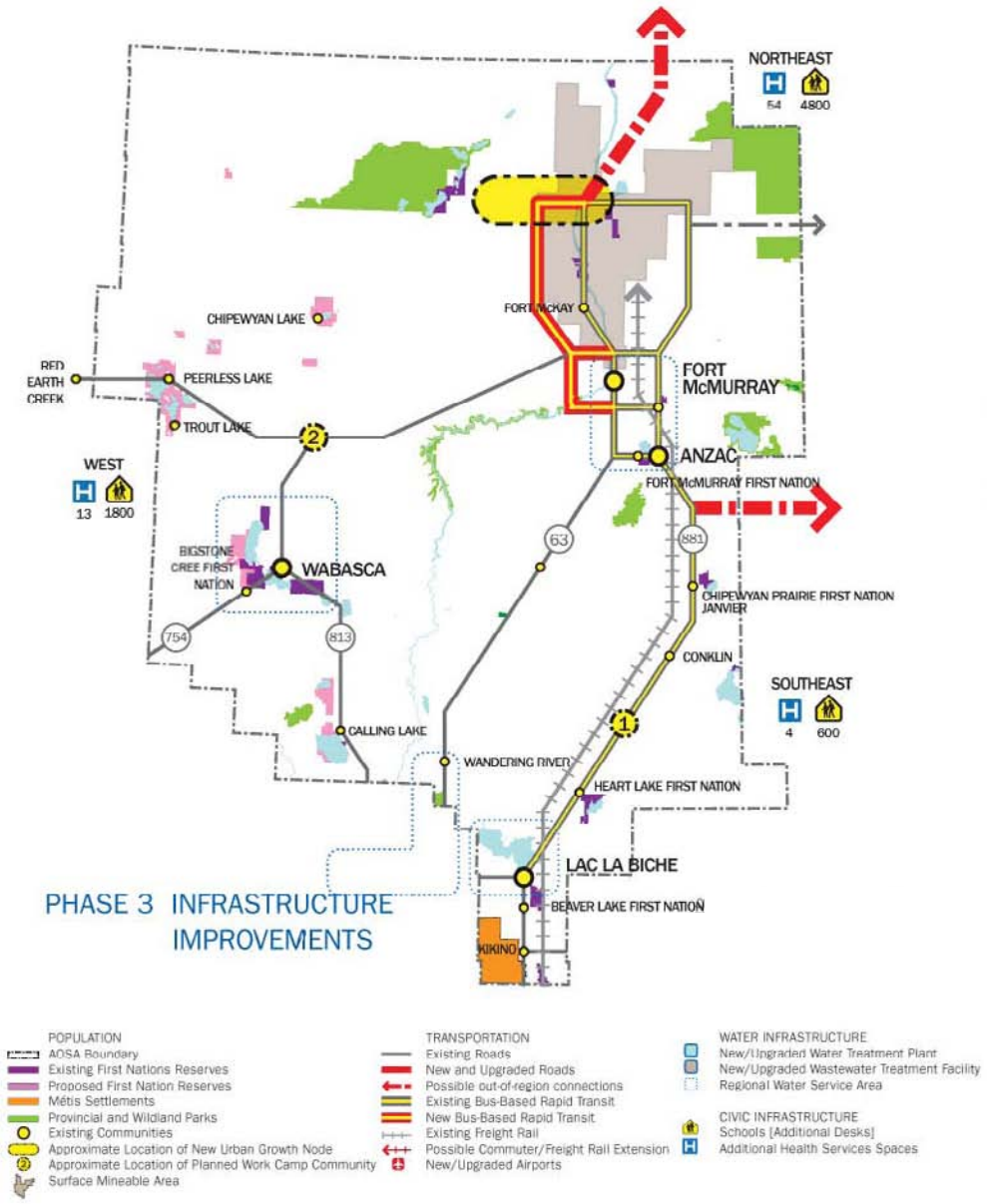
Estimated Bitumen Production: 3.7 million barrels per day
Estimated Regional Population: 165,400
Estimated Time Frame: 2015 - 2025

PHASE 2 HIGHLIGHTS OF INFRASTRUCTURE IMPROVEMENTS

GROWTH CENTRES	• Fort McMurray, Anzac, Lac La Biche and the new urban growth node continue to experience high rates of growth • Siting studies are completed for a new planned work camp community north of Wabasca
TRANSPORTATION	• Extend the eastern highway route initiated in Phase 1 northward to access project sites east of the Athabasca River • Completion of ring road around Fort McMurray • New road corridor west from Fort McMurray to Wabasca and the Red Earth Creek Area • Extension of Highway 813 north from Wabasca • Establish an inter-provincial connection to Saskatchewan near Axe Lake • Introduce commuter rail service in conjunction with new freight rail service between Fort McMurray and the new urban growth node, servicing oil sands projects in the Surface Mineable Area • Extend bus-based rapid transit measures south and northeast of Fort McMurray • New airport servicing the new urban growth node and nearby oil sands projects
WATER / WASTEWATER	• Upgrades to Fort McMurray water treatment plant • New water and wastewater treatment facilities for the planned work camp community north of Wabasca
EDUCATION	• Approximately 7,700 new spaces at elementary and secondary schools
HEALTH	• Approximately 82 new health care services spaces

Appendix C – Infrastructure Maps and Charts: CRISP Phase 3

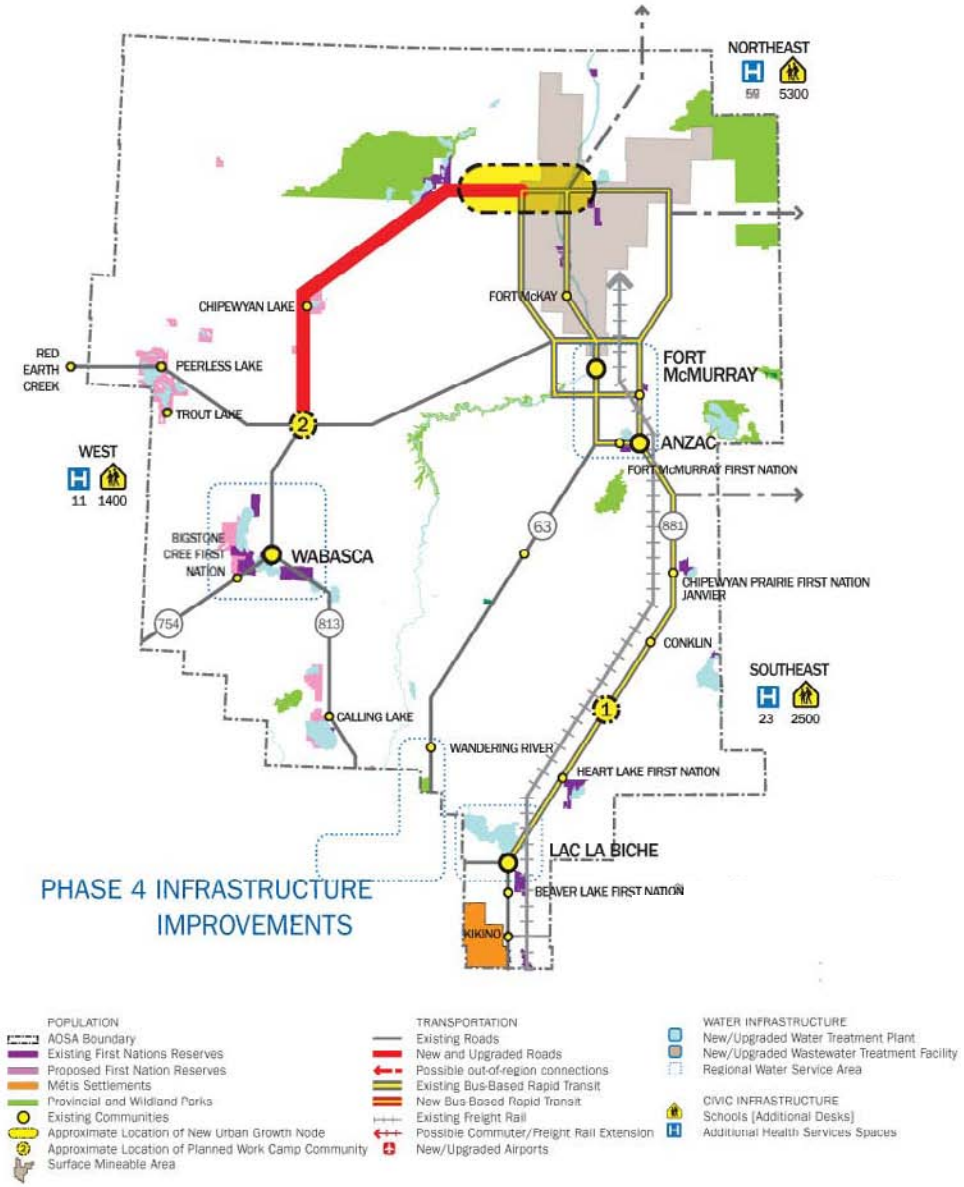
Estimated Bitumen Production: 5.0 million barrels per day
Estimated Regional Population: 199,200
Estimated Time Frame: 2026 - 2034



PHASE 3 HIGHLIGHTS OF INFRASTRUCTURE IMPROVEMENTS

GROWTH CENTRES	• Continue to accommodate growth in Fort McMurray, Anzac, Lac La Biche, Wabasca and the new urban growth node, as well as in the new planned work camp community north of Wabasca
TRANSPORTATION	• Establish a western highway route north of Fort McMurray to access project sites on the western edge of the Surface Mineable Area from both Fort McMurray and the new urban growth node • Extend Highway 63 north to establish a provincial all-season road to Fort Chipewyan • Establish an inter-provincial, all-season connection to Saskatchewan near Garson Lake • Upgrade Wabasca's airport to service increased oil sands activity in the region
WATER / WASTEWATER	• Introduce and upgrade water and wastewater facilities as required
EDUCATION	• Approximately 7,200 new spaces at elementary and secondary schools
HEALTH	• Approximately 71 new health care services spaces

Appendix C – Infrastructure Maps and Charts: CRISP Phase 4



Estimated Bitumen Production: 6.0 million barrels per day
Estimated Regional Population: 240,500
Estimated Time Frame: 2035-2045

PHASE 4 HIGHLIGHTS OF INFRASTRUCTURE IMPROVEMENTS

GROWTH CENTRES	• Continue to accomodate growth in Fort McMurray, Anzac, Lac La Biche, Wabasca and the new planned work camp communities and urban growth node
TRANSPORTATION	• Establish a northwestern highway route to connect the new urban growth node and planned work camp community to project sites related to carbonate development in the northwest of the AOSA
WATER / WASTEWATER	• Introduce and upgrade water and wastewater facilities as required.
EDUCATION	• Approximately 9,200 new spaces at elementary and secondary schools
HEALTH	• Approximately 92 new health care services spaces

Appendix D – CRISP Priority Implementation Actions

There are a number of short term actions that will need to be undertaken in order to successfully implement the CRISP. These actions can be grouped according to three broad themes:

- Continued Planning
- Exploration of Alternative Financing Mechanisms
- Coordinated Implementation

ACTION	TIMELINE	LEAD PARTIES	INTENDED OUTCOME
1. Continued Planning			
a) Develop a coordinated regional transit strategy and industry transportation action plans for road, air and rail.	Fall 2011 Completion	Industry, Government of Alberta (Transportation, Sustainable Resource Development), Federal Government (Transport Canada, NAV Canada), transportation providers and impacted airport authorities/organizations.	·Greater sharing of industry roads to reduce development footprint and fragmentation. ·Ensure industry roads function as precursors to future highway corridors where appropriate. ·Increase the proportion of oil sands workers who travel to work by transit. ·Reduce requirements for private airfields. ·Identify preferred transit technologies (rail/bus) and routing. ·Identify necessary operational and policy measures to increase transit use in the region.
b) Complete siting, governance, financing, servicing, economic development and community sustainability studies for the planned work camp communities and the new urban growth node identified in the CRISP.	Fall 2011 Completion	Government of Alberta, impacted municipalities and industry.	·Identify appropriate locations for these centres. ·Identify appropriate governance, financing and servicing arrangements that address transportation, water, wastewater, schools and hospitals, as well as other forms of infrastructure and servicing that were outside of the scope of the CRISP. ·Ensure that the new urban growth node is a model of environmental sustainability. ·Ensure that establishment of the new urban growth node and planned work camp communities is achieved in time to accommodate expected growth. ·Limit traditional private work camps except within areas that are not serviced by an existing community, planned work camp community or new urban
c) Identify and protect corridors and complete functional planning and design studies for future infrastructure needs.	Fall 2011 Completion	Government of Alberta, impacted municipalities and industry.	·Ensure that lands are protected during licensing and approvals processes for future infrastructure needs such as roads ·Ensure that critical infrastructure projects are "shovel ready" so that the government can respond quickly when future growth triggers demands for new infrastructure
d) Undertake a labour workforce study in collaboration with First Nations and Métis populations to identify training needs and other mechanisms for increasing their participation in the oil sands industry.	2012 Completion	Government of Alberta, Industry, Federal Government (INAC), First Nations and Métis organizations.	·Maximize Aboriginal participation in the oil sands workforce and reduce need for in-migration of new workers

Appendix D – CRISP Priority Implementation Actions

ACTION	TIMELINE	LEAD PARTIES	INTENDED OUTCOME
e) Ensure that functional planning and feasibility studies for municipal water and wastewater facilities as well as industry water and wastewater servicing plans identify opportunities for industrial use of municipal greywater.	Ongoing	Government of Alberta, impacted municipalities and industry.	• Reduce industry demand for raw water. • Identify potential revenues streams for municipalities.
2. Exploration of Alternative Financing Mechanisms			
a) Undertake discussions regarding creative funding and financing approaches to implement the CRISP.	Ongoing	Government of Alberta, impacted municipalities, Federal Government and industry.	• Ensure appropriate cost sharing amongst federal, provincial and municipal governments as well as private industry.
b) Integrate short-term infrastructure priorities, including existing capacity gaps and state-of-good-repair needs for existing infrastructure as well as the Phase One CRISP priorities into the Government of Alberta Capital Plan and 2012-2015 Budget.	Summer 2011 Completion	Government of Alberta (Oil Sands Sustainable Development Secretariat, Strategic Capital Planning – Alberta Treasury Board and program delivery Ministries).	• Secure funding for immediate CRISP priorities.
3. Coordinated Implementation			
a) Complete the Urban Development Reserve project to create a process for the timely release of Crown Land to support the CRISP's implementation.	October 2011 Completion	Government of Alberta (Oil Sands Sustainable Development Secretariat, Sustainable Resource Development, Alberta Energy, Justice and Municipal Affairs) and municipalities.	• Ensure that a process is in place for timely response to the need for new urban lands to accommodate growth.
b) Establish a formal mechanism to oversee the CRISP's implementation, and to ensure coordination with regional planning under the *Land-use Framework*.	December 2010 Completion	Government of Alberta (Oil Sands Sustainable Development Secretariat and impacted Ministries), impacted municipalities, Federal Government and industry.	• Promote ongoing collaboration between impacted parties. • Ensure that relevant plans and strategies are mutually reinforcing. • Ensure that day-to-day activities of all levels of government as well as industry continue to work towards the implementation of the CRISP, and do not work at cross purposes. • Ensure that monitoring takes place in accordance with the Monitoring Framework, and that the necessary data for the Monitoring Framework is collected.
c) Establish the CRISP Monitoring Framework and identify an appropriate body to oversee the monitoring and to compile the required data.	Spring 2011 Completion	Government of Alberta (Office of Statistics and Information, Oil Sands Sustainable Development Secretariat, Finance and Enterprise, and other affected ministries), industry and impacted municipalities.	• Ensure that the CRISP continues to remain relevant and responsive as conditions in the region change, and that required infrastructure is integrated into the capital planning process.
d) Integrate the CRISP into the Government of Alberta's application and approval processes.	Spring 2011 Completion	Government of Alberta (ERCB, Sustainable Resource Development, Energy, Environment).	• Ensure that current applications and future oil sands projects support directing growth to existing communities, planned work camp communities, and the new urban growth node rather than private work camps. • Ensure that industry infrastructure planning supports the implementation of the CRISP, particularly with respect to transportation planning. • Ensure that appropriate infrastructure as well as operational policies and procedures are in place to maximize transit use.

Appendix E – Objectives and Guiding Principles

In developing the CRISP, multiple scenarios were considered, scenarios that utilized different options for accommodating growth and infrastructure servicing. Each approach had advantages and disadvantages.

A series of Objectives and Guiding Principles were developed to guide the evaluation and analysis of the various options. These Objectives and Guiding Principles were based on achieving the Vision and key outcomes of *Responsible Actions*, the Alberta government's strategic plan for responsible development of its oil sands resource.

A. REDUCED ENVIRONMENTAL FOOTPRINT	
OBJECTIVE	GUIDING PRINCIPLE
A1. Protect and maintain natural ecosystems and biodiversity, and minimize ecosystem fragmentation.	A1a. Reduce the development footprint associated with population growth and infrastructure development.
	A1b. Direct growth pressures away from environmentally sensitive areas.
A2. Minimize carbon footprint associated with population growth and infrastructure development and operation.	A2a. Maximize potential for oil sands workers and other residents to commute by transit.
	A2b. Reduce commuting times.
	A2c. Develop infrastructure and communities that employ leading edge and alternative green technologies, and meet international standards such as LEED.
A3. Improve water quality.	A3a. Maximize potential for higher order water and wastewater treatment systems and reduce reliance on private services and lagoon systems.

B. INCREASED QUALITY OF LIFE FOR ALBERTANS TODAY AND IN THE FUTURE	
OBJECTIVE	GUIDING PRINCIPLE
B1. Respect local aspirations and cultures.	B1a. Respect local visions and aspirations as expressed through local meetings, local plans such as Municipal Development Plans, and Traditional Use Studies.
	B1b. Direct growth to areas that currently offer, or have the potential to offer, a diverse choice of housing options and a wide range of services and amenities.
B2. Provide a wide range of high quality services and amenities and a range of housing choices for existing, new and temporary residents.	B2a. Direct growth to areas that currently offer, or have the potential to offer, a diverse choice of housing options and a wide range of services and amenities.
	B2b. Ensure access to safe and clean sources of water for all residents.
	B2c. Ensure availability of land to support growth and provide for affordable housing options.
	B2d. Consider impacts on and access to social and community services such as recreational and cultural facilities and emergency services.
B3. Invest in infrastructure in a manner that contributes to a lasting environmental, economic and community legacy.	B3a. Where appropriate, invest in infrastructure that has the potential to continue servicing communities, long after the oil sands resource is exhausted. Minimize infrastructure that remains on the landscape after its usefulness has ended.
B4. Ensure public health, safety and emergency preparedness.	B4a. Provide strategic redundancies in critical infrastructure, such as multiple transportation routes to major centres, that can be used in the event of emergencies.
	B4b. Focus permanent population growth away from areas that have potential to be adversely affected by industrial development.
B5. Enhance opportunities for the continued practice of traditional uses and constitutionally protected rights.	B5a. Direct growth pressures away from traditional land use areas.

Appendix E – Objectives and Guiding Principles

C. OPTIMIZED ECONOMIC GROWTH	
OBJECTIVE	GUIDING PRINCIPLE
C1. Support orderly development of the oil sands as a key economic driver within the AOSA and the Province.	C1a. Plan growth and infrastructure in a manner that is staged, phased and flexible to respond and adapt to the dynamic nature of the oil sands industry.
	C1b. Link infrastructure investment to areas of highest potential for oil sands development.
	C1c. Direct permanent settlement and infrastructure in a manner that does not hinder access to areas of high resource potential.
C2. Provide for a diverse, resilient economy over the long term.	C2a. Focus permanent settlement in locations that optimize potential for diversified local economies over the long term.
	C2b. Support opportunities for enhanced inter-provincial and international trade and development.
C3. Achieve cost effective public and private infrastructure investment.	C3a. Optimize use of existing infrastructure wherever possible.
	C3b. Focus population growth in a manner that allows for the most efficient delivery of infrastructure.
	C3c. Utilize infrastructure solutions that maximize cost effectiveness and return on investment, such as regional systems where appropriate.
	C3d. Minimize duplication of infrastructure investment amongst different levels of government, different private sector companies, and across the private and public sectors.
	C3e. Identify and protect corridors for long-term linear infrastructure needs.
C4. Provide infrastructure linkages that support First Nations and Métis participation in the economy and community development.	C4a. Increase infrastructure connections to First Nations and Métis Settlements.

D. LINKAGES	
OBJECTIVE	GUIDING PRINCIPLE
D1. Create a coordinated and integrated infrastructure plan.	D1a. Ensure that the CRISP supports other provincial initiatives, including Responsible Actions, the Lower Athabasca Regional Plan and other regional plans, Provincial Energy Strategy, and the province's Climate Change Adaptation Strategy.
	D1b. Ensure that the CRISP supports relevant municipal, Aboriginal and federal policy initiatives.
	D1c. Link the AOSA to other oil sands areas, as well as other regions of Alberta and neighbouring provinces.

CRISP AOSA

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FOR THE **ATHABASCA OIL SANDS AREA**

Government of Alberta

The Comprehensive Regional Infrastructure Sustainability Plan (CRISP) is a long-term strategic infrastructure plan to accommodate population growth as oil sands development continues to expand in the Athabasca Oil Sands Area (AOSA).

The plan is intended to guide planning by providing a flexible blueprint and recommendations for necessary infrastructure based on a technical assessment of expected population levels at certain production levels.

It was developed through consultation with and input from key stakeholders including municipalities, industry, community groups, First Nations and Métis, and the general public throughout the Athabasca Oil Sands Area.

It is not a funded government initiative. Any identified capital costs are intended to inform stakeholders and decision makers early on of future investment needs that may be required to support the sustainable production growth from 2.3 million bpd (2014) to 6.0 million bpd (2045).

CONTENTS

EXECUTIVE SUMMARY

The Comprehensive Regional Infrastructure Sustainability Plan (CRISP) is the Government of Alberta's long-term strategic infrastructure plan to accommodate population growth as oil sands development continues to expand in the Athabasca Oil Sands Area (AOSA). The plan provides a technical assessment of expected population levels at certain production levels, and recommendations for the resulting necessary infrastructure to support those populations.

Transportation and infrastructure are critical strategic investments that are part of a foundation that will shape the Alberta business environment and support the economic growth of the Province. CRISP, along with other relevant information, will provide guidance to assist government and regulatory bodies with oil sands decision-making to ensure the plan supports a high quality of life and sustainable communities in the area.

As a flexible blueprint for future infrastructure and community development, the scope of CRISP includes identifying the need and location for:

- Transportation (highways, rail, transit, air);
- Schools, health facilities, and correctional facilities;
- Water and wastewater treatment facilities;
- Urban expansion, particularly land release for residential and commercial development;
- Utilities, including transmission lines (location only, not need); and
- Pipelines (location only, not need);

CRISP is not a funded government initiative and any identified capital costs are intended to inform stakeholders and decision makers early on of future investment needs that may be required to support the sustainable production growth from 2.3 million bpd (2014) to 6.0 million bpd (2045).

Successful implementation and funding of the CRISP will require extensive coordination and alignment of priorities across the various departments of the Government of Alberta as well as between all levels of government and industry. Coordination will include the exploration of alternative financing mechanisms, partnerships and innovative project delivery.

The province will need to ensure that CRISP priorities are reflected in the province's capital planning, land release and application and approvals processes. Industry's project planning needs to be aligned with the CRISP and the plan will, as an approved blueprint for developments, help guide the industry in its planning activities.

Successful implementation of the CRISP will depend on and include careful monitoring of the trends that affect growth in the Athabasca Oil Sands Area. The CRISP Monitoring Framework will track trends in bitumen production and population growth as well as other key indicators. This will ensure that changes that could affect infrastructure needs in the region can be anticipated with enough advance warning to adapt and respond to the new conditions.

The CRISP allows the province to continue implementation of Responsible Actions: A Plan for Alberta's Oil Sands. Specifically, Strategy 2 of Responsible Actions addresses healthy communities and a quality of life that attracts and retains individuals, families and businesses.

The CRISP was prepared with input from a Core Planning Team comprising key ministries and impacted municipalities. A series of multi-stakeholder workshops, public open houses, and meetings were also held with First Nations, Métis, industry organizations and municipal councils. An overview of the plan has been presented to key industry bodies (Canadian Association of Petroleum Producers, In-Situ Oil Sands Alliance, Oil sand Developer Group), to the Alberta Economic Development Authority, Northern Alberta Development Council and the Regional Municipality of Wood Buffalo, which all support the document in its present stage.

The Government of Alberta will be the primary coordinating body for the implementation of the CRISP.

School at Bigstone Cree Nation, Desmarais

EXECUTIVE SUMMARY (CONT'D)

Figure E.1 The Comprehensive Regional Infrastructure Sustainability Plan for the Athabasca Oil Sands Area (at 6.0 million BPD of Production).

POPULATION
- AOSA Boundary
- Existing First Nations Reserves
- Proposed First Nations Reserves
- Métis Settlements
- Provincial and Wildland Parks
- Existing Communities
- Approximate Location of New Urban Growth Node
- Approximate Location of Planned Work Camp Community
- Oil Sands Project Locations
- Surface Mineable Area

TRANSPORTATION
- Roads
- Possible out-of-region connections
- Bus-Based Rapid Transit
- Freight Rail
- Possible Commuter/Freight Rail Extension
- New/Upgraded Airports
- Existing Public Airport
- Existing Private Airport

WATER INFRASTRUCTURE
- New/Upgraded Water Treatment Plant
- New/Upgraded Wastewater Treatment Facility
- Regional Water Service Area

CIVIC INFRASTRUCTURE
- Schools [Additional Desks]
- Additional Health Services Spaces

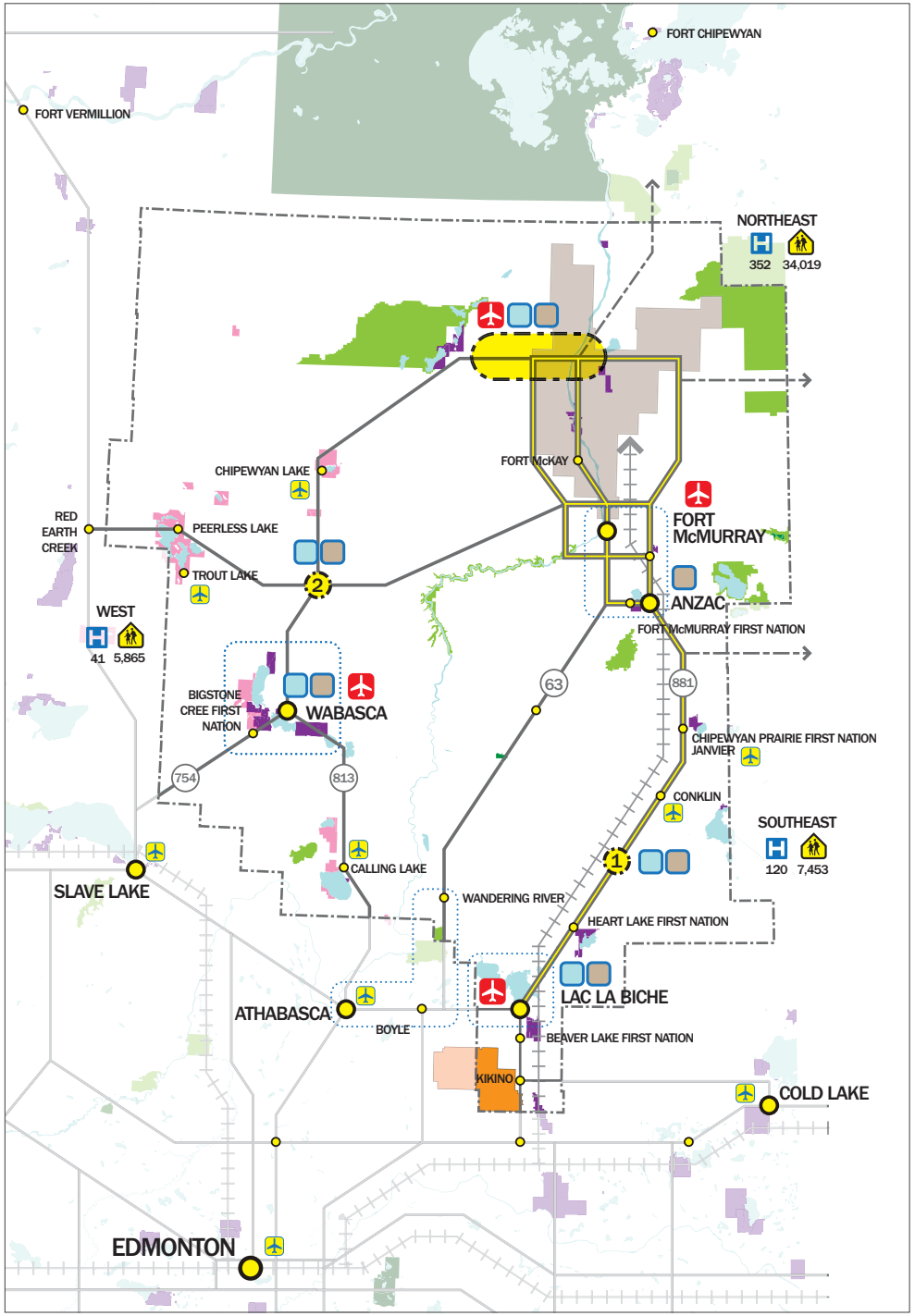


Figure E.2 CRISP Highlights

CRISP HIGHLIGHTS	Phase 1 (2014) 2.3 m/bpd	Phase 2 (2025) 3.7 m/bpd	Phase 3 (2034) 5.0 m/bpd	Phase 4 (2045) 6.0 m/bpd	TOTAL
ESTIMATED POPULATION (Cumulative Total)*					
Fort McMurray	78,400	95,400	106,400	117,600	
Lac La Biche	6,600	11,300	13,700	16,200	
Wabasca-Desmarais	3,200	4,200	6,000	9,400	
New Urban Growth Node	11,400	19,600	29,500	42,300	
Planned Camp Communities	4,900	3,600	6,400	10,200	
Other	24,800	31,300	37,200	44,800	
Regional Total	129,300	165,400	199,200	240,500	
OIL SANDS DIRECT EMPLOYMENT (Cumulative Total)**					
Operations	17,389	24,009	29,867	34,813	
Construction	10,072	11,075	9,220	16,870	
TRANSPORTATION INFRASTRUCTURE					
Upgraded Roads (total linear km)	350	250	0	0	600
New Roads (total linear km)	60	500	200	190	950
New Rapid Transit (total linear km)	250	300	130	0	680
New Rail (total linear km)	0	120	0	0	120
Upgraded Civic Airports	2	0	1	0	3
New Civic Airports	0	1	0	0	1
CIVIC INFRASTRUCTURE					
Water Treament Facilities (New/Upgraded)	4	1	0	0	5
Wastewater Treament Facilities (New/Upgraded)	5	1	0	0	6
Educational Facilities (New Desks)	4900	7700	7200	9200	29,000
Additional Health Services Spaces	65	82	71	93	311

* *Based on population modeling undertaken by Applications Management for the Oil Sands Sustainable Development Secretariat, 2010.*

** *Based on employment modeling undertaken by Applications Management for the Oil Sands Sustainable Development Secretariat, 2010.*

1.0 INTRODUCTION
2.0 CONTEXT
3.0 DEVELOPING THE CRISP
4.0 THE CRISP
5.0 IMPLEMENTATION
6.0 WHERE DO WE GO FROM HERE?

1.1 WHAT IS THE CRISP?

The Athabasca Oil Sands Area (AOSA) has experienced significant growth pressures since the mid 1990s, driven largely by the expansion of the oil sands industry. The Bitumen Production Levels chart (Figure 1.1.1) shows estimated oil sands production levels. In three years, the data indicates that production levels will reach 2.3 million barrels per day. This level is 77 per cent higher than production levels achieved in 2008. With relatively strong prices for oil expected to continue in the future, growth in the region can be expected to continue as well.

For long-time residents and newcomers alike, growth offers many opportunities. It can bring with it new services such as health care facilities, a wider range of stores and retail choices, and recreational amenities such as sports fields and community centres. It can also create new employment opportunities, not only in the oil sands industry, but in other resource-based industries as well as in growing service, commercial and institutional sectors.

History has shown, however, that growth also presents many challenges. It can place pressure on infrastructure and essential services such as roads, schools and hospitals. Housing shortages can drive up prices, force people to live in temporary accommodations, and make it difficult for employers to attract skilled labour. Growth can also place strains on the natural environment and areas of traditional land use.

Many of these challenges were documented in *Investing in our Future: Responding to the Rapid Growth of Oil Sands Development*, the final report of the Oil Sands Ministerial Strategy Committee released in 2006, and the *Multistakeholder* and *Aboriginal Consultation Final Reports* released in 2007 as part of the Government of Alberta's Oil Sands Consultation Initiative.

The Comprehensive Regional Infrastructure Sustainability Plan (CRISP) is the Government of Alberta's long-term vision and strategic plan for growth and infrastructure in the AOSA. It is a plan that anticipates future needs so that the opportunities that growth presents can be fully realized, and the potential negative consequences can be avoided.

The CRISP focuses on identifying how to accommodate potential population and employment growth in the AOSA as well as how to provide the infrastructure that will be required related to transportation, water and wastewater servicing, schools and health care facilities. While the plan considers the needs of each community, it is a regional plan that seeks to grow and develop the region as a whole.

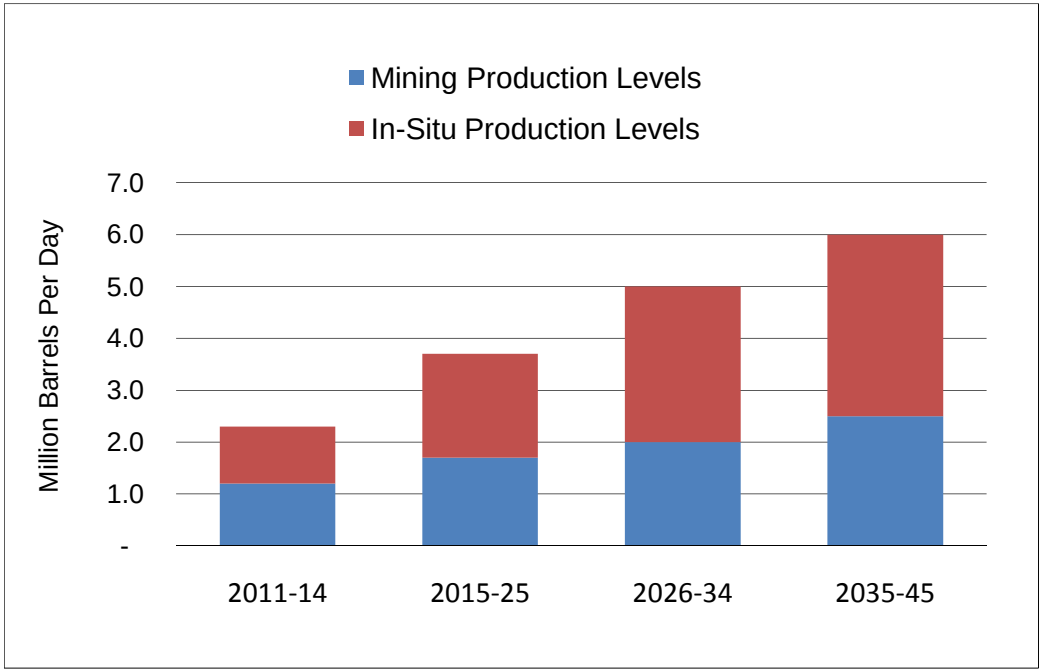


Figure 1.1.1 Bitumen Production Levels

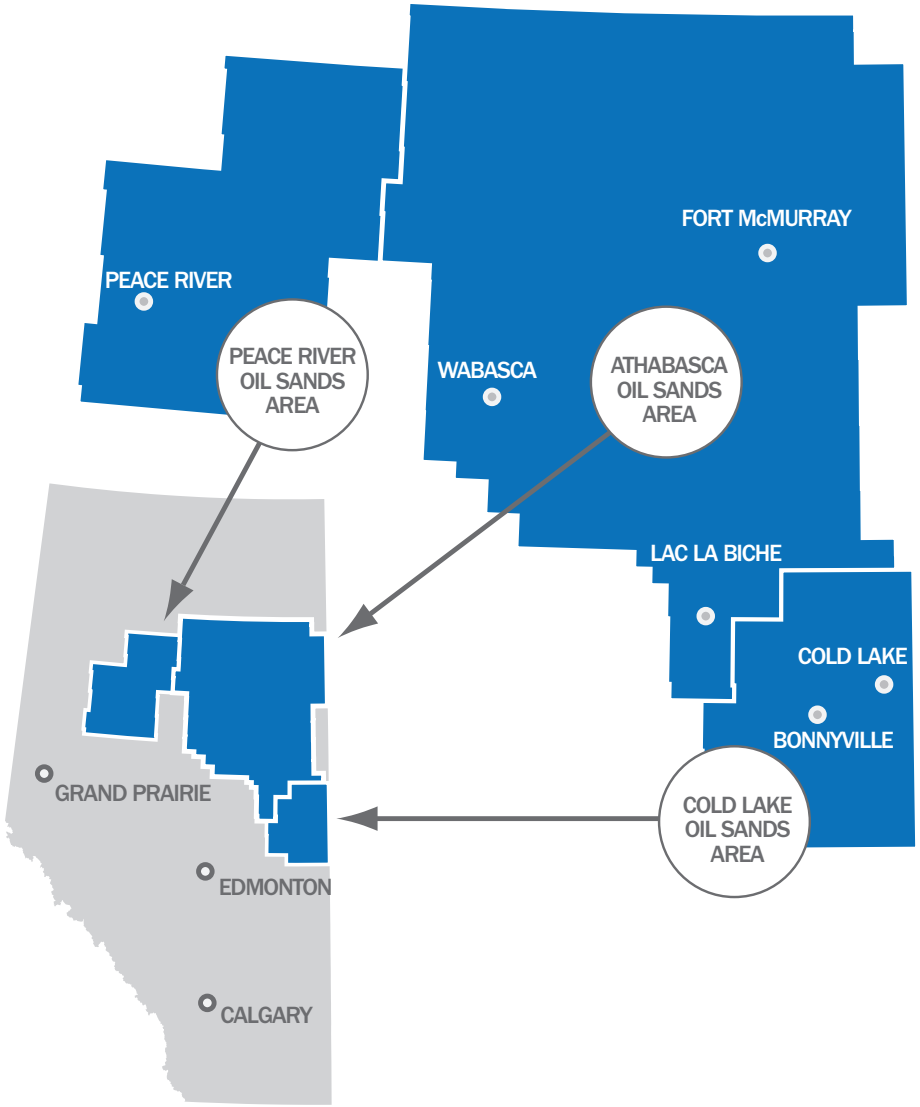


Figure 1.1.2 : Alberta's Oil Sands Areas

As the government's vision for future infrastructure and community development as indicated in *Responsible Actions: A Plan for Alberta's Oil Sands*, the CRISP will inform a wide range of decisions, including:

- municipal decisions on land use and capital planning;
- provincial infrastructure investment priorities;
- the approval of future oil sands projects;
- land release for communities in the region that are surrounded by Crown land; and
- the implementation of the *Land-use Framework* and the development of the *Lower Athabasca Regional Plan* and other regional plans.

The CRISP is a staged plan that is designed to be flexible enough to respond to changes in market conditions. As such, the CRISP is not bound to a specific timeframe nor does it attach specific dates as to when infrastructure will be constructed. Instead, infrastructure requirements are defined relative to potential oil sands production rates and associated population growth increments. The CRISP Monitoring Framework, described in Section 5.2, will utilize a series of population and resource-development "triggers" to monitor growth in the AOSA so that infrastructure needs are anticipated and responded to in a timely way.

The geographic scope for the CRISP is the AOSA, shown in Figure 1.1.2. The AOSA includes portions of the Regional Municipality of Wood Buffalo, the Municipal District of Opportunity No. 17, Lac La Biche County, County of Athabasca No. 12, Municipal District of Lesser Slave River No. 124, and small portions of McKenzie County, Northern Sunrise County, Smoky Lake County and St. Paul No. 19. The reserves of nine First Nation communities fall within the boundaries of the AOSA: Athabasca Chipewyan First Nation, Fort McKay First Nation, Fort McMurray #468 First Nation, Chipewyan Prairie Dene First Nation, Beaver Lake Cree Nation, Bigstone Cree Nation, Peerless Trout First Nation, Heart Lake First Nation and Whitefish (Goodfish) Lake First Nation. The AOSA also includes the Kikino Métis Settlement, Métis Nation of Alberta Regions 1 and 5, and several communities with high Métis populations.

CRISPs for the remaining two oil sands areas, Peace River and Cold Lake, will be completed by the Government of Alberta in the next few years.

1.2 MOVING FORWARD WITH RESPONSIBLE ACTIONS

In 2009, the Government of Alberta adopted *Responsible Actions: A Plan for Alberta's Oil Sands* which outlines a 20-year strategic approach to the responsible development of the oil sands resource.

The Government of Alberta's long-term vision for the oil sands is that development occurs responsibly, sustains growth for industry and the province over the long term, and is done in a manner that enhances Albertans' quality of life.

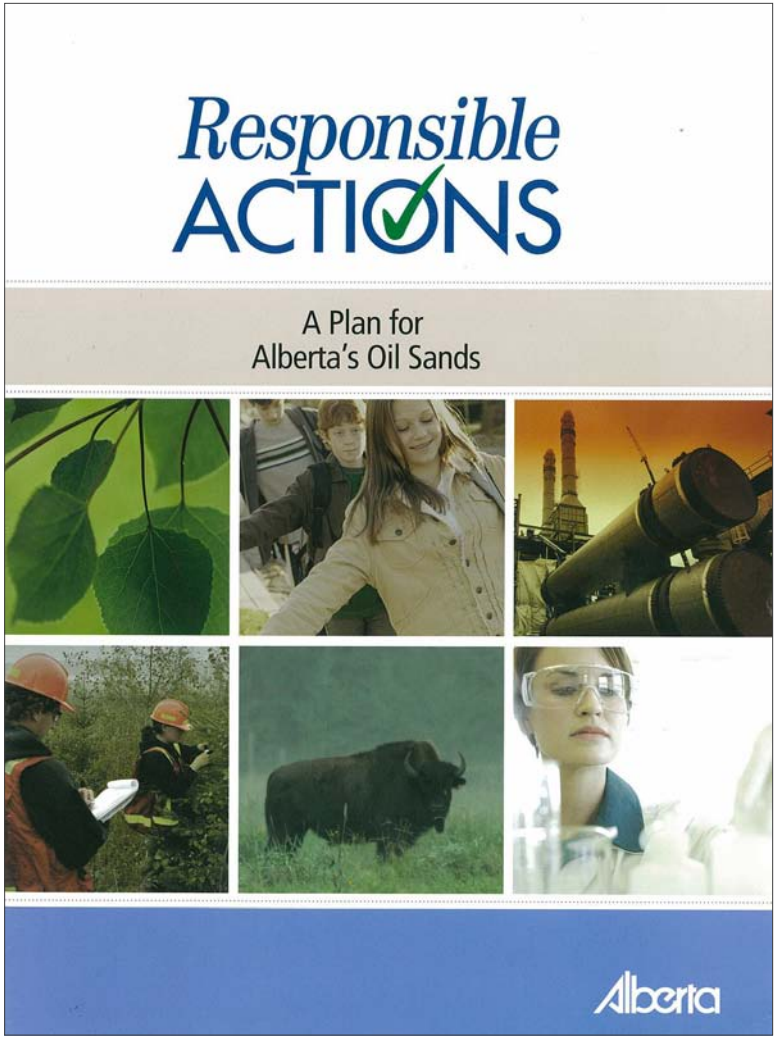
Through leadership, resourcefulness and innovation, *Responsible Actions* aims to achieve the following outcomes related to Alberta's oil sands:

- optimized economic growth;
- reduced environmental footprint; and
- increased quality of life for Albertans today and in the future.

The CRISP is intended to help achieve these outcomes as well. In particular, the CRISP represents a significant step forward in the implementation of Strategy Two of *Responsible Actions*, which is to promote healthy communities and a quality of life that attracts and retains individuals, families, and businesses.

ALBERTA'S VISION FOR OIL SANDS DEVELOPMENT

Alberta is a global leader in the innovative, responsible, and collaborative development of oil sands. The benefits of development continue to support clean, healthy, and vibrant communities for Albertans and future generations. Communities and development reside together in a manner that balances progress with environmental stewardship (*Responsible Actions*, February 2009).



Cover of Responsible Actions: A Plan for Alberta's Oil Sands

1.3 COORDINATED PLANNING FOR THE ATHABASCA OIL SANDS AREA

Over the past several years, the Government of Alberta has launched several initiatives focused on planning for future community and energy industry growth as well as resolving land use conflicts between resource development and other land use interests and rights. Two such planning initiatives are *Responsible Actions* and Alberta's *Land-use Framework* (LUF). The implementation of both of these initiatives are well aligned, and in many ways more detailed planning projects such as the CRISP help to achieve the vision, strategies and objectives of both. As mentioned previously, the CRISP is a key implementation action under Strategy 2 in *Responsible Actions*, but it also assists in creating efficient use of land related to community growth and establishes an ongoing Monitoring Framework to better inform land-use management and capital planning decisions, both of which are important strategies under the LUF.

The LUF was released in 2008 to set out an approach to manage Alberta's lands and natural resources that achieves the province's long-term economic, environmental and social goals. It provides a blueprint for land-use management and decision making that addresses Alberta's growth pressures. Part of implementing the LUF is the development of seven regional plans across the province over the next several years. These plans will assist in managing the cumulative effects of development on land, water, air and biodiversity at the regional level, and will establish management frameworks, set conservation areas and identify land use zoning for each region. Regional plans will be established under the *Alberta Land Stewardship Act.* Upon completion of each regional plan, the communities residing in the area will be required to update their Municipal Development Plans to align with the policies, plans and thresholds contained within the applicable regional plans for their area.

The AOSA is covered by portions of three LUF planning regions: the Lower Athabasca Region, the Lower Peace Region and a small area within the North Saskatchewan Region. This is due to the fact that the Oil Sands Areas in Alberta are based on geological considerations and the location of the bitumen resource, whereas the LUF regions have been established using watersheds best fit to municipal boundaries. Currently, the Lower Athabasca Regional Plan (LARP) is under development and the Lower Peace and North Saskatchewan Regional Plans will be created in the coming two to five years. Despite the difference in physical boundaries, the extensive planning for the future currently being undertaken is very

Figure 1.3.1 : Hierarchy of Planning

complementary. The CRISP is referenced in the LARP with regards to outlining the details of future growth and infrastructure development in the area and also provides guidance to municipalities for more localized planning and engineering.

The CRISP links to several other provincial policy initiatives as well. These include the *20-year Strategic Capital Plan, Provincial Energy Strategy* and *Building and Educating Tomorrow's Workforce*. Through the CRISP, the Government of Alberta will be able to understand what capital assets are needed in the long-term to effectively develop the province's oil sands resource. A more coordinated and responsible approach to infrastructure development and the creation and enhancement of communities in the AOSA will assist in attracting and retaining the workers, and their families, who are required to secure the benefits of this important resource for all Albertans and the rest of Canada.

2.1 UNDERSTANDING THE OIL SANDS RESOURCE

Unlike other regions of the province where there are numerous factors that impact population growth and associated demands for infrastructure, in the AOSA oil sands development is the primary economic driver and population is clearly tied to the employment requirements of oil sands projects. As such, understanding the nature of the oil sands resource is one of the foundations for considering when, where and how growth in the AOSA will occur.

Bitumen is deposited in reservoirs covering a considerable portion of northern Alberta (see Figure 2.1.1). Alberta's Energy Resources Conservation Board (ERCB) puts the quantity of ultimately recoverable reserves as follows:

- Oil Sands in the Surface Mineable Area (SMA): 69 billion barrels
- In situ Oil Sands: 188 billion barrels
- Carbonate Reservoirs: 57 billion barrels

In the AOSA, the bitumen is geologically located in the Wabiskaw-McMurray, Grosmont and Grand Rapids reservoirs, each of which is described in greater detail below.

WABISKAW-MCMURRAY

The Wabiskaw-McMurray Formation is an unconsolidated sand reservoir containing 959 billion barrels of oil-in-place (131 billion barrels in the Surface Mineable Area and another 828 billion barrels at depths too deep to mine). An estimated 34.2 billion barrels of this bitumen is likely recoverable by mining methods and 135 billion barrels is recoverable using in situ recovery. To the end of 2009, 26.6 billion barrels of the recoverable reserve (or 16per cent) were under active development and the cumulative bitumen production was 6.9 billion barrels. When considering future growth and infrastructure needs in the AOSA it is important to note that, using current technology, mineable extraction will be in decline within the next 50-100 years. However it is also important to recognize that employment associated with mineable extraction is significantly higher per barrel produced compared to employment associated with in situ operations.

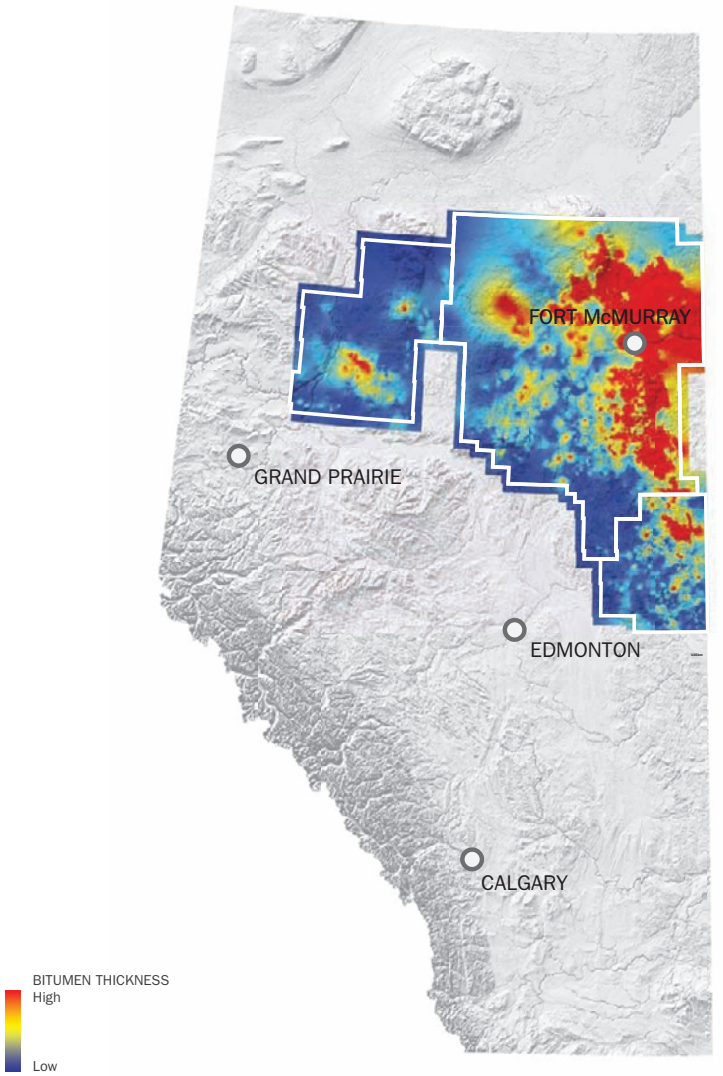


Figure 2.1.1 : Alberta Bitumen Deposits

Note: Bitumen thickness derived from the Integrated Geological Data System published by the Alberta Energy Resources Conservation Board. The thickness of the oil zone, expressed in meters, after removing rock matrix and non oil-filled porosity. Oil column thickness = (net pay) x (porosity) x (oil saturation).

Towards the south and west, where the Wabiskaw-McMurray Formation becomes about 100 metres deep, in situ processes are employed to produce the bitumen. The most common method is Steam Assisted Gravity Drainage (SAGD) in which horizontal wells are drilled to deliver steam heat which allows the bitumen to be pumped to the surface. While the expected ultimate recovery of bitumen in this formation is large, the application of the SAGD process is still in its infancy.

In the southwestern part of the AOSA (formerly called the Wabiskaw deposit), the bitumen is less viscous and it can be produced without steam heating. Because of the lower operating costs, this area has attracted development more quickly than in the SAGD areas, producing nearly 70,000 barrels per day of bitumen.

GROSMONT

The Grosmont Formation underlies the Wabiskaw-McMurray oil sands deposit and consists of a carbonate reservoir with an in-place resource of about 318 billion barrels. The bitumen in the Grosmont is of lower quality than that found in the Wabiskaw-McMurray Formation to the east, but the sheer volume (representing approximately one sixth of total hydrocarbons in the region) has made it an attractive target for development.

Early drilling in the 1970's and pilot projects in the following decade met with varied success, but recent technological advances in recovery methods and the overall interest in bitumen deposits in Alberta has made the Grosmont more attractive in recent years. Currently, several companies are pursuing pilot projects in order to determine the feasibility of extracting bitumen from the Grosmont, so it is expected that commercial-scale projects will be a reality in the future. However, significant production levels, and therefore workforce requirements, population growth, and associated infrastructure needs, are expected to occur later in the CRISP planning horizon.

GRAND RAPIDS

The Grand Rapids Formation is located primarily in the western and southern portions of the AOSA and consists of unconsolidated oil sands, estimated to contain about 55 billion barrels of bitumen in place with very little current development or exploration. Bitumen found in this formation is recoverable through in situ methods. Although natural gas is produced from a small number of wells in this area, little is known about the bitumen potential in the Grand Rapids zone.

2.2 LINKAGES BETWEEN GROWTH AND THE OIL SANDS RESOURCE

Historical and future growth in the AOSA, and particularly in Fort McMurray, is clearly linked to oil sands development. Up to 1950, there were a few early exploration wells and some small scale mining operations near the banks of the Athabasca River. By 1970, the first commercial-scale oil sands mine and upgrader (formerly known as Great Canadian Oil Sands, now Suncor) was in production and preparatory work was starting for the Syncrude project. This activity resulted in a population of approximately 7,000 people in Fort McMurray in the early 1970s. As both projects ramped up, population increased to just over 30,000 people in the early 1980s – a more than three-fold increase in just 10 years.

Population was relatively stable until 1995 when the current oil sands industry expansion phase started. In the 1995 to 2006 period, Suncor and Syncrude expanded their integrated mining projects and Shell brought its first mine on line. These and some smaller in situ projects resulted in a doubling of the population of Fort McMurray to almost 65,000 people by 2006. Although population increases and community growth have slowed over the past couple of years due to the downward trend in the economy, recent signs indicate that oil sands development is again ramping up. According to ERCB projections, overall production is likely to increase from the current 1.3 million bpd to reach 3.2 million bpd by 2020.

In addition to overall projected production rates, the location and thickness of the resource throughout the AOSA is an important factor to consider when planning for growth. Bitumen thickness is an important indicator of where future oil sands development and future employment growth is likely to occur. The bitumen thickness of the oil sands resource in the AOSA is shown in Figure 2.1.1 in the previous section. Comparing this information to a review of announced and approved oil sands projects contained within the Canadian Energy Research Institute's database indicates that the majority of development over the next 50 years is likely to occur within or surrounding the Surface Mineable Area (SMA) north of Fort McMurray, and close to the Highway 881 corridor south of Fort McMurray in the vicinity of the community of Conklin (see Figure 2.2.2). Over the long-term there will also be development of carbonates in the Chipewyan Lake area north of Wabasca, although substantial improvements to technology are required for this area to be developed economically.

The CRISP is based on the assumption of a continual increase in production up to 6.0 million barrels per day in the AOSA (see Figure 2.2.3). This level of production is based on currently approved and announced projects, and is linked to the high scenario outlined in the Terms of Reference for the *Lower Athabasca Regional Plan*. By planning now for this level of production, the CRISP can anticipate the full range of infrastructure needs that will ultimately be needed in the AOSA.

While there is no certainty in terms of when, or even if this level of production will be reached, the CRISP has assumed a time horizon of 2045 for the purpose of modelling growth and infrastructure demands. Based on population modeling done for the CRISP, 6.0 million barrels per day could result in a population of between 195,000 and 245,000, depending on the choices made about new communities, the use of camps, economic diversification goals, and the transportation system put in place. It is important to note that the CRISP is designed to be flexible and responsive to changes in production rates. Section 5.2 describes the CRISP Monitoring Framework that utilizes a series of population and resource-development "triggers" to monitor growth in the AOSA so that the province can respond to faster or slower rates of growth in bitumen production.

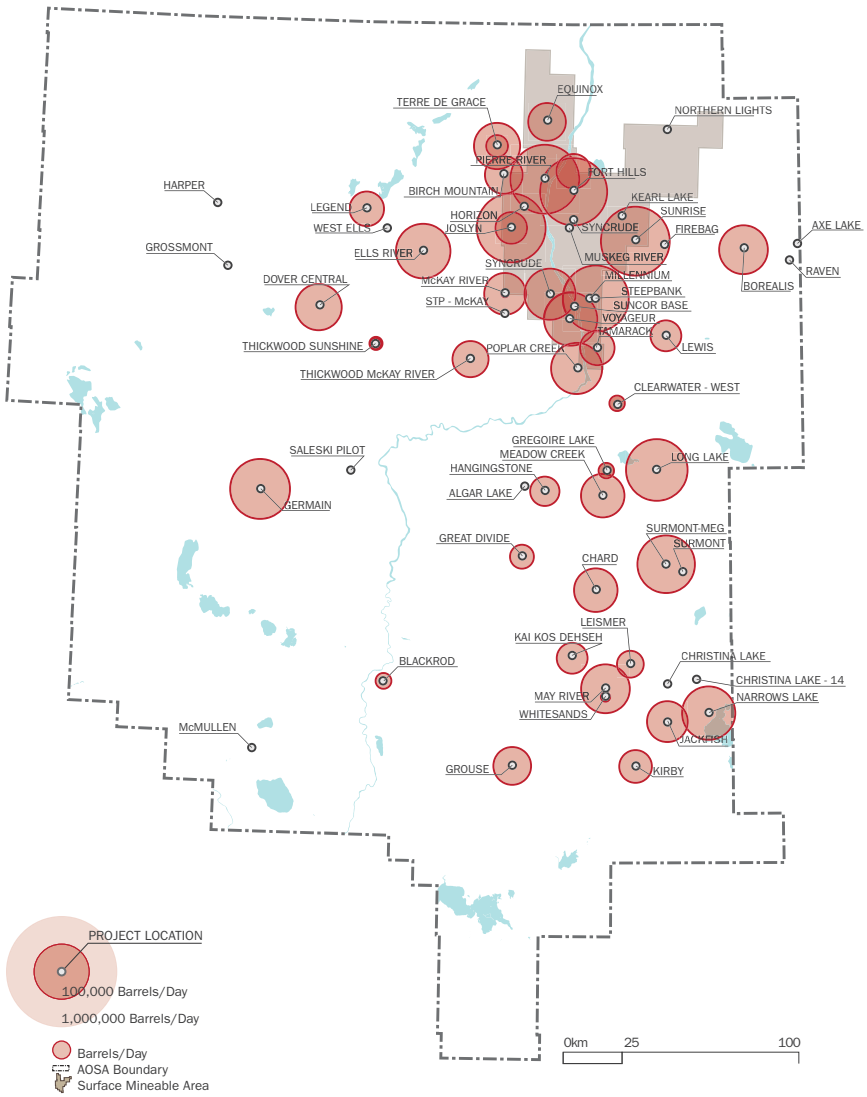


Figure 2.2.1 : CRISP Long - Term Bitumen Production Planning Forecast for the AOSA by Project Location (Total of 6.0 million bpd).
Source: Adapted from project production path modeling undertaken by Applications Management for the Oil Sands Sustainable Development Secretariat, 2010

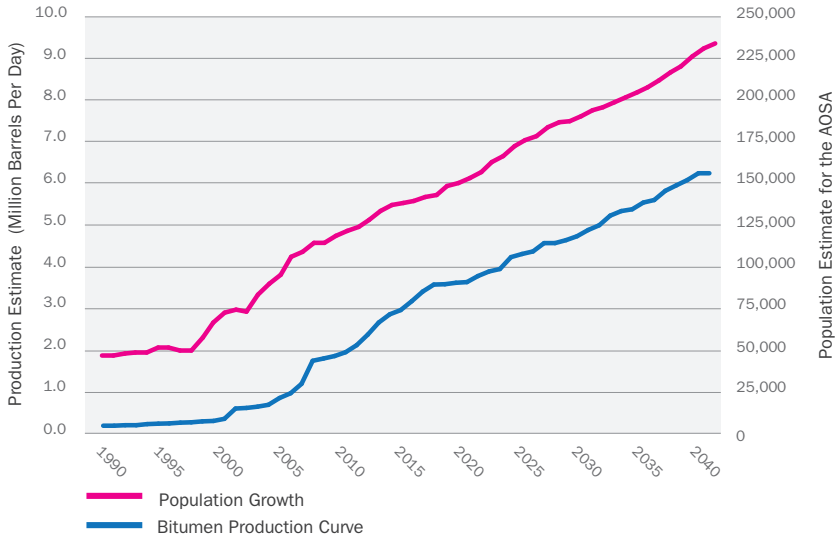


Figure 2.2.2 CRISP Long-Term Bitumen Production Planning Forecast and Population Estimate for the AOSA
Source: Adapted from Applications Management and Nichols Applied Management Analysis

2.3 CHOICES FOR GROWTH

The AOSA is not the only region in the world that is experiencing rapid growth related to resource development. Similar regions exist in other parts of Canada as well as in South America, Africa, Central Asia, the Middle East, the Pacific Rim, and Western Australia. All of these regions are facing or have faced similar conditions to those currently being experienced in the AOSA – and important lessons can be drawn from them.

The fundamental questions that all of these regions face include:

- attracting and retaining the workforce that is needed by industry;
- attracting not just workers, but also families, small businesses and others to create a diverse population, and a diverse and sustainable local economy;
- ensuring that growth benefits the pre-existing indigenous or local communities;
- minimizing the social impacts associated with a large influx of newcomers; and
- leveraging the resource extraction "boom" in a way that contributes to a lasting, positive environmental, social and economic legacy for the region.

In recognition of these issues, and the historical and contemporary precedents from across Canada and around the world, the CRISP considered four broad options for accommodating future growth in the AOSA:

- existing communities
- traditional work camps
- planned work camp communities
- new urban growth nodes

EXISTING COMMUNITIES

The CRISP considered various options for accommodating growth throughout the AOSA in existing communities. Advantages of accommodating growth in existing communities include taking advantage of existing community services and infrastructure, providing the "critical mass" of residents in these communities to support the introduction of new services that benefit both new and existing residents, and stimulating local economies. Concerns with this approach include over-stressing existing services and infrastructure, overwhelming existing communities with an influx of new

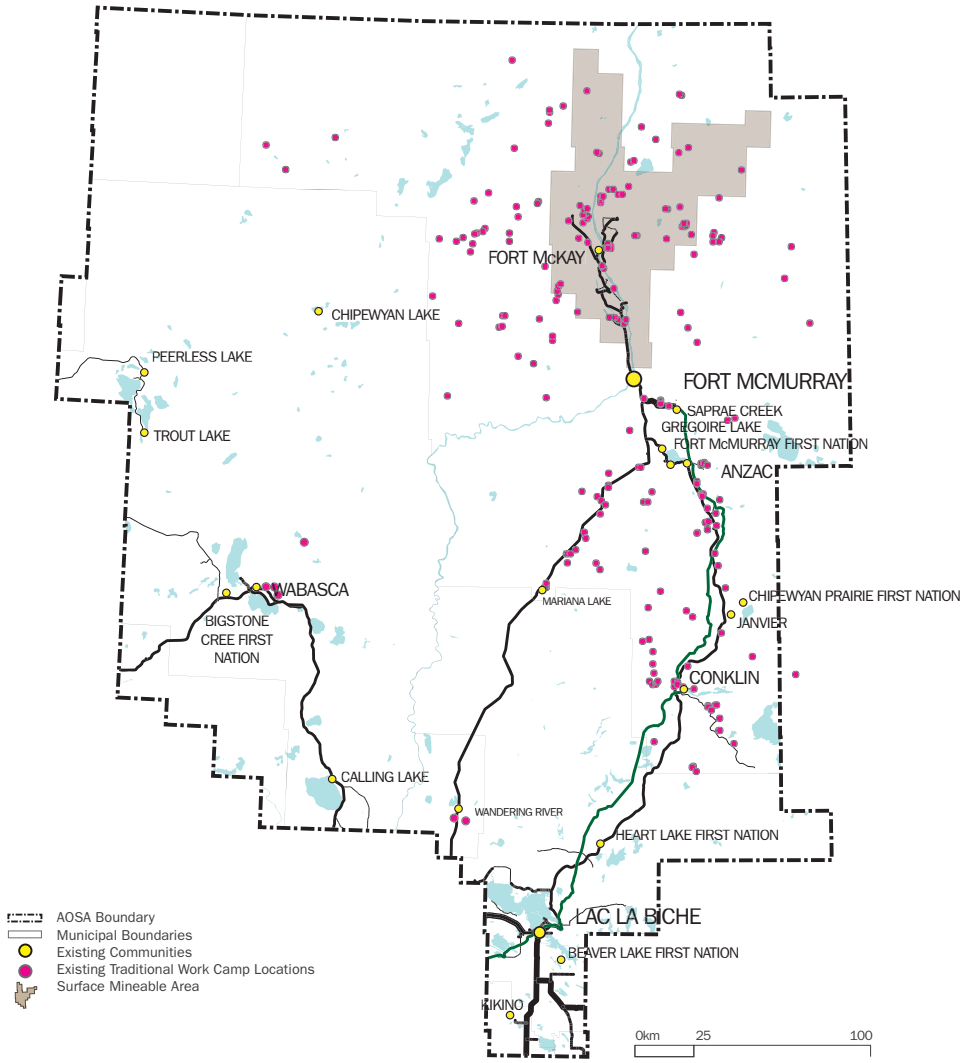


Figure 2.3.1 : Current Locations of Traditional Work Camps
Source: Based on a review of work camp locations provided by the Oil Sands Development Group and the Regional Municipality of Wood Buffalo

residents, and the poor access that some existing communities have to the areas of highest future job growth.

TRADITIONAL WORK CAMPS

Currently, much of the employment growth associated with oil sands development is being accommodated in private work camps. Expanded use of such camps is another choice that is available for accommodating future growth in the AOSA. These camps, built and operated at the expense and discretion of private industry, are thought to offer the advantage of maximum flexibility. They can be built quickly and located strategically to minimize travel distances for workers. However, they can also strain public services, as workers in these camps seek services in nearby communities. Concerns have also been expressed about negative impacts on public safety associated with temporary work camps, and work camps historically have offered little in the way of lasting benefits to communities. They are also expensive to build and operate and, within 10 or so years, camps are a much-deteriorated asset that may require considerable renovation and improvement in order to extend their lives. Additionally, traditional work camps attract fewer families and permanent residents to the region. In developing the CRISP, scenarios were considered that focused most growth in traditional work camps and these resulted in overall population growth across the AOSA that was 10-15 per cent lower compared to options that sought to direct growth to communities, reflecting the lower numbers of families and service workers that a work camp approach to growth would attract.

PLANNED WORK CAMP COMMUNITIES

An alternative approach to traditional private work camps scattered across the region are planned work camp communities. These types of communities are being introduced in other high-growth resource regions around the world, and can take many forms.

Just like traditional work camps, a planned work camp community would initially accommodate construction-phase workers as well as a few support staff. However, unlike traditional work camps, they would be planned and designed from the beginning in a way that would allow them to evolve

Existing Traditional Work Camp Near Anzac

2.3 CHOICES FOR GROWTH (CONT'D)

over time to serve as longer-term communities for operations staff and their families, and the services and supports they will require. Illustrations of how such a community may evolve are provided in Figures 2.3.2 and 2.3.3.

A planned work camp community would typically be strategically located along a highway corridor, at a location that minimizes commuting times to multiple project sites. Development would be based on a land use and area structure plan that would allow for it to evolve into a longer-term community over time. Communal facilities such as recreation centres and cafeterias would be centralized in the community's "core." Housing would be built at a higher quality to increase its lifespan, and would be designed such that it could be adapted to accommodate permanent residents and even families as the community transitions from a temporary construction workforce to a more permanent operations workforce.

In some cases, these communities might not evolve into permanent communities, and would be decommissioned and dismantled when the resource is exhausted, much like traditional work camps. In this event, the site could be returned to its original state, and buildings and other materials could be re-used in other locations. However, in other cases, secondary industries may grow to replace the jobs from the original resource industry, and the planned work camp community could evolve into a permanent community.

The advantage of a planned work camp community is that it focuses the workforce in a few strategic locations, rather than spreading them across multiple project sites. This allows for more efficient servicing and a lower environmental impact. Planned work camp communities can also help with attracting the workforce that is needed by the oil sands industry. They have the potential to evolve into more permanent communities that have a lasting benefit in the region, and that can attract a more diverse population compared to traditional work camps. Workers are tending, more and more, to seek out the best accommodation and the most normalized working conditions they can find. Many also have families from whom they are less and less prepared to be separated for extended periods of time, an outcome that planned work camp communities are better able to achieve.

NEW URBAN GROWTH NODES

An alternative for accommodating growth in rapidly-growing resource areas like the AOSA is the creation of new urban growth nodes. Unlike a planned work camp community, these nodes would be built to serve as permanent new communities from the outset.

Illustrations of how such a community may evolve, and how this differs from a planned work camp community, are provided in Figures 2.3.2 to 2.3.5. A key difference between the new urban growth node and the planned work camp community is location. As mentioned previously, a planned work camp community would be located near a highway to maximize access to project sites. Locations for a new urban growth node, on the other hand, would emphasize access to amenities such as lakes and conservation areas as well as opportunities for secondary industries, such as tourism and forestry, in order to enhance their potential for success as a permanent community.

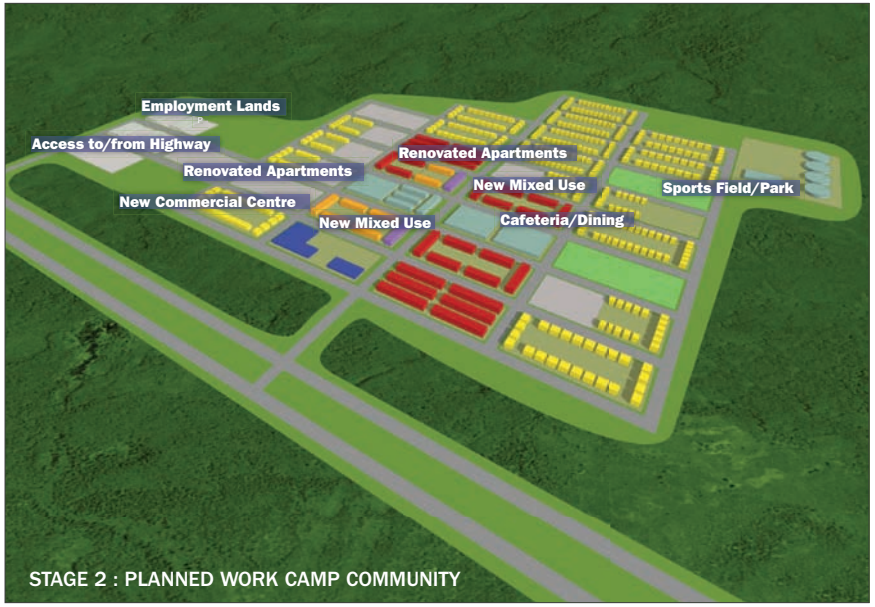
The built form of a new urban growth node would also be different. In the initial construction workforce phase, it would resemble a planned work camp community. However, early investment in key amenities such as schools, community centres and recreational amenities would attract a more diversified population as well as local enterprises earlier in its transition to the operations phase.

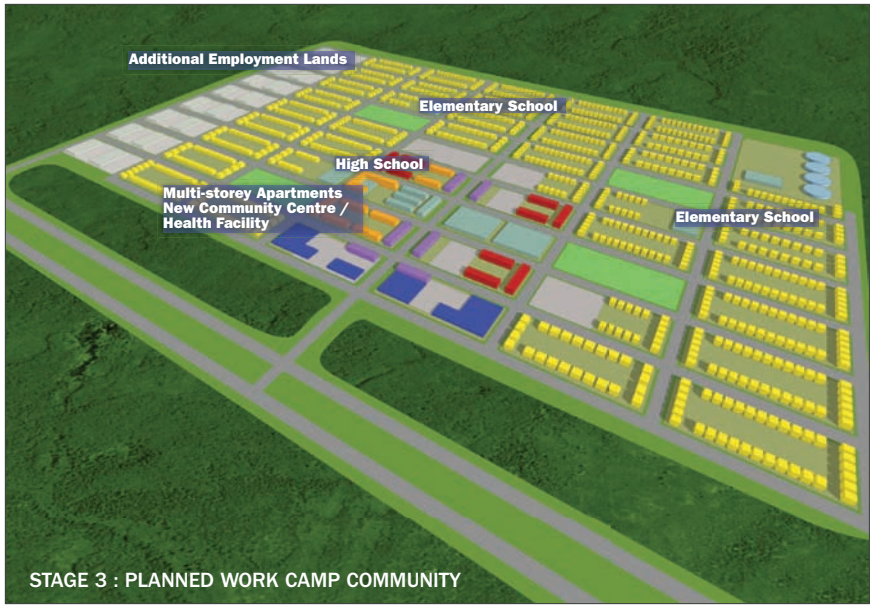
Early investment in services and amenities, combined with location selection, would be designed to attract a more diversified population and develop a more diversified local economy earlier in the community's evolution. This would result in a higher overall population compared to a planned work camp community for a similar-sized oil sands operations workforce.

Creating new permanent communities is not a new concept in Alberta or in Canada. Indeed, Canada has a long history of sponsoring "new towns" related to resource development – some of the most well known being Drayton Valley, Kitimat, Tumbler Ridge, Fox Creek, Flin Flon, Elliot Lake, and Kapuskasing, These were all purpose-built communities which involved front-end investment by resource companies and/or provincial or federal governments.

A planned work camp community and a new urban growth node would be

Figure 2.3.2 Evolution of a Planned Work Camp Community





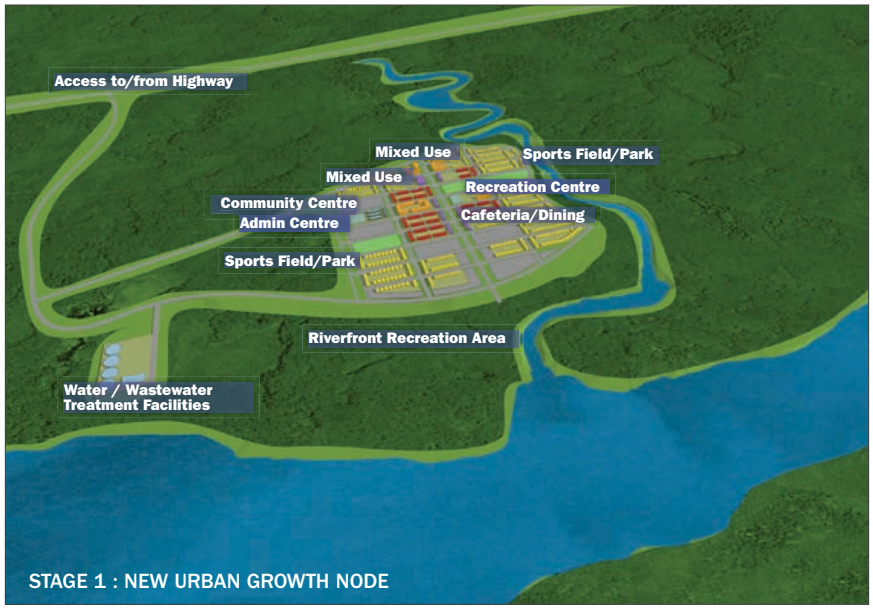
It its earliest stage of development, a planned work camp community would be dominated by construction phase workers and associated support staff. The Stage 1 image shown here represents a community of approximately 5,000 workers. Unlike a traditional work camp, the planned work camp community is designed and laid out according to a street and block pattern that would allow it to evolve over time into a permanent community. Higher density housing (shown in red) is built initially as temporary accommodation for construction workers, and some single family homes/row housing are available for operations and service sector workers (shown in yellow). Communal facilities (cafeteria, recreation centre, etc.) are centrally located in an area that could evolve into the community's downtown.

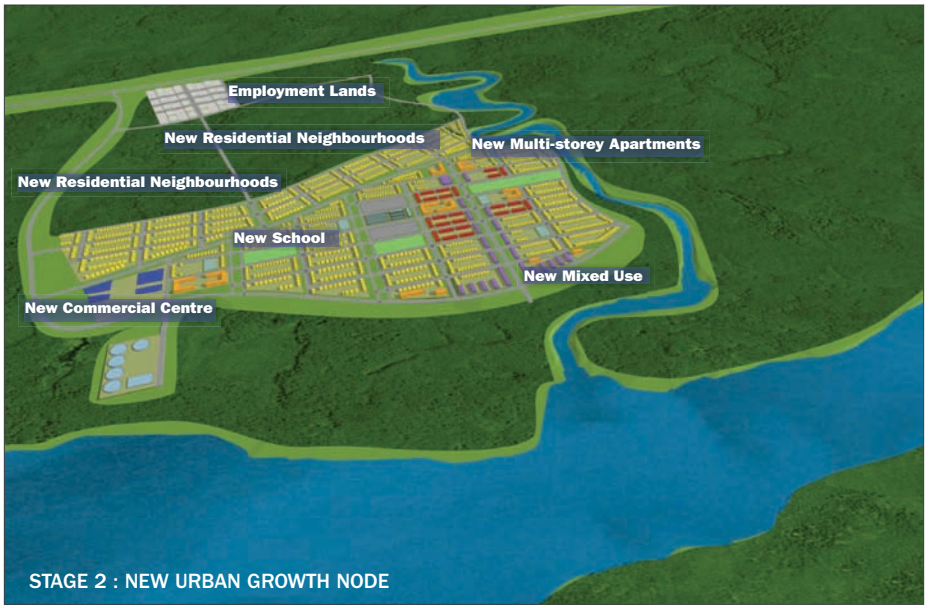
As the workforce begins to transition from construction to operations in Stage 2, more family housing (shown in yellow) is introduced. Some of the original temporary housing (shown in red) is converted to permanent apartment housing (shown in orange). Some of the communal facilities that had serviced the construction workforce become mixed use commercial areas (shown in purple). Some secondary industry is also introduced in planned employment areas.

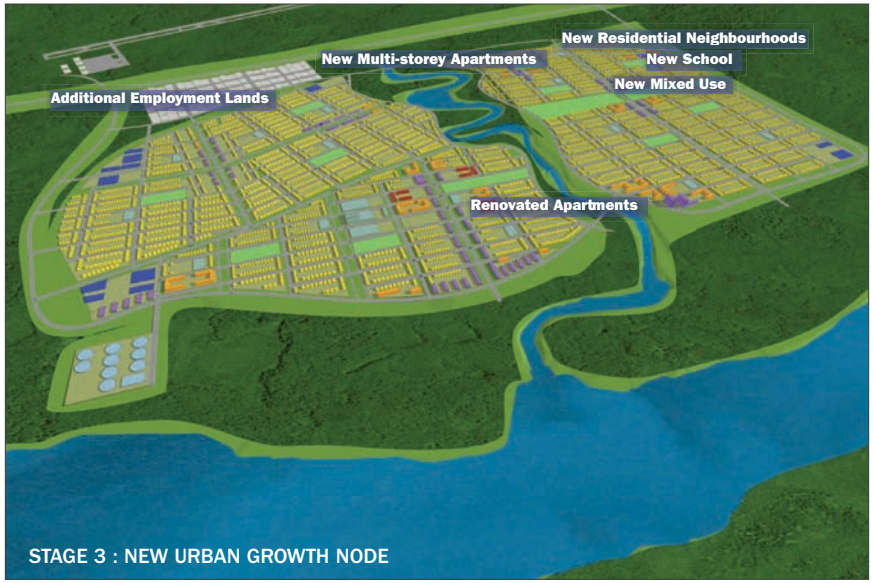
In Stage 3, with a relatively stable operations workforce, the planned work camp community begins to establish itself as a permanent community with the addition of some community services such as schools and health care facilities. It would be expected, however, that some planned work camp communities would not reach this phase of evolution, and would instead either stabilize as worker communities or be decommissioned over time.

2.3 CHOICES FOR GROWTH (CONT'D)

Figure 2.3.3 Evolution of a New Urban Growth Node







A new urban growth node closely resembles a planned work camp community during its earliest stage of development. It is dominated by construction workers and support staff, and it is designed in such a way that will allow it to evolve over time into a permanent community. It includes a mix of higher density temporary housing for construction workers (shown in red), and some single family housing for operations and service sector workers (shown in yellow). Communal facilities are centrally located in an area that is intended to evolve into the community's downtown.

To attract a more diverse population, schools and health care facilities are introduced as the community transitions to accommodate more operations workers in Stage 2. With services such as these, and a stronger emphasis on attracting families, overall growth in the new urban growth node is greater and it has a higher proportion of single family housing compared to a planned work camp community at the same stage of development. Also in this stage, some of the communal facilities from Stage 1 evolve into mixed use commercial areas (shown in purple). Some secondary industry is also introduced in planned employment areas.

In Stage 3, the new urban growth node has matured into a permanent community. While its operations workforce would be the same as that of the planned work camp community for this stage, its overall population and range of services are much higher because the more diverse population generates spin-off local economic activity, including a growing service sector.

Construction of Low and Medium Density Housing in Fort McMurray

2.4 CHOICES FOR INFRASTRUCTURE

Highway Upgrading Near Fort McMurray

As the population of the AOSA grows, the demands for infrastructure will also grow. The CRISP focuses on the infrastructure needs associated with transportation, water and wastewater treatment, schools and health care facilities. Just as there are several choices available for how growth is accommodated, there are several choices available for how these infrastructure needs can be met.

The pros and cons of these different infrastructure choices were considered along with the different choices that are available for accommodating growth to evaluate potential scenarios for the future of the AOSA.

TRANSPORTATION

More jobs in the AOSA will mean more people commuting to work. The growing oil sands industry will also mean more goods being transported across the region, including over dimensional loads. The result will be increased demand for transportation infrastructure. One potential option for addressing this demand is to improve the existing roadways through adding lanes and interchanges and by building new roads. This would add capacity for travel by private vehicles. Alternatives to travel by car or truck are another option for the AOSA. This could include commuter rail lines or enhanced bus service for moving people, and freight rail lines for transporting goods. These alternatives have significant potential to reduce traffic on the region's roads and to reduce greenhouse gas emissions associated with transportation.

Greater use of transit in the AOSA presents a considerable opportunity for making better use of existing and new road infrastructure. Most of the traffic on the region's roads, particularly north of Fort McMurray, comprises workers commuting to oil sands project sites. Currently, much of this travel takes place in private vehicles, resulting in very inefficient use of the available road space. As part of a Rapid Transit Strategy, more could be done to shift these travelers from private vehicles to transit. A Rapid Transit Strategy could encompass a wide spectrum of policy, operational and infrastructure measures. Policy measures could include requiring oil sands companies to transport their workers by transit, for example through limitations on on-site parking. Operational measures could

include reserving portions of the roadway for buses during peak travel times. Infrastructure measures could include the construction of new, fully dedicated bus corridors, or targeted bus bypass shoulders on existing roads that allow buses to move faster and more freely than regular traffic during peak times, or the introduction of commuter rail service.

WATER AND WASTEWATER

As the population of the region grows there will also be increased demand for water and wastewater treatment and distribution systems. Existing communities will require expansions to their existing systems, and new communities will require new facilities. Generally speaking, two different types of water and wastewater treatment and distributions systems are possible. In a regional system, a central treatment plant treats drinking water and pumps it to nearby communities, while another plant receives and treats the wastewater. With separate systems, on the other hand, each community has its own water treatment plant and wastewater treatment facility. From a cost perspective, building new, separate treatment facilities for each community is typically cheaper, because it does not require extensive regional pipe and pumping systems to distribute the water or wastewater over long distances. However, there are other important considerations as well. For example, centralizing treatment at one facility under a regional system can create better economies of scale that allow for more advanced treatment technologies to be used and make it easier to retain qualified operators. Regional systems also provide an opportunity to link smaller existing communities to more advanced treatment systems, and reduce reliance on less efficient small water treatment plants and lagoon systems.

The potential for the re-use of greywater by industry is another important consideration. Treated wastewater, or “greywater”, from communities can potentially be used by oil sands projects for their industrial processes, which could result in important reductions in the amount of raw water that industry withdraws from lakes and rivers in the region. For example, Suncor’s refinery in Strathcona County uses treated wastewater from EPCOR’s Gold Bar plant for process water purposes.

SCHOOLS AND HEALTH CARE FACILITIES

The CRISP also considers the demand that population growth will place on schools and health care facilities in the region. The choices for growth discussed in the previous section are closely linked with the need for schools and health care facilities. A growth model that relies on traditional work camps, for example, will bring fewer families and youth to the region, resulting in lower demand for schools. Similarly, the lower permanent population and seniors population that would characterize a work camp focused growth model would also result in lower demand for health care facilities. On the other hand, growing existing communities or establishing new ones would require new or expanded schools and health care facilities to serve them.

MULTI-USE CORRIDORS

As oil sands production in the AOSA increases, so too will the demand for new utility corridors to distribute materials such as bitumen, diluents, natural gas, electricity, and carbon for carbon capture. The CRISP considers opportunities for consolidating these facilities within multi-use corridors that can minimize land fragmentation and environmental impact.

OTHER INFRASTRUCTURE AND SERVICES

The focus of the CRISP is on infrastructure related to transportation, water and wastewater, education, health care and utility corridors. However, it is important to note that growing communities will also create demands for several other types of hard and soft services, such as emergency services, waste management facilities and recreation facilities, as well as the associated staff to operate and maintain this infrastructure. In the case of new urban growth nodes and planned work camp communities, consideration of the demand for these types of services will be particularly important. While these are outside of the scope of the CRISP, they will need to keep pace with the growth of the region as well.

3.1 METHODOLOGY

To develop the CRISP, a series of growth scenarios that utilized a mix of work camps, existing communities, planned work camp communities and new urban growth nodes were assessed against a number of criteria, and reviewed with stakeholders, in order to identify a "shortlist" of potential growth options for the region. For each of these options, population estimates were prepared and modelling was undertaken.

The population estimates for the CRISP build on a model developed by the Regional Municipality of Wood Buffalo (RMWB). Although this modeling process varies in some aspects from standard forecasting principles due to the unique demographic circumstances in this area, the estimates produced consider both natural growth rates in the region as well as the affects of in-migration in response to employment in the oil sands industry. They also take into account the differential effects that workers living in permanent communities with their families have compared to workers living in the region temporarily in work camps or in other non-permanent housing. The demographic information used for the model is derived from Statistics Canada publications and from publically available industry data regarding current and future employment needs. For aboriginal communities specifically, population was estimated by applying an average annual growth rate. The rate used was set marginally below the population scenarios developed by Statistics Canada (Projections of the Aboriginal populations, Canada, provinces and territories 2001 to 2017, Catalogue no. 91-547-XIE) to reflect Alberta's classification as a low-fertility region. Further work will be required in the future to enhance and validate the population forecasting method for the AOSA so that it meets the needs of the province, municipalities and industry.

For each growth option, a number of potential infrastructure servicing options were then developed. These servicing options employed a mix of automobile versus multi-modal transportation choices and regional versus separate water and wastewater servicing choices. The resulting growth and infrastructure scenarios were evaluated against approximately 50 different social, environmental and economic criteria linked to the CRISP Objectives and Guiding Principles. Examples of the qualitative and quantitative criteria that were used in the evaluation process include:

- capital and operating and maintenance costs of the infrastructure;
- greenhouse gas emissions associated with travel in the region;
- commute times for workers;
- access to community services and amenities for new and existing residents;
- impact on the natural environment;
- traffic congestion on the region's highways; and
- the number of communities connected to regional water and wastewater systems.

Alternative scenarios were also considered, such as relying exclusively on fly-in-fly-out arrangements for accommodating future growth as well as varying the locations of growth centres.

It is important to note that a number of key assumptions underlie the analysis that was undertaken for the CRISP. For example, the CRISP is based on a potential bitumen production rate of 6.0 million bpd and an assumption that this rate of production will occur by 2045, will utilize existing technologies and be based on existing levels of productivity. Six million bpd represents the high scenario from the Lower Athabasca Regional Plan and is based on a database developed by the Canadian Energy Research Institute (CERI) which uses company data on announced and approved projects to forecast oil sands production in the region. To support this level of production, the CRISP assumes that the necessary workforce will be available and will come to the region from a number of sources. The CRISP also assumes that previously announced infrastructure projects, such as the twinning of Highway 63 and the construction of Highway 686, will proceed. With respect to funding for infrastructure, the CRISP does not make any assumptions about who will pay for infrastructure or how it will be funded.

The development and evaluation of the various growth and infrastructure scenarios for the CRISP was guided by a Core Planning Team consisting of key ministries and impacted municipalities. Over the course of the CRISP's development, the Core Planning Team met monthly to discuss issues and propose and compare alternative scenarios.

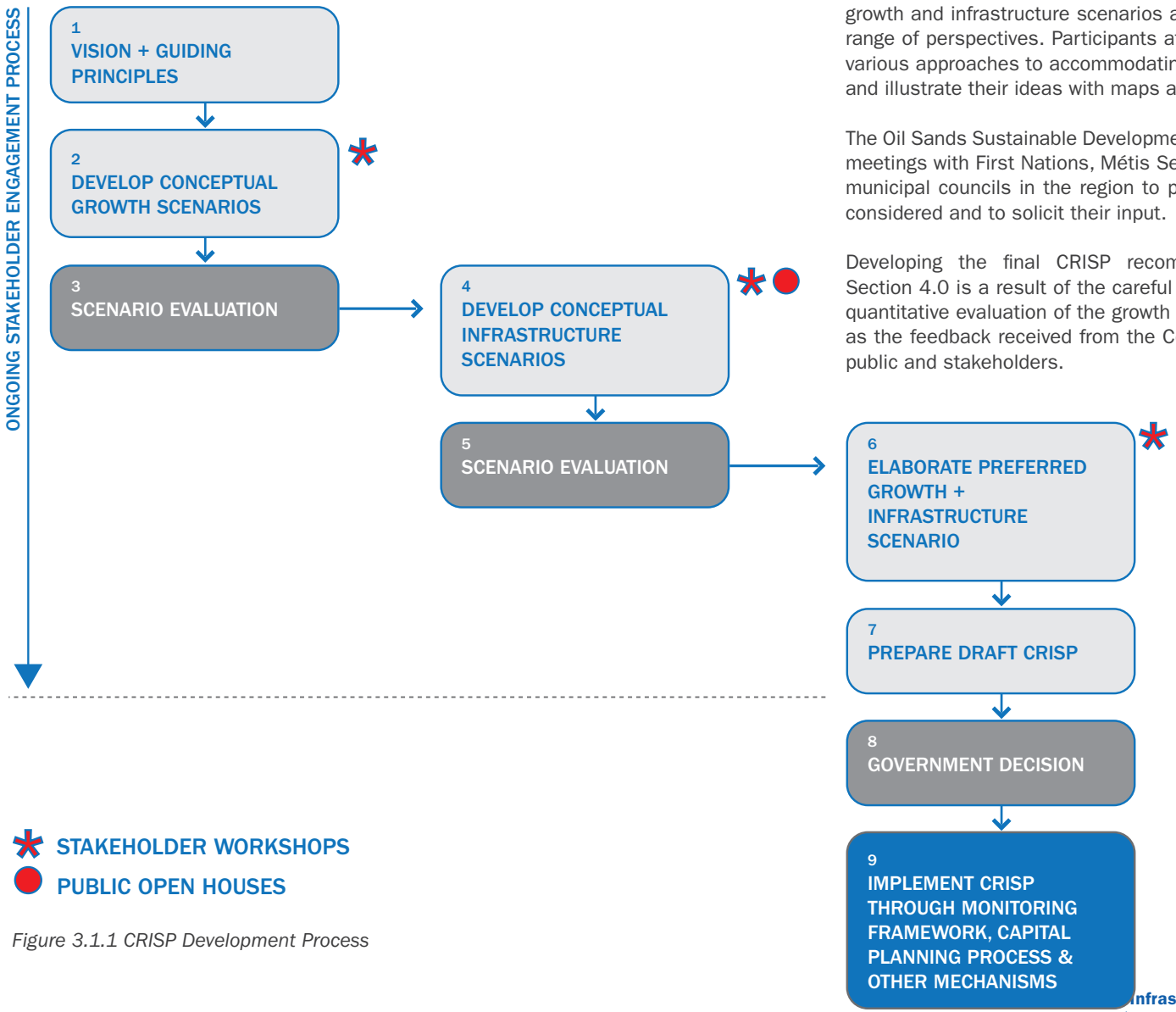


Figure 3.1.1 CRISP Development Process

Three multi-stakeholder workshops and a series of public open houses were also held in communities across the AOSA to present the various growth and infrastructure scenarios and to receive feedback from a wide range of perspectives. Participants at these events were able to discuss various approaches to accommodating and servicing growth in the region and illustrate their ideas with maps and drawings.

The Oil Sands Sustainable Development Secretariat also held a number of meetings with First Nations, Métis Settlements, Métis Organizations, and municipal councils in the region to present the choices that were being considered and to solicit their input.

Developing the final CRISP recommendation that is presented in Section 4.0 is a result of the careful consideration of the qualitative and quantitative evaluation of the growth and infrastructure scenarios as well as the feedback received from the Core Planning Team, members of the public and stakeholders.

3.2 OBJECTIVES AND GUIDING PRINCIPLES

In developing the CRISP, a series of scenarios were considered that utilized different options for accommodating growth and for infrastructure servicing. Each approach has advantages and disadvantages.

To guide the selection of the option that is recommended in the CRISP, a series of Objectives and Guiding Principles were developed. They are based on achieving the Vision and key outcomes of *Responsible Actions.* The Objectives and Guiding Principles draw on work done under a number of different Government of Alberta initiatives, including the *Lower Athabasca Regional Plan*, and they were developed in consultation with the Core Planning Team and through engagement with a wide range of stakeholders.

The Objectives and Guiding Principles are grouped according to the key outcomes identified in *Responsible Actions,* as well as a fourth grouping related to linkages with other initiatives.

Figure 3.2.1 : CRISP Objectives and Guiding Principles

A. REDUCED ENVIRONMENTAL FOOTPRINT	
OBJECTIVE	GUIDING PRINCIPLE
A1. Protect and maintain natural ecosystems and biodiversity, and minimize ecosystem fragmentation.	A1a. Reduce the development footprint associated with population growth and infrastructure development.
	A1b. Direct growth pressures away from environmentally sensitive areas.
A2. Minimize the carbon footprint associated with population growth and infrastructure development and operation.	A2a. Maximize potential for oil sands workers and other residents to commute by transit.
	A2b. Reduce commuting times.
	A2c. Develop infrastructure and communities that employ leading edge and alternative green technologies, and meet international standards such as LEED.
A3. Improve water quality.	A3a. Maximize potential for higher order water and wastewater treatment systems and reduce reliance on private services and lagoon systems.

B. INCREASED QUALITY OF LIFE FOR ALBERTANS TODAY AND IN THE FUTURE	
OBJECTIVE	GUIDING PRINCIPLE
B1. Respect local aspirations and cultures.	B1a. Respect local visions and aspirations as expressed through local meetings, local plans such as Municipal Development Plans, and Traditional Use Studies.
	B1b. Direct growth to areas that currently offer, or have the potential to offer, a diverse choice of housing options and a wide range of services and amenities.
B2. Provide a wide range of high quality services and amenities and a range of housing choices for existing, new and temporary residents.	B2a. Direct growth to areas that currently offer, or have the potential to offer, a diverse choice of housing options and a wide range of services and amenities.
	B2b. Ensure access to safe and clean sources of water for all residents.
	B2c. Ensure availability of land to support growth and provide for affordable housing options.
	B2d. Consider impacts on and access to social and community services such as recreational and cultural facilities and emergency services.
B3. Invest in infrastructure in a manner that contributes to a lasting environmental, economic and community legacy.	B3a. Where appropriate, invest in infrastructure that has the potential to continue servicing communities, long after the oil sands resource is exhausted. Minimize infrastructure that remains on the landscape after its usefulness has ended.
B4. Ensure public health, safety and emergency preparedness.	B4a. Provide strategic redundancies in critical infrastructure, such as multiple transportation routes to major centres, that can be used in the event of emergencies.
	B4b. Focus permanent population growth away from areas that have potential to be adversely affected by industrial development.
B5. Enhance opportunities for the continued practice of traditional uses and constitutionally protected rights.	B5a. Direct growth pressures away from traditional land use areas.

C. OPTIMIZED ECONOMIC GROWTH	
OBJECTIVE	GUIDING PRINCIPLE
C1. Support orderly development of the oil sands as a key economic driver within the AOSA and the Province.	C1a. Plan growth and infrastructure in a manner that is staged, phased and flexible to respond and adapt to the dynamic nature of the oil sands industry.
	C1b. Link infrastructure investment to areas of highest potential for oil sands development.
	C1c. Direct permanent settlement and infrastructure in a manner that does not hinder access to areas of high resource potential.
C2. Provide for a diverse, resilient economy over the long term.	C2a. Focus permanent settlement in locations that optimize potential for diversified local economies over the long term.
	C2b. Support opportunities for enhanced inter-provincial and international trade and development.
C3. Achieve cost effective public and private infrastructure investment.	C3a. Optimize use of existing infrastructure wherever possible.
	C3b. Focus population growth in a manner that allows for the most efficient delivery of infrastructure.
	C3c. Utilize infrastructure solutions that maximize cost effectiveness and return on investment, such as regional systems where appropriate.
	C3d. Minimize duplication of infrastructure investment amongst different levels of government, different private sector companies, and across the private and public sectors.
	C3e. Identify and protect corridors for long-term linear infrastructure needs.
C4. Provide infrastructure linkages that support First Nations and Métis participation in the economy and community development.	C4a. Increase infrastructure connections to First Nations and Métis Settlements.

D. LINKAGES	
OBJECTIVE	GUIDING PRINCIPLE
D1. Create a coordinated and integrated infrastructure plan.	D1a. Ensure that the CRISP supports other provincial initiatives, including *Responsible Actions*, the *Lower Athabasca Regional Plan* and other regional plans, *Provincial Energy Strategy,* and the province's *Climate Change Adaptation Strategy.*
	D1b. Ensure that the CRISP supports relevant municipal, Aboriginal and federal policy initiatives.
	D1c. Link the AOSA to other oil sands areas, as well as other regions of Alberta and neighbouring provinces.

3.3 EVALUATING THE OPTIONS

This section presents some key observations that resulted from the evaluation of the various scenarios that were prepared as part of developing the CRISP. In recognition of the unique circumstances that exist in different parts of the AOSA with respect to the oil sands resource and extraction processes, the observations are organized according to three general subregions. The northeast subregion stretches from Anzac northwards and includes communities that are primarily influenced by employment growth in the Surface Mineable Area. The southeast subregion from Anzac southwards loosely relates to the communities that are most influenced by the SAGD operations along the Highway 881 corridor. The west subregion in the Wabasca and Chipewyan Lake areas relates primarily to the carbonate oil sands resource. These subregions are shown in Figure 3.3.1. Figure 3.3.1 also identifies a series of employment areas, which represent groupings of oil sands project sites within these subregions that were identified for the purpose of analyzing employment growth. These are discussed in more detail in Section 4.3.

NORTHEAST SUBREGION

In the future, Fort McMurray is expected to continue as the primary service centre in the region. It will continue to attract a significant amount of population and employment growth. The CRISP considered options that would focus growth exclusively in Fort McMurray, which resulted in the population of that community doubling to approximately 145,000 by the time production in the AOSA reaches 6.0 million bpd. However, commuting times and road infrastructure needs under this scenario were significant, as workers would be forced to travel longer and longer distances to access new project sites in the northern part of the Surface Mineable Area.

The major future job growth in the AOSA will be in the northern part of the Surface Mineable Area (Area 2 – Mineable Area North), at projects that are beyond commuting distance from Fort McMurray. Several options were explored for accommodating this growth. If work camps were relied upon to accommodate this growth, the work camp population in the AOSA would likely remain above 20,000 to 25,000 on a permanent basis to accommodate construction and operations workers, as well as workers conducting pre-construction activities (e.g. seismic, resource delineation and SAGD well drilling and completions, road building, etc.).

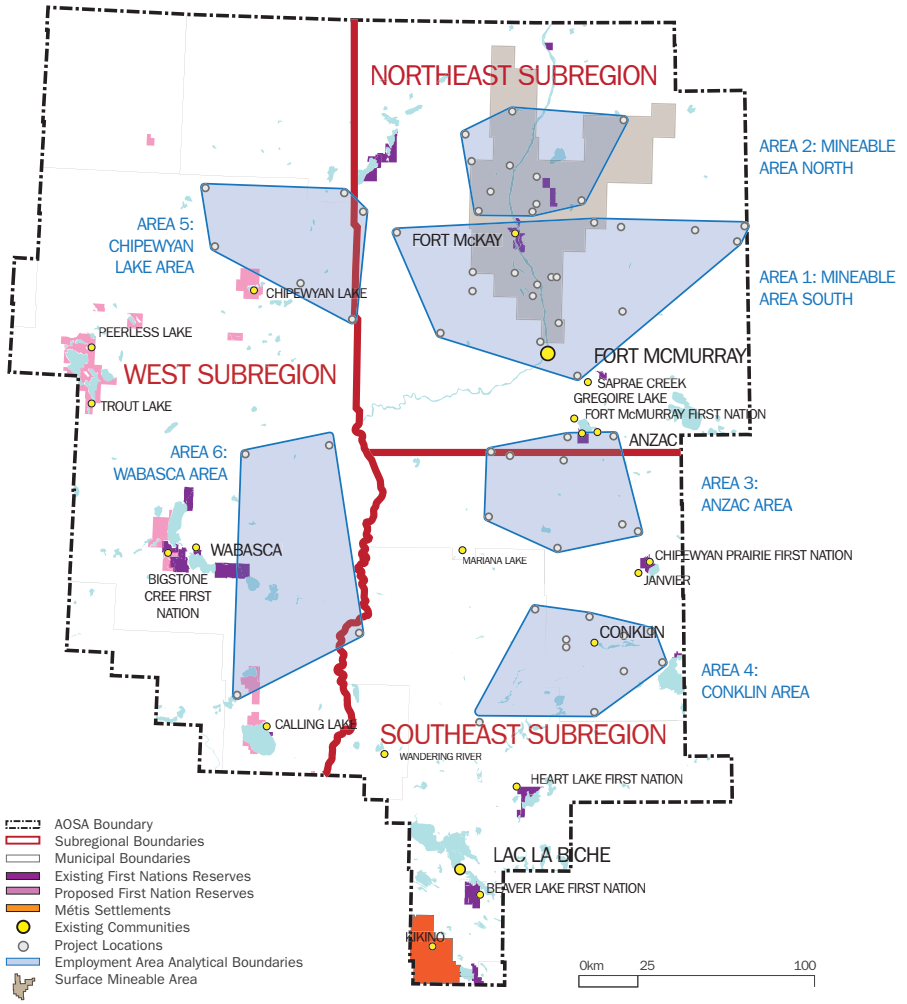


Figure 3.3.1 : Subregions of the AOSA.

Another option that was explored was the introduction of a new urban growth node in the northeast subregion. Potential locations for a new growth node were examined east of the Athabasca River (at McLelland Lake) and west of the Athabasca River just outside of the Surface Mineable Area. Additional analysis would be required to determine land suitability and exact placement of this new growth node, but either location demonstrated an ability to grow into a significant new population centre. Regardless of location, an urban growth node in this area was shown to reduce the population living in traditional work camps to less than 5,000 people and also reduce growth pressures on Fort McMurray.

The Fort McKay area was also considered as a possible growth node; however, this location was found to be too close to Fort McMurray to have a significant impact on commute times and too far from many of the northern project sites to reduce reliance on work camps.

A number of potential transportation corridors were tested for the northeast subregion as well. Currently, the only major highway to the north is Highway 63. Traffic modeling of the scenarios showed that this corridor will continue to show the greatest traffic demand in the future. Under a business-as-usual scenario, with Fort McMurray continuing as the only major urban community in this area, traffic volumes on Highway 63 would grow to a level that would require up to 12 lanes of capacity, as more-and-more workers travel longer-and-longer distances from Fort McMurray to reach project sites in the Surface Mineable Area.

Introducing a new growth node to the north resulted in significant reductions in traffic volumes on Highway 63. Rather than all workers travelling out of Fort McMurray, projects in the north could be served by workers travelling out of the new growth node as well. Introducing a new growth node was shown to reduce traffic on the Highway 63 corridor significantly, reducing infrastructure requirements by as much as four lanes, and reducing commuting times as well.

The scenario modelling also demonstrated that lane requirements on the existing Highway 63 corridor could be reduced even further with the introduction of new north-south roads north of Fort McMurray and a new ring road around Fort McMurray. These corridors also provide better access to job growth east and west of the Surface Mineable Area and alternate routes for wide loads and hazardous loads that avoid downtown Fort McMurray. Without a ring road, if this level of traffic volume were added to the existing Highway 63 corridor through Fort McMurray, it would result in an additional demand of 4-6 lanes on that corridor through the city.

The potential of freight rail to relieve pressure on the region's roads was also considered. Currently, freight rail service ends south of Fort McMurray. Capital costs for extending this service into the Surface Mineable Area would be significant, but there is considerable potential to remove trucks from the roads and reduce highway infrastructure requirements by shifting more goods from truck to rail. Freight rail would also facilitate the out-of-region export of petroleum coke and sulphur, which are now essentially stranded at project sites in the region. A bitumen production rate of 6.0 million bpd would fill 30 trains per day of petroleum coke and sulphur if freight rail service was extended north. Without freight rail, 2,000 trucks per day would be needed to move this material.

With respect to water and wastewater servicing, from a cost perspective, building new treatment facilities for new growth areas was generally found to be cheaper overall then extending piped services from the existing treatment plants in Fort McMurray. However, in some cases, the cost differences were not great on a per capita basis, and other important considerations such as the opportunity to link Fort McKay to a regional system and the opportunity to support reuse of greywater by industry with a regional system lend support to the option of regional servicing.

SOUTHEAST SUBREGION

Steady job growth is expected in the Conklin area over the next 10 years due to in situ bitumen production. To service this growth, a new urban growth node or planned work camp community of approximately 15,000 would be required at Conklin. Concerns have been expressed from some local residents about this level of growth. As an alternative, opportunities were explored to accommodate more of this growth in Anzac and Lac La Biche.

3.3 EVALUATING THE OPTIONS (CONT'D)

In the extreme, if the Conklin area were serviced entirely out of Lac La Biche, the latter could grow to nearly 20,000 people. However, given the commuting distances involved, this would be an unlikely scenario. While the scenario evaluation showed that there is potential to accommodate some growth in Lac La Biche and Anzac, particularly if higher order transit service is introduced, there will still be a need to address worker housing in the immediate Conklin area.

In all scenarios, Highway 63 and Highway 881 would continue to function as the primary transportation corridors in the southeast subregion. Traffic projections on Highway 63 suggest that the planned twinning of this corridor to four lanes will be sufficient to accommodate future growth.

Traffic levels on Highway 881 are dependent on the option chosen for accommodating the growth around Conklin. A new growth node at Conklin reduces commuting distances, and therefore traffic levels, on Highway 881. Attempting to service this area from Lac La Biche and Anzac, on the other hand, would result in longer commuting times and higher traffic levels.

The movement of goods on Highways 63 and 881 is a significant issue in this subregion, particularly with respect to moving overdimensional loads. Currently, overdimensional loads to the in situ projects near Conklin must travel north on Highway 63 and then south on Highway 881, past Anzac and Janvier to Conklin. To remedy this, a new linkage was tested that connected Highway 881 and Highway 63, roughly between Mariana Lake and Conklin. This corridor showed very low traffic demand and relatively high costs, suggesting that upgrading Highway 881 itself may be a more cost effective solution for transporting overdimensional loads to the Conklin area.

With respect to water and wastewater servicing, as was the case in the northeast, building separate treatment facilities for each community would be the cheapest solution. However, there are other important considerations as well, including the opportunity to replace multiple smaller, local lagoons in communities along the Highway 881 corridor with a centralized, mechanized treatment facility, and the opportunity to support reuse of greywater by industry along the corridor.

WESTERN SUBREGION

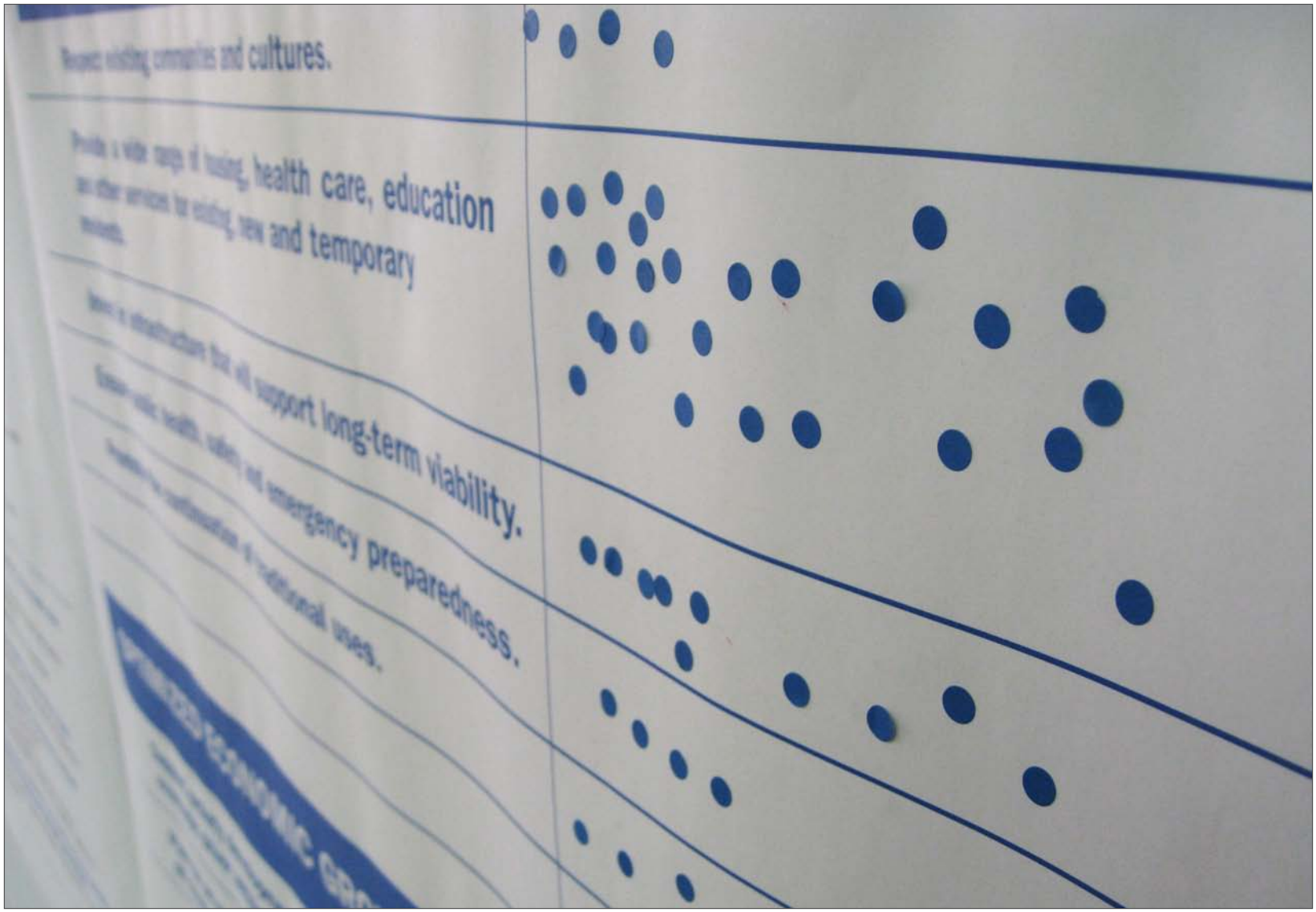
Significant job growth in the western subregion is expected to occur late in the planning horizon (20 or more years). A number of options were considered for servicing this growth. The nearest existing communities to these future oil sands projects are Chipewyan Lake, Wabasca and Red Earth Creek. There is also the potential to service projects in the area north of Chipewyan Lake from a new urban growth node north of Fort McMurray. However, given the distances involved, a new centrally located planned work camp community would likely still be required, as well as some individual, traditional work camps for more remote projects.

There is a particularly high potential to service projects in the western subregion with workers drawn from Aboriginal communities at Bigstone Cree First Nation, the Slave Lake Area, Red Earth Creek Area and Fort Vermillion area.

If workforce participation from nearby Aboriginal communities were maximized (e.g. Bigstone Cree First Nation), it could reduce the population living in work camps by approximately 25 per cent. Aboriginal communities from further away (e.g. Fort Vermilion area) could provide the remainder of the oil sands workforce, but would still require housing in a planned work camp community or traditional work camp closer to the project sites.

Transportation corridors in this area are currently quite limited. Alberta Transportation has planned a new east-west corridor connecting Fort McMurray with the western part of the AOSA. An extension of the Highway 813 corridor north to the Chipewyan Lake Area is also planned by Alberta Transportation. This link would serve as the primary commuter route between Wabasca and Bigstone Cree First Nation and the project sites to the north. The traffic modeling undertaken for the CRISP suggests that a two-lane level of service will be sufficient for these corridors.

As with the other regions of the AOSA, opportunities for both separate and regional water and wastewater services were explored. Given the topography involved and the need for pumping stations, extending regional water services from Wabasca to the north would be more expensive compared to servicing growth centres in the north with their own, separate systems.



'Dotmocracy Exercise' at CRISP Public Open House in Lac La Biche where participants "voted" for the principles that mattered most to them.

3.3 EVALUATING THE OPTIONS (CONT'D)

Highway 63 Corridor in Fort McMurray

TRANSIT

With regards to transit, a number of the scenarios that were evaluated included the introduction of various forms of commuter rail and bus-based transit.

Commuter rail speeds and costs vary greatly depending on the type of technology and track being used. For modeling purposes, a fairly elite electric rail service that averages speeds of 180km/hour was initially tested. This service showed fairly significant benefits in terms of travel times and transportation-related greenhouse gas emission reductions, but at a very high cost. Introducing high speed rail between Lac La Biche and the northern edge of the Surface Mineable Area lowered GHG emissions from transportation sources region-wide by approximately 5-10 per cent and travel times by approximately 11 per cent, but at a very significant capital cost of approximately $1.3 billion. Ridership and overall benefits were particularly high north of Fort McMurray.

More traditional types of rail such as diesel trains were also modeled. At approximately $500 million, utilizing diesel rail technology offers significant capital cost savings, as well as additional operating cost savings, compared to high speed technologies. Diesel rail technology also has the potential to share all or portions of the rail corridor with freight rail service, if there is sufficient spare capacity, resulting in significant cost savings. However, diesel rail technology does provide less benefit in terms of average travel times.

Various enhanced bus transit options were also considered for the AOSA. Greater use of buses in the region would result in significantly lower average travel times and GHG emissions compared to a transportation system that relies on private vehicles. However, the overall benefits of a bus-based system would be less than with commuter rail.

Besides cost, bus-based transit offers a number of operational advantages over commuter rail as well. It is more stageable than commuter rail (i.e. it can be introduced incrementally). Routing of bus-based transit is more flexible than rail. Bus-based transit also gives industry greater control over scheduling than would be the case with a centrally-operated commuter rail system. Additionally, because the project sites are dispersed across the region, bus technology can offer a service that requires fewer transfers than would be possible for commuter rail. It is important to note, however, that any measures considered as part of a bus-based transit system that include restricting the use of road capacity for the exclusive use of buses would require amendments to Alberta's existing highways legislation.

Choice of technology aside, the comparison of the infrastructure scenarios showed a clear benefit both in terms of travel times and GHG emissions, if transit use can be maximized. Increasing transit mode shared to approximately 50 per cent could also reduce future road requirements by 2 to 4 lanes in the heavily travelled Highway 63 corridor immediately north of Fort McMurray. Regardless of which technology is employed, transit service would be most viable in the area north of Fort McMurray where employment is highest and where project sites are more densely clustered compared to the southeast or western subregions.

To make transit (rail or bus) truly cost effective, measures would be needed to promote its use. A Rapid Transit Strategy would need to include policy, operational and infrastructure measures designed to direct more commuters to transit, and to make transit an attractive choice for workers.

4.1 VISION FOR THE FUTURE OF THE AOSA

The Athabasca Oil Sands Area (AOSA) will be a vibrant and diverse region.

Workers in the oil sands industry will have many choices available to them for living with their families in the region. Existing communities such as Fort McMurray, Anzac, Lac La Biche, Athabasca, Slave Lake and Wabasca will grow, attracting workers and their families, as well as new businesses and entrepreneurs that will diversify the economic base and provide access to more services. In the north of the region, a new community of just over 40,000 people will be designed to be a model of environmental sustainability, with water and energy efficient housing, transit-oriented development, walkable neighbourhoods, and extensive use of green technologies.

While some workers in the oil sands industry will continue to live only temporarily in the region, the prevalence of work camps will actually be lower in the future than it is today, as they are replaced by permanent housing in new and existing communities, as well as planned work camp communities. Increased participation of the large Aboriginal workforce available within and adjacent to the AOSA will be realized and will also play a significant role in reducing the need for in-migration of temporary workers into the region.

The infrastructure that is needed to support and sustain this growth will be delivered in a timely and efficient manner. It will be funded and constructed through innovative partnerships and collaboration between all levels of government and private industry.

Communities across the region will be connected by a robust, multi-modal transportation network. New roads will provide access to employment opportunities from both new and existing communities, including First Nations and Métis communities. Goods moving through the region will have more routes available to them that avoid population centres and result in fewer delays and obstructions for travellers.

Transit will be a major feature of the AOSA transportation system. A rapid transit system involving a combination of rail, low emission buses and air will provide quick access between communities and project sites, reducing reliance on private vehicles, transportation-related greenhouse gas emissions, and congestion on the region's roads. With half of the oil sands workforce arriving at work by transit, the AOSA will have the highest rate of commuter transit use in the country.

New and upgraded water and wastewater facilities in the region will ensure that all residents have access to safe sources of drinking water, and wastewater effluent will be of a quality that minimizes impacts on the region's lakes and rivers.

New schools and health care facilities will be provided as the region grows, ensuring that these vital services keep pace with population growth. Growing population centres will also bring other new services and amenities to the region, providing greater access for both new and existing residents.

The high quality of life in the region, abundant housing choices, and access to services and amenities will make the AOSA a better place to live for existing residents and an attractive choice for newcomers.

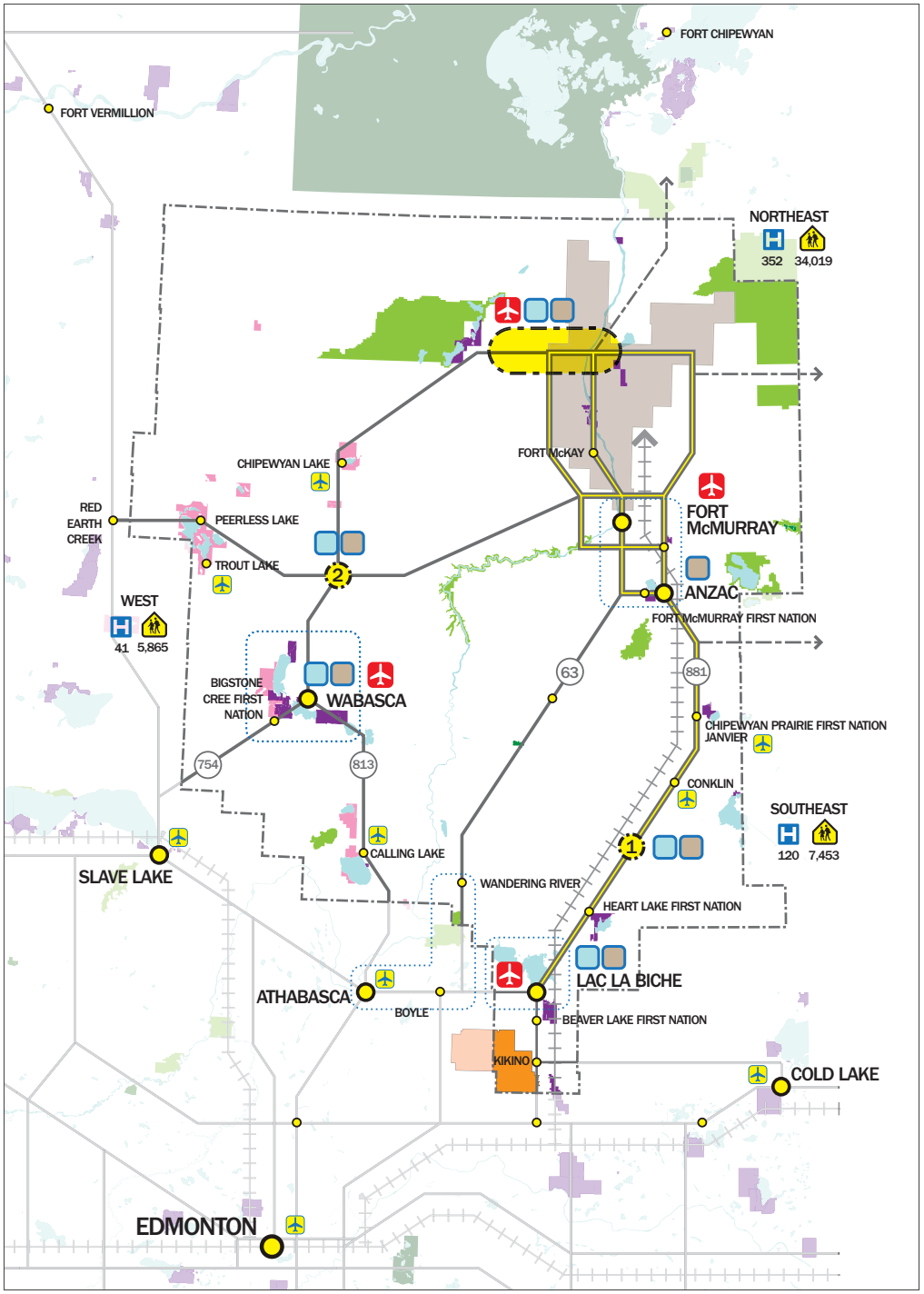


Figure 4.1.1 The Comprehensive Regional Infrastructure Sustainability Plan for the Athabasca Oil Sands Area (at 6.0 million bpd of production)

POPULATION
- AOSA Boundary
- Existing First Nations Reserves
- Proposed First Nations Reserves
- Métis Settlements
- Provincial and Wildland Parks
- Existing Communities
- Approximate Location of New Urban Growth Node
- Approximate Location of Planned Work Camp Community
- Oil Sands Project Locations
- Surface Mineable Area

TRANSPORTATION
- Roads
- Possible out-of-region connections
- Bus-Based Rapid Transit
- Freight Rail
- Possible Commuter/Freight Rail Extension
- New/Upgraded Airports
- Existing Public Airport
- Existing Private Airport

WATER INFRASTRUCTURE
- New/Upgraded Water Treatment Plant
- New/Upgraded Wastewater Treatment Facility
- Regional Water Service Area

CIVIC INFRASTRUCTURE
- Schools [Additional Desks]
- Additional Health Services Spaces

4.2 AOSA POPULATION

The CRISP outlines the infrastructure that will be required in the AOSA over the next several years, should oil sands production and population increase. It is presented in four phases, with each phase representing a different increment of potential bitumen production growth, and associated potential population growth. While approximate years are provided for each phase, these years are estimates only, and are based on an assumed bitumen production path.

The population of the AOSA is estimated to reach 240,500 people at a bitumen production rate of 6.0 million bpd. This population estimate is tied to elements of the CRISP such as new growth centres, transportation networks, schools, health care facilities and so on. These elements attract families and non-oil sands workers to the region who would not have been attracted to the region under a more status quo, work camp, or fly-in-fly-out approach to growth.

Population growth for the region overall, and for each community within the region, is tied very closely to rates of growth in the oil sands industry, so it is subject to change as the dynamics of the oil industry change. Population may grow at a slower or faster rate than what is presented here. The CRISP Monitoring Framework will be used to track trends in key indicators over time in order to provide early identification of any need for adjustments to the CRISP phasing.

The population estimates for each phase of potential bitumen production are presented in Figure 4.2.1.

The focus of the CRISP is on transportation infrastructure, as well as water, wastewater, schools and health care facilities. Infrastructure needs related to each of these are presented for each phase in the following sections.

POPULATIONS	Ex. Conditions (2008) 1.3 m/bpd	Phase 1 (2014) 2.3 m/bpd	Phase 2 (2025) 3.7 m/bpd	Phase 3 (2034) 5.0 m/bpd	Phase 4 (2045) 6.0 m/bpd
EXISTING COMMUNITIES*					
Fort McMurray	71,900	78,400	95,400	106,400	117,600
Anzac	850	2,400	6,300	9,400	12,200
Conklin	400	400	400	400	400
Janvier	200	200	200	200	200
Fort McKay	850	1,000	1,200	1,200	1,200
Rest of RMWB	1,400	1,500	1,600	1,600	1,600
Hamlet of Lac La Biche	4,200	6,600	11,300	13,700	16,200
Rest of Lac La Biche	6,700	6,900	7,300	7,500	7,800
Wabasca-Demarais	2,900	3,200	4,200	6,000	9,400
Chipewyan Lake Area	100	100	100	150	200
Rest of MD of Opportunity	1,200	1,300	1,600	1,750	1,900
Total	90,700	102,000	129,600	148,300	168,700
FIRST NATIONS + MÉTIS SETTLEMENTS**					
Beaver Lake	350	400	500	600	750
Whitefish (Goodfish) Lake	1,100	1,200	1,600	1,900	2,500
Bigstone Cree	2,600	2,900	3,700	4,500	5,700
Fort McMurray #468	250	300	350	450	550
Chipewyan Prairie	350	350	500	550	750
Heart Lake	200	200	250	350	400
Kikino Métis Settlement	1,100	1,200	1,600	1,900	2,400
Peerless Trout	800	850	1,100	1,300	1,700
Total	6,800	7,400	9,600	11,600	14,800
NEW GROWTH AREAS*					
New Urban Growth Node	0	11,400	19,600	29,500	42,300
Planned Camp Community 1	0	4,900	2,200	1,400	4,400
Planned Camp Community 2	0	0	1,400	5,000	5,800
Total	0	16,300	23,200	35,900	52,500
TRADITIONAL WORK CAMPS*					
Traditional Work Camps	12,200***	3,600	3,000	3,400	4,500
AOSA REGIONAL TOTAL	109,700	129,300	165,400	199,200	240,500

Figure 4.2.1 Population Estimates for the AOSA. All figures are estimates and have been rounded.
** Based on population modeling undertaken by Applications Management for the Oil Sands Sustainable Development Secretariat, 2010.*
*** Based on applying an average annual growth rate of 2.25% applied to the 2006 Census population.*
**** Estimate does not include mobile workers engaged in pre-construction activities (e.g. resource delineation, access road building, site preparation).*

4.3 AOSA EMPLOYMENT

Population growth in the AOSA is very closely related to employment growth in the oil sands industry. Figure 4.3.1 illustrates the trends in oil sands-related construction, operations and total employment for each of the employment areas that were illustrated in Figure 3.3.1 in Section 3.3.

Throughout the CRISP planning horizon, the Surface Mineable Area will continue to be the dominant source of oil sands employment in the AOSA. This is in part due to the high levels of bitumen production in this region, and in part due to the more labour intensive extraction process associated with surface mining compared to in situ operations.

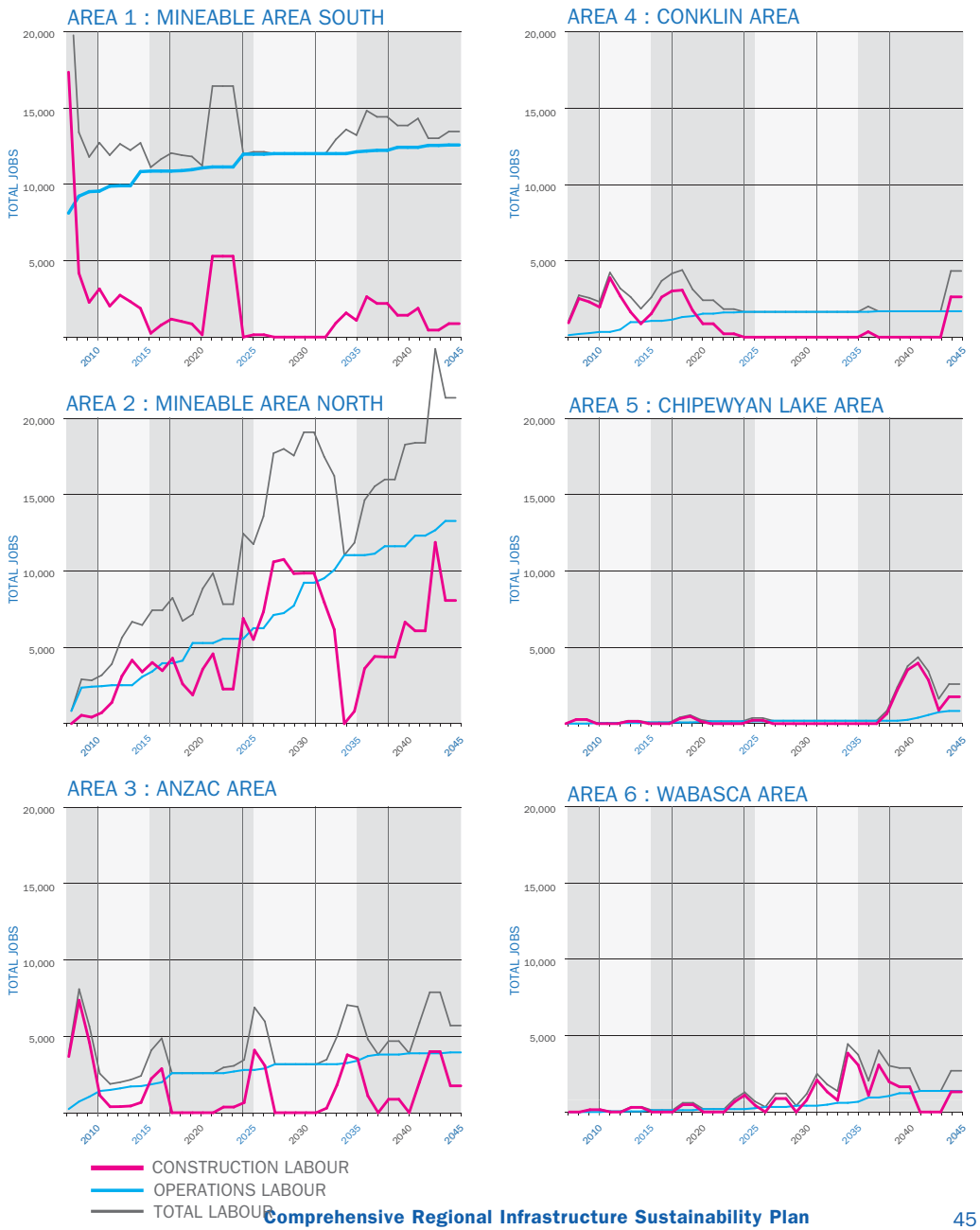
In the southern portion of the Surface Mineable Area (Area 1), the large construction workforce is currently transitioning into an operations workforce. This operations workforce is expected to remain high, but steady, over the course of the CRISP planning horizon.

The most significant employment growth will be in the north part of the Surface Mineable Area (Area 2). This includes a fluctuating construction work force and a steadily increasing operations workforce.

Outside of the Surface Mineable Area, short term employment growth will be highest in the Anzac (Area 3) and Conklin (Area 4) areas along the Highway 881 corridor, associated with in situ oil sands operations. The operations workforce is expected to increase steadily over the next 10 years, and then begin to level off. The construction workforce will continue to fluctuate in this area as new projects come on stream and for shut down and maintenance activities.

In the west (Areas 5 and 6), commercial-scale extraction of the carbonate bitumen reserves is likely still several years away. As a result, employment growth is expected to occur later in the planning horizon.

Figure 4.3.1 Oil Sands Project Employment Estimates by Sub-region.
Source: Adapted from project employment modeling undertaken by Applications Management for the Oil Sands Sustainable Development Secretariat, 2010.



4.4 EXISTING CONDITIONS

Bitumen Production : 1.3 Million Barrels per Day
Regional Population : 109,700
Date : 2008

Oil sands related employment is currently concentrated in the south end of the Surface Mineable Area, just north of Fort McMurray. Operations employment is particularly high here, representing more than half of the oil sands operations employment in the AOSA. Construction activity is also high in this area, as it is south of Fort McMurray around Anzac and Conklin.

The population of the region reflects this trend in employment, with two-thirds of the population residing in Fort McMurray. The temporary population living in traditional work camps is high as well, representing more than ten per cent of the region's population.

Transportation infrastructure is dominated by the two major highway corridors – Highways 63 and 881. Highway 63 extends north of Fort McMurray terminating as an all-season highway just north of Fort McKay. There is no paved, all-season east-west transportation infrastructure in the AOSA, and no connections of this type to communities to the north or east.

While transit is used fairly heavily by oil sands workers living in Fort McMurray, these buses operate in mixed traffic, often below capacity, and there are no dedicated transit facilities. Most workers prefer to commute by private vehicle.

The primary public airport in the region is in Fort McMurray, with smaller public airports in Conklin, Lac La Biche and Wabasca. A number of private airfields exist across the region at various oil sands project sites.

Goods movement in the region is primarily by truck on Highways 63 and 881. Freight rail service terminates just south of Fort McMurray. The movement of overdimensional loads is constrained in some areas, particularly through Fort McMurray and south of Conklin on Highway 881.

Water and wastewater servicing is provided primarily by separate treatment facilities in each community, with Fort McMurray providing regional water services to Anzac, and Lac La Biche providing regional services to some smaller communities in Lac La Biche County.

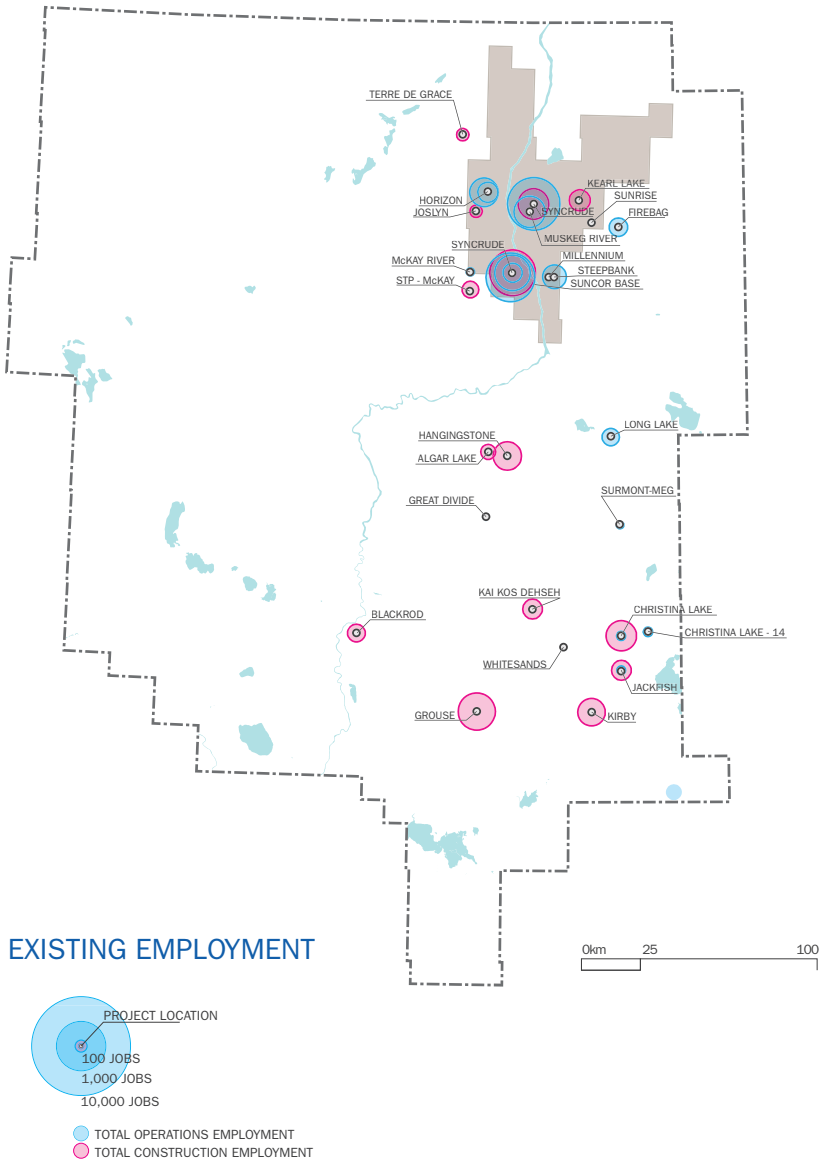
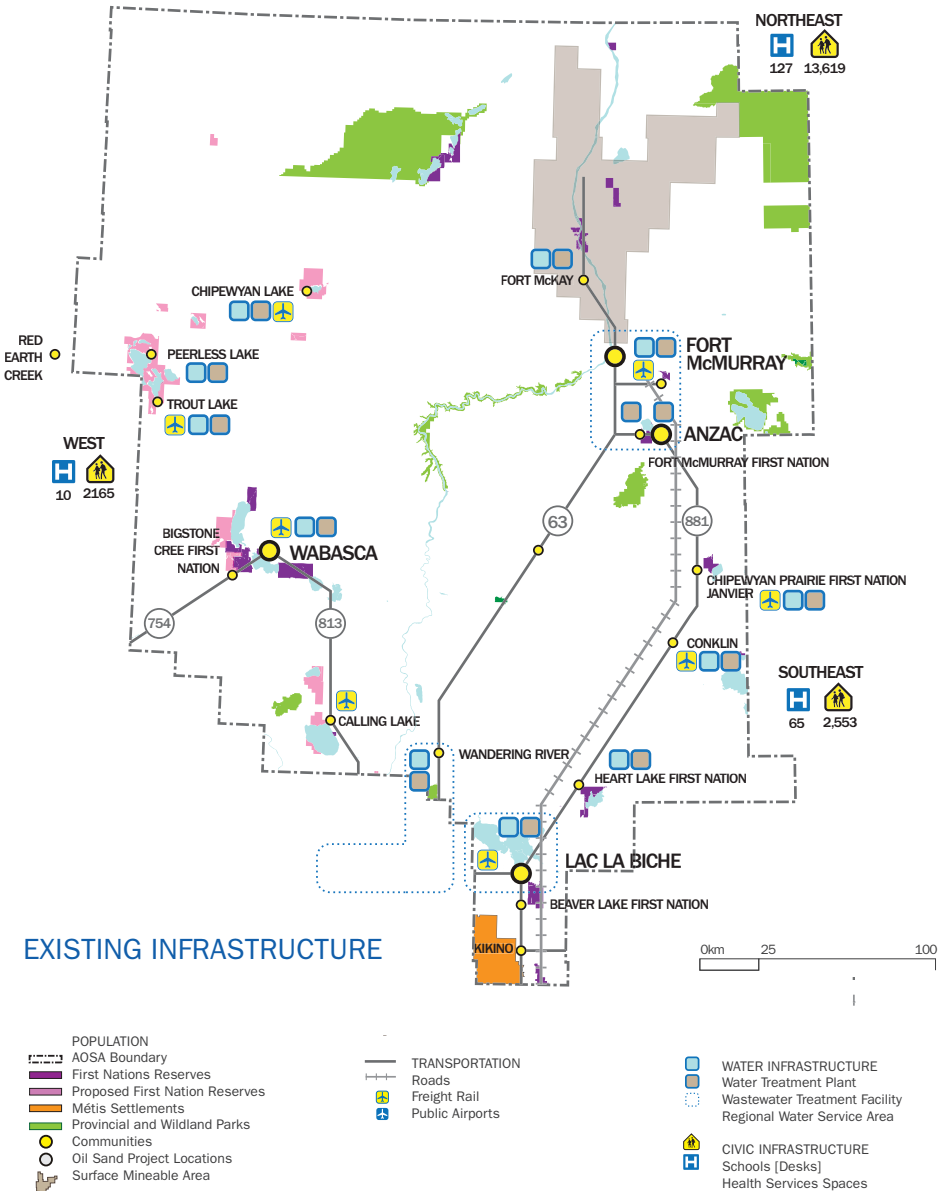


Figure 4.4.1 : Existing Employment, Infrastructure and Population Levels

EXISTING INFRASTRUCTURE



EXISTING POPULATION

EXISTING COMMUNITIES*	
Fort McMurray	71,900
Anzac	850
Conklin	400
Janvier	200
Fort McKay	850
Rest of RMWB	1,400
Hamlet of Lac La Biche	4,200
Rest of Lac La Biche	6,700

Wabasca-Demarais	2,900
Chipewyan Lake Area	100
Rest of MD of Opportunity	1,200
FIRST NATIONS / MÉTIS SETTLEMENTS**	
Beaver Lake	350
Whitefish (Goodfish) Lake	1,100
Bigstone Cree	2,600
Fort McMurray #468	250
Chipewyan Prairie	350

Heart Lake	200
Kikino Métis Settlement	1100
Peerless Trout	800
NEW GROWTH AREAS*	
New Urban Growth Node	0
Planned Camp Community 1	0
Planned Camp Community 2	0
TRADITIONAL WORK CAMPS*	12,200 ***
AOSA REGIONAL TOTAL*	109,700

** Based on population modeling undertaken by Applications Management for the Oil Sands Sustainable Development Secretariat, 2010.*
*** Based on applying an average annual growth rate of 2.25% applied to the 2006 Census population.*
**** Estimate does not include mobile workers engaged in pre-construction activities (e.g. resource delineation, access road building, site preparation).*

4.5 PHASE 1

Estimated Bitumen Production : 2.3 Million Barrels per Day
Estimated Regional Population : 129,300
Estimated Date : 2010 - 2014

In Phase 1 of the CRISP, oil sands production has increased to 2.3 million barrels per day and the region's population has grown to 129,300 people. Fort McMurray continues to be the dominant centre. Operations employment to the north grows significantly as well. To service this, a new urban growth node is introduced north of the Surface Mineable Area. This community could be a model of environmental sustainability, with energy and water efficient housing and abundant greenspace. Leadership in Energy and Environmental Design (LEED) standards for buildings and neighbourhoods can be used as a benchmark for design and construction, making this community one of the first LEED certified neighbourhoods in the country. Operations employment grows in the Conklin area as well, driving population growth in Lac La Biche, as well as the need for a new planned work camp community just south of Conklin.

Traditional work camp populations decline significantly as growth is directed to existing communities, the new urban growth node and the planned work camp community. To facilitate this, it would be expected that establishing traditional work camps in the vicinity of these new nodes would be restricted. The limited work camp population that still exists would be predominantly construction workers and workers at remote project sites.

Implementation of a number of infrastructure projects begins in this phase.

Transportation upgrades are focused on servicing the major growth areas. The planned twinning of the southern portion of Highway 63 is completed. Lane capacity is added on Highway 63 north of Fort McMurray to connect it and the new urban growth node to projects in the Surface Mineable Area. A ring road to the east of the city provides a bypass for over dimensional loads as well as improved access between the Fort McMurray airport and the Surface Mineable Area, and better access to projects east of the Athabasca River. Movement of over dimensional loads is also improved with upgrades to Highway 881 south of Conklin.

The beginning stages of a bus-based rapid transit system are also introduced. These would be focused on policy and operational measures, but also include any necessary infrastructure improvements in key locations as roads are built and upgraded. Enhanced bus service will allow for shorter commute times between Lac La Biche and the surrounding Aboriginal communities and project sites near Conklin, and between Fort McMurray, the new urban growth node and projects in the Surface Mineable Area. Shifting commuters from cars to transit reduces travel times and greenhouse gas emissions significantly, particularly with the use of green hybrid bus technology.

New water and wastewater treatment facilities would be established at the new urban growth node as well as the planned work camp community near Conklin, and upgrades would be required to the facilities in Lac La Biche, Wabasca and Anzac. Approximately 65 new health care services spaces and 4,900 new spaces at elementary and secondary schools would be required, primarily to service growth in Fort McMurray and at the new urban growth node.

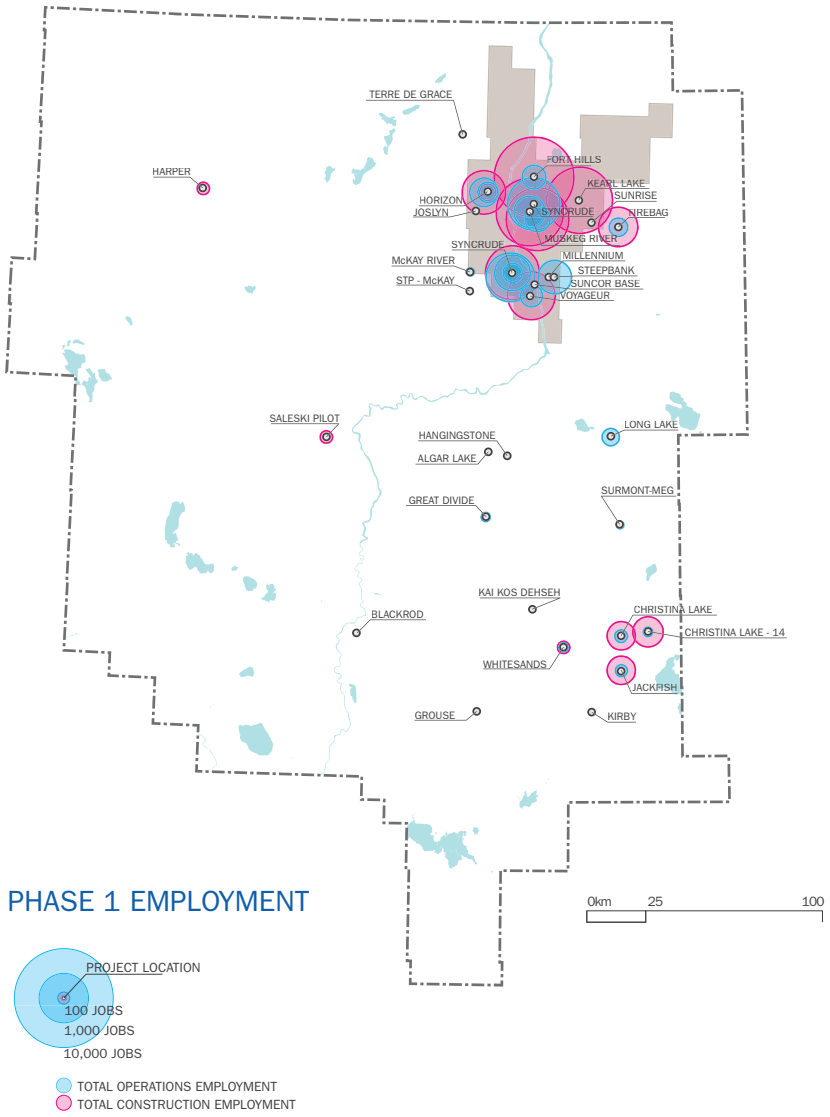
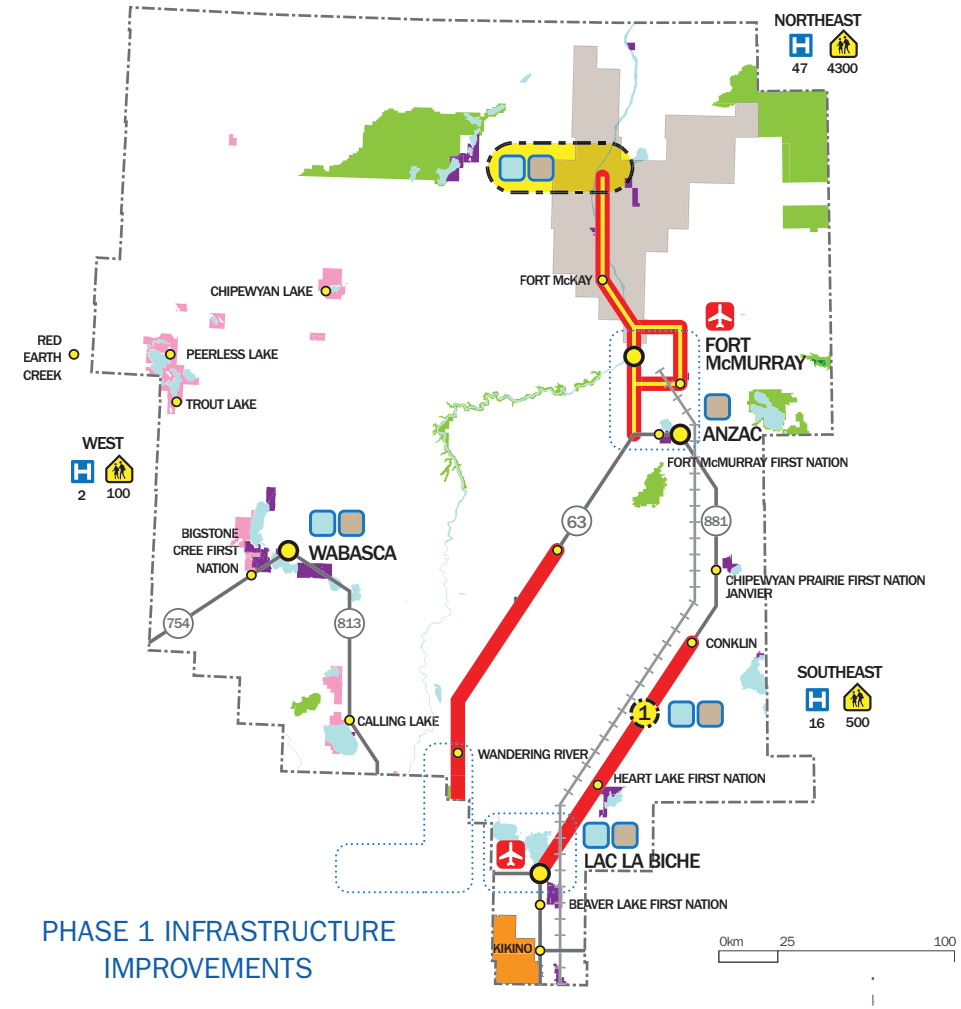


Figure 4.5.1 : Phase 1



PHASE 1 INFRASTRUCTURE IMPROVEMENTS

POPULATION
- AOSA Boundary
- Existing First Nations Reserves
- Proposed First Nation Reserves
- Métis Settlements
- Provincial and Wildland Parks
- Existing Communities
- Approximate Location of New Urban Growth Node
- Approximate Location of Planned Work Camp Community
- Surface Mineable Area

TRANSPORTATION
- Existing Roads
- New and Upgraded Roads
- Possible out-of-region connections
- New Bus-Based Rapid Transit
- Existing Freight Rail
- Possible Commuter/Freight Rail Extension
- New/Upgraded Airports

WATER INFRASTRUCTURE
- New/Upgraded Water Treatment Plant
- New/Upgraded Wastewater Treatment Facility
- Regional Water Service Area

CIVIC INFRASTRUCTURE
- Schools [Additional Desks]
- Additional Health Services Spaces

PHASE 1 ESTIMATED POPULATION

EXISTING COMMUNITIES*	
Fort McMurray	78,400
Anzac	2,400
Conklin	400
Janvier	200
Fort McKay	1,000
Rest of RMWB	1,500
Hamlet of Lac La Biche	6,600
Rest of Lac La Biche	6,900

Wabasca-Demarais	3,200
Chipewyan Lake Area	100
Rest of MD of Opportunity	1,300
FIRST NATIONS / MÉTIS SETTLEMENTS**	
Beaver Lake	400
Whitefish (Goodfish) Lake	1,200
Bigstone Cree	2,900
Fort McMurray #468	300
Chipewyan Prairie	350

Heart Lake	200
Kikino Métis Settlement	1,200
Peerless Trout	850
NEW GROWTH AREAS*	
New Urban Growth Node	11,400
Planned Camp Community 1	4,900
Planned Camp Community 2	0
TRADITIONAL WORK CAMPS*	3,600
AOSA REGIONAL TOTAL*	129,300

** Based on population modeling undertaken by Applications Management for the Oil Sands Sustainable Development Secretariat, 2010.*
*** Based on applying an average annual growth rate of 2.25% applied to the 2006 Census population.*

PHASE 1 HIGHLIGHTS OF INFRASTRUCTURE IMPROVEMENTS

GROWTH CENTRES	• Fort McMurray continues as the dominant centre in the region • Siting studies completed for new urban growth node north of Fort McMurray and new planned work camp community near Conklin, and population growth begins to occur in these areas
TRANSPORTATION	• Additional lane capacity on Highway 63 south of Mariana Lake and north of Fort McMurray • Upgrades to Highway 881 south of Conklin to improve movement of overdimensional loads • Eastern by-pass route around Fort McMurray • Implementation of bus-based rapid transit north of Fort McMurray and between Lac La Biche and project sites near Conklin • Upgrade Lac La Biche and Fort McMurray airports to accommodate increased demands
WATER / WASTEWATER	• New water and wastewater treatment facilities at the new urban growth node and planned work camp community near Conklin • Upgrades to treatment facilities in Lac La Biche, Wabasca and Anzac
EDUCATION	• Approximately 4,900 new spaces at elementary and secondary schools
HEALTH	• Approximately 65 new health care services spaces

4.6 PHASE 2

Estimated Bitumen Production : 3.7 Million Barrels per Day
Estimated Regional Population : 165,400
Estimated Date : 2015 - 2025

In Phase 2 of the CRISP, oil sands production has increased to 3.7 million barrels per day and the population of the region has grown in response to just over 165,000 people. The highest growth in operations employment has continued to be in the north part of the Surface Mineable Area, particularly east of the Athabasca River. Construction activity in the north is high as well. Employment growth has begun to level off in the Conklin and Anzac areas. Construction activity has started to emerge in the Wabasca area and siting studies are completed for a new planned work camp community in the area.

Population growth reflects this employment trend, with the highest rates of growth occurring in Fort McMurray, the new urban growth node, Anzac and Lac La Biche. The population of the planned work camp community south of Conklin declines as it transitions from a construction to an operations workforce.

Four major new transportation corridors are added in this phase. A new north-south corridor east of the Athabasca River connects both Fort McMurray and the new urban growth node to project sites east of the river. The ring road around Fort McMurray is completed with the addition of the link around the west side of the city. A new east-west corridor is established to connect Fort McMurray with communities to the west. Finally, Highway 813 is extended northwards to connect Wabasca and Bigstone Cree First Nation to the growing employment opportunities associated with oil sands projects in the west.

A new road connection is also provided to connect Fort McMurray and the new urban growth node to oil sands resource areas in Saskatchewan.

To reduce traffic on the region's roads and to shorten travel times, a new commuter rail service could be introduced between Fort McMurray and the new urban growth node, servicing oil sands projects in the Surface Mineable Area. Freight service could also be provided on this same line. Bus-based rapid transit measures would continue to be introduced as necessary, as new roads are built and existing roads are expanded.

A new airport is constructed servicing the new urban growth node and nearby oil sands projects.

To service growth in Fort McMurray and Anzac, upgrades would be required to the water treatment facility in Fort McMurray. New water and wastewater treatment facilities would be required at the planned work camp community north of Wabasca.

Approximately 82 new health care services spaces and 7,700 new spaces at elementary and secondary schools would be required.

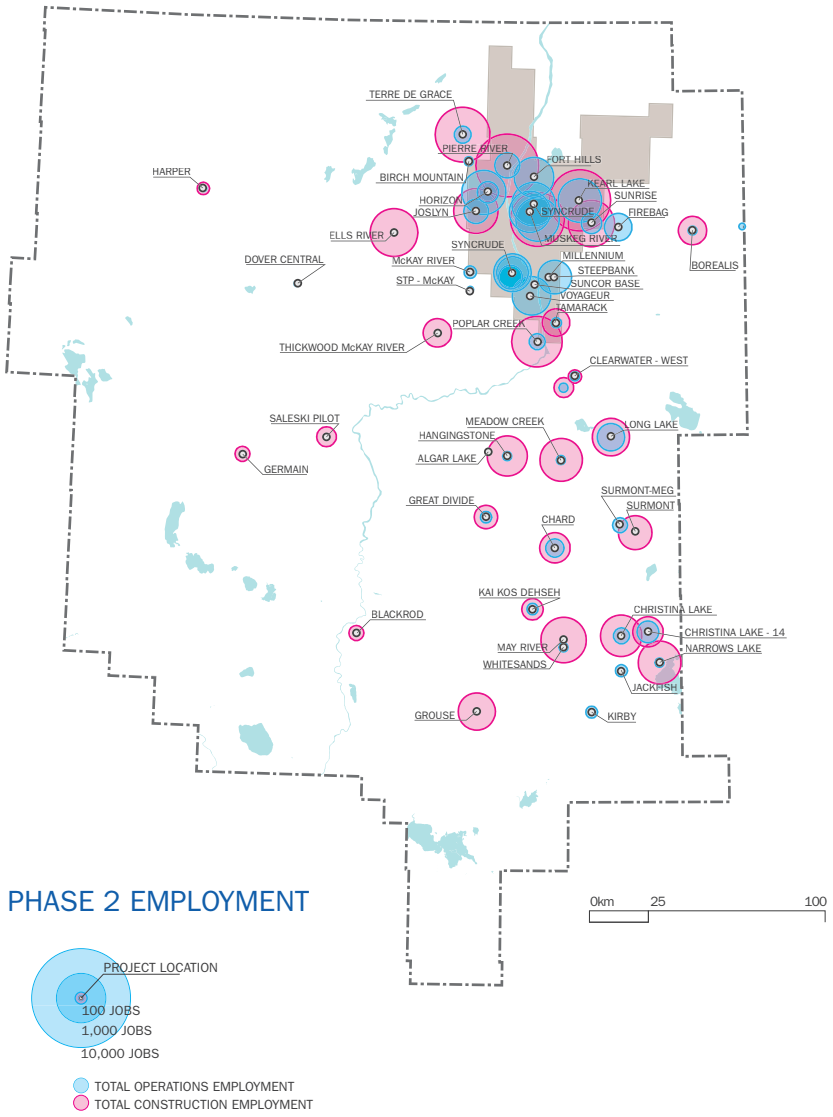
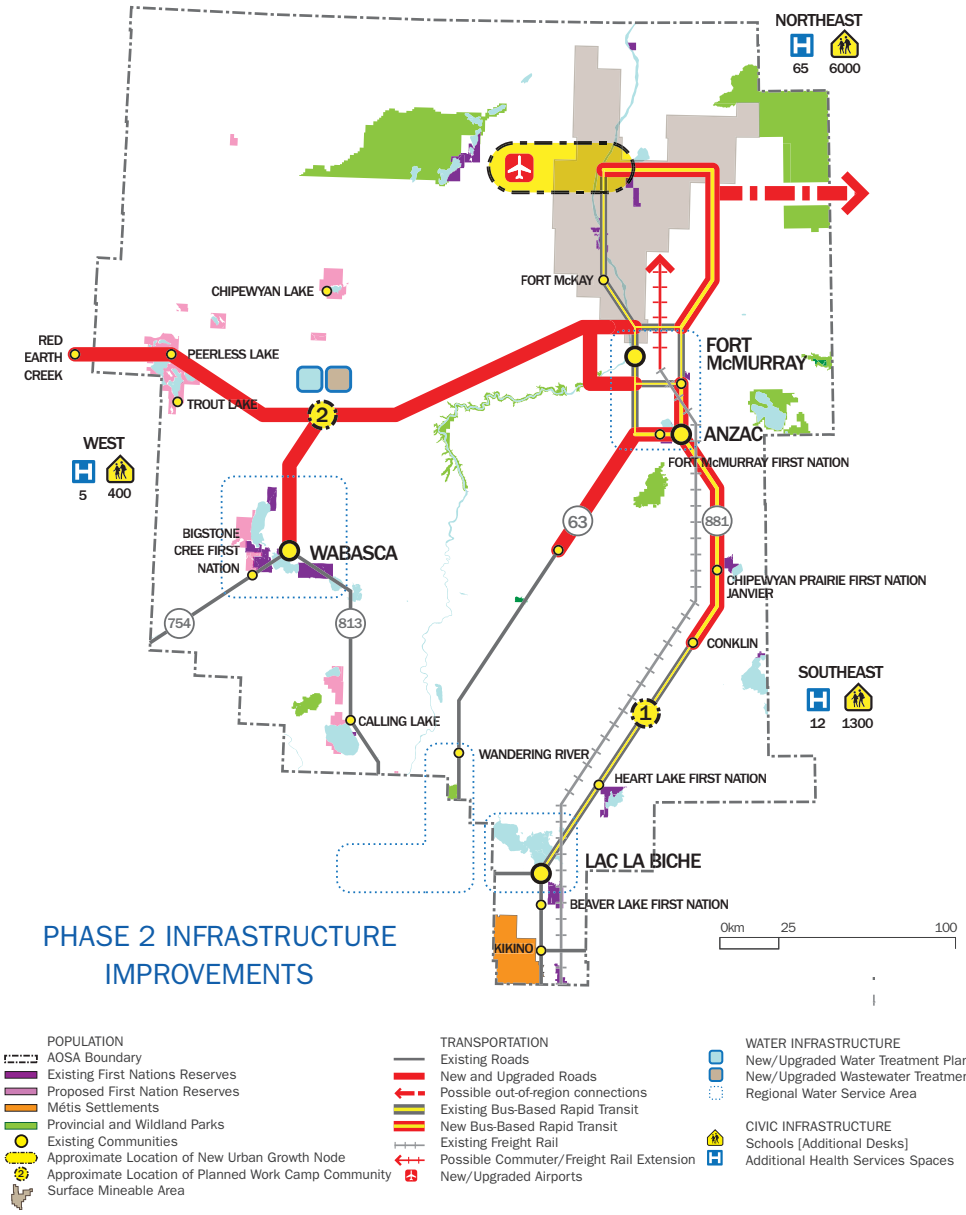


Figure 4.6.1 : Phase 2

PHASE 2 INFRASTRUCTURE IMPROVEMENTS



PHASE 2 ESTIMATED POPULATION

EXISTING COMMUNITIES*	
Fort McMurray	95,400
Anzac	6,300
Conklin	400
Janvier	200
Fort McKay	1,200
Rest of RMWB	1,600
Hamlet of Lac La Biche	11,300
Rest of Lac La Biche	7,300

Wabasca-Demarais	4,200
Chipewyan Lake Area	100
Rest of MD of Opportunity	1,600
FIRST NATIONS / MÉTIS SETTLEMENTS**	
Beaver Lake	500
Whitefish (Goodfish) Lake	1,600
Bigstone Cree	3,700
Fort McMurray #468	350
Chipewyan Prairie	500

Heart Lake	250
Kikino Métis Settlement	1,600
Peerless Trout	1,100
NEW GROWTH AREAS*	
New Urban Growth Node	19,600
Planned Camp Community 1	2,200
Planned Camp Community 2	1,400
TRADITIONAL WORK CAMPS*	3,000
AOSA REGIONAL TOTAL*	165,400

** Based on population modeling undertaken by Applications Management for the Oil Sands Sustainable Development Secretariat, 2010.*
*** Based on applying an average annual growth rate of 2.25% applied to the 2006 Census population.*

PHASE 2 HIGHLIGHTS OF INFRASTRUCTURE IMPROVEMENTS

GROWTH CENTRES	·Fort McMurray, Anzac, Lac La Biche and the new urban growth node continue to experience high rates of growth ·Siting studies are completed for a new planned work camp community north of Wabasca
TRANSPORTATION	·Extend the eastern highway route initiated in Phase 1 northward to access project sites east of the Athabasca River ·Completion of ring road around Fort McMurray ·New road corridor west from Fort McMurray to Wabasca and the Red Earth Creek Area ·Extension of Highway 813 north from Wabasca ·Establish an inter-provincial connection to Saskatchewan near Axe Lake ·Introduce commuter rail service in conjunction with new freight rail service between Fort McMurray and the new urban growth node, servicing oil sands projects in the Surface Mineable Area ·Extend bus-based rapid transit measures south and northeast of Fort McMurray ·New airport servicing the new urban growth node and nearby oil sands projects
WATER / WASTEWATER	·Upgrades to Fort McMurray water treatment plant ·New water and wastewater treatment facilities for the planned work camp community north of Wabasca
EDUCATION	·Approximately 7,700 new spaces at elementary and secondary schools
HEALTH	·Approximately 82 new health care services spaces

4.7 PHASE 3

Estimated Bitumen Production : 5.0 Million Barrels per Day
Estimated Regional Population : 199,200
Estimated Date : 2026 - 2034

In Phase 3 of the CRISP, oil sands production increases to just under 5 million barrels per day and the population of the region reaches nearly 200,000 people. The highest growth in operations employment continues to be in the north part of the Surface Mineable Area. Job growth, particularly in construction, is also high in the Wabasca area. Elsewhere, operations employment begins to level off.

Population growth continues to be strong in the urban growth node and also in the planned work camp community north of Wabasca, whereas growth in Anzac reflects a high period of construction activity in this time period.

Several new transportation linkages both within the AOSA and connecting the AOSA to other regions are provided during this phase. A new transportation corridor north of Fort McMurray and west of the Athabasca River provides relief for Highway 63, as well as enhanced access between Fort McMurray and the new urban growth node to projects in this area. An additional connection to the oil sands resources of Saskatchewan is introduced in this phase and a new all-season connection is provided north to the Fort Chipewyan area.

An expanded airport at Wabasca serves as the primary airport for the growing oil sands activity in the region.

Approximately 71 new health care services spaces and 7,200 new spaces at elementary and secondary schools would be required.

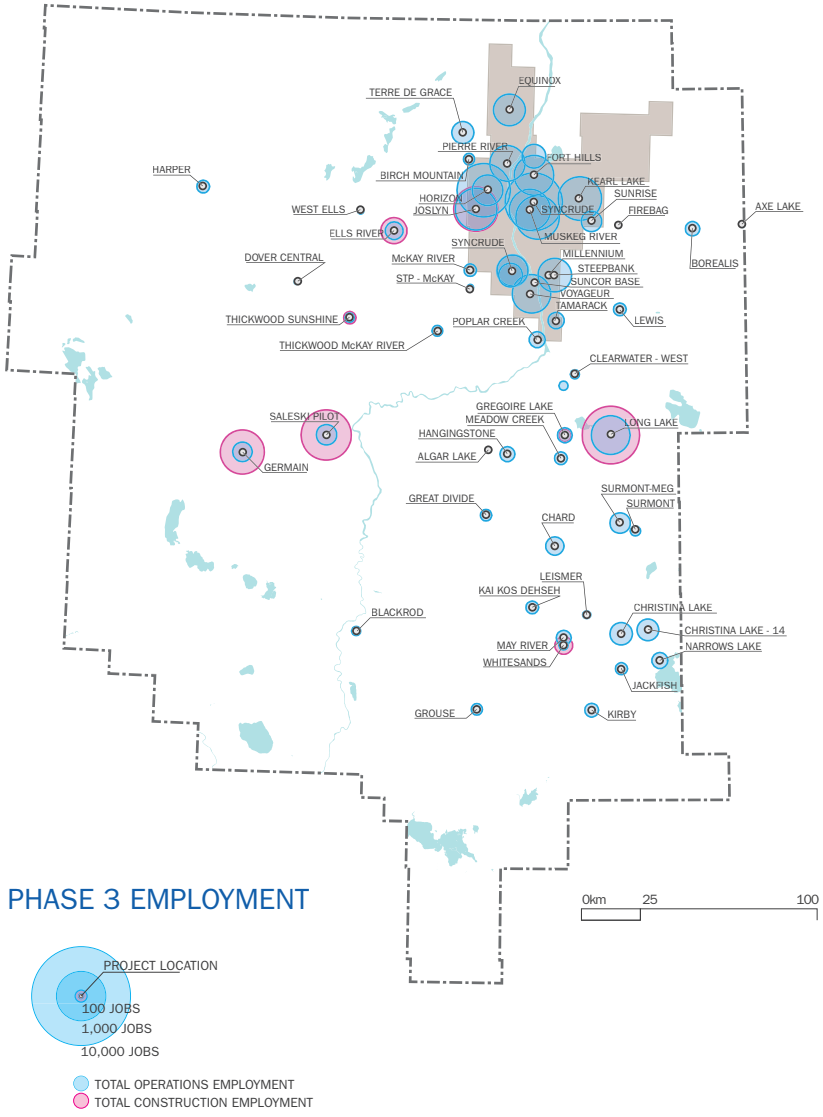
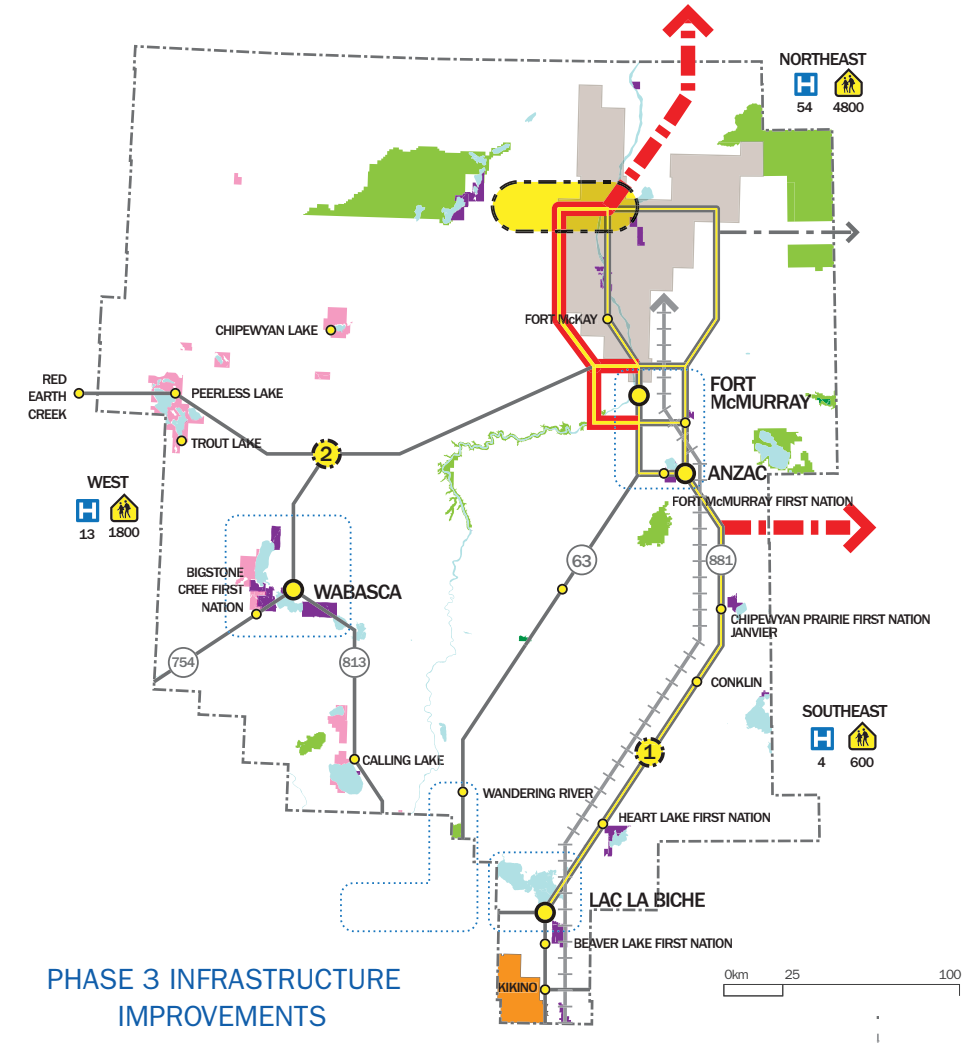


Figure 4.7.1 : Phase 3



PHASE 3 INFRASTRUCTURE IMPROVEMENTS

POPULATION
- AOSA Boundary
- Existing First Nations Reserves
- Proposed First Nation Reserves
- Métis Settlements
- Provincial and Wildland Parks
- Existing Communities
- Approximate Location of New Urban Growth Node
- Approximate Location of Planned Work Camp Community
- Surface Mineable Area

TRANSPORTATION
- Existing Roads
- New and Upgraded Roads
- Possible out-of-region connections
- Existing Bus-Based Rapid Transit
- New Bus-Based Rapid Transit
- Existing Freight Rail
- Possible Commuter/Freight Rail Extension
- New/Upgraded Airports

WATER INFRASTRUCTURE
- New/Upgraded Water Treatment Plant
- New/Upgraded Wastewater Treatment Facility
- Regional Water Service Area

CIVIC INFRASTRUCTURE
- Schools [Additional Desks]
- Additional Health Services Spaces

PHASE 3 ESTIMATED POPULATION

EXISTING COMMUNITIES*	
Fort McMurray	106,400
Anzac	9,400
Conklin	400
Janvier	200
Fort McKay	1,200
Rest of RMWB	1,600
Hamlet of Lac La Biche	13,700
Rest of Lac La Biche	7,500

Wabasca-Demarais	6,000
Chipewyan Lake Area	150
Rest of MD of Opportunity	1,750
FIRST NATIONS / MÉTIS SETTLEMENTS**	
Beaver Lake	600
Whitefish (Goodfish) Lake	1,900
Bigstone Cree	4,500
Fort McMurray #468	450
Chipewyan Prairie	550

Heart Lake	350
Kikino Métis Settlement	1,900
Peerless Trout	1,300
NEW GROWTH AREAS*	
New Urban Growth Node	29,500
Planned Camp Community 1	1,400
Planned Camp Community 2	5,000
TRADITIONAL WORK CAMPS*	3,400
AOSA REGIONAL TOTAL*	199,200

** Based on population modeling undertaken by Applications Management for the Oil Sands Sustainable Development Secretariat, 2010.*
*** Based on applying an average annual growth rate of 2.25% applied to the 2006 Census population.*

PHASE 3 HIGHLIGHTS OF INFRASTRUCTURE IMPROVEMENTS

GROWTH CENTRES	·Continue to accommodate growth in Fort McMurray, Anzac, Lac La Biche, Wabasca and the new urban growth node, as well as in the new planned work camp community north of Wabasca
TRANSPORTATION	·Establish a western highway route north of Fort McMurray to access project sites on the western edge of the Surface Mineable Area from both Fort McMurray and the new urban growth node ·Extend Highway 63 north to establish a provincial all-season road to Fort Chipewyan ·Establish an inter-provincial, all-season connection to Saskatchewan near Garson Lake ·Upgrade Wabasca's airport to service increased oil sands activity in the region
WATER / WASTEWATER	·Introduce and upgrade water and wastewater facilities as required
EDUCATION	·Approximately 7,200 new spaces at elementary and secondary schools
HEALTH	·Approximately 71 new health care services spaces

4.8 PHASE 4

Estimated Bitumen Production : 6.0 million Barrels per Day
Estimated Regional Population : 240,500
Estimated Date : 2035 - 2045

Phase 4 represents the full infrastructure requirement of the AOSA at 6.0 million barrels per day. This level corresponds to a population in the region of approximately 240,500.

Steady employment growth continues in the north part of the Surface Mineable Area. There is also growth in production in the carbonate bitumen reserves in the west, leading to employment growth in the Wabasca area, as well as further north in the Chipewyan Lake area.

Population growth continues to be strong in the urban growth node and in Wabasca. Growth in both of these communities is related to employment growth in the Chipewyan Lake area. A new transportation corridor connecting both Wabasca and the new urban growth node to these employment areas allows these communities to house the workforce for some of this project activity. Earlier investment in increased Aboriginal workforce participation initiatives will be particularly relevant in this phase as it is expected that growing Aboriginal communities at Bigstone Cree First Nation, the Slave Lake Area, Red Earth Creek Area and Fort Vermillion area would provide a significant proportion of the workforce in the western subregion of the AOSA, either through direct commuting, or as residents of the growing planned work camp community.

Approximately 92 new health care services spaces and 9,200 new spaces at elementary and secondary schools would be required.

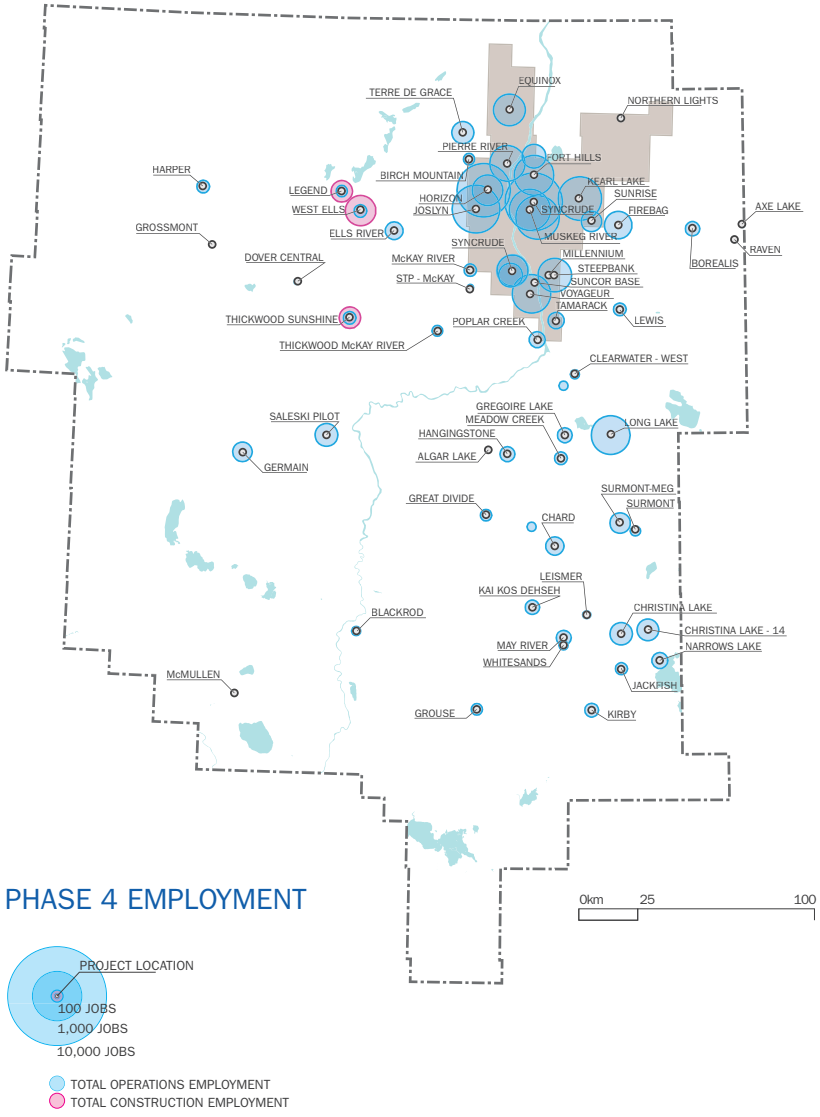
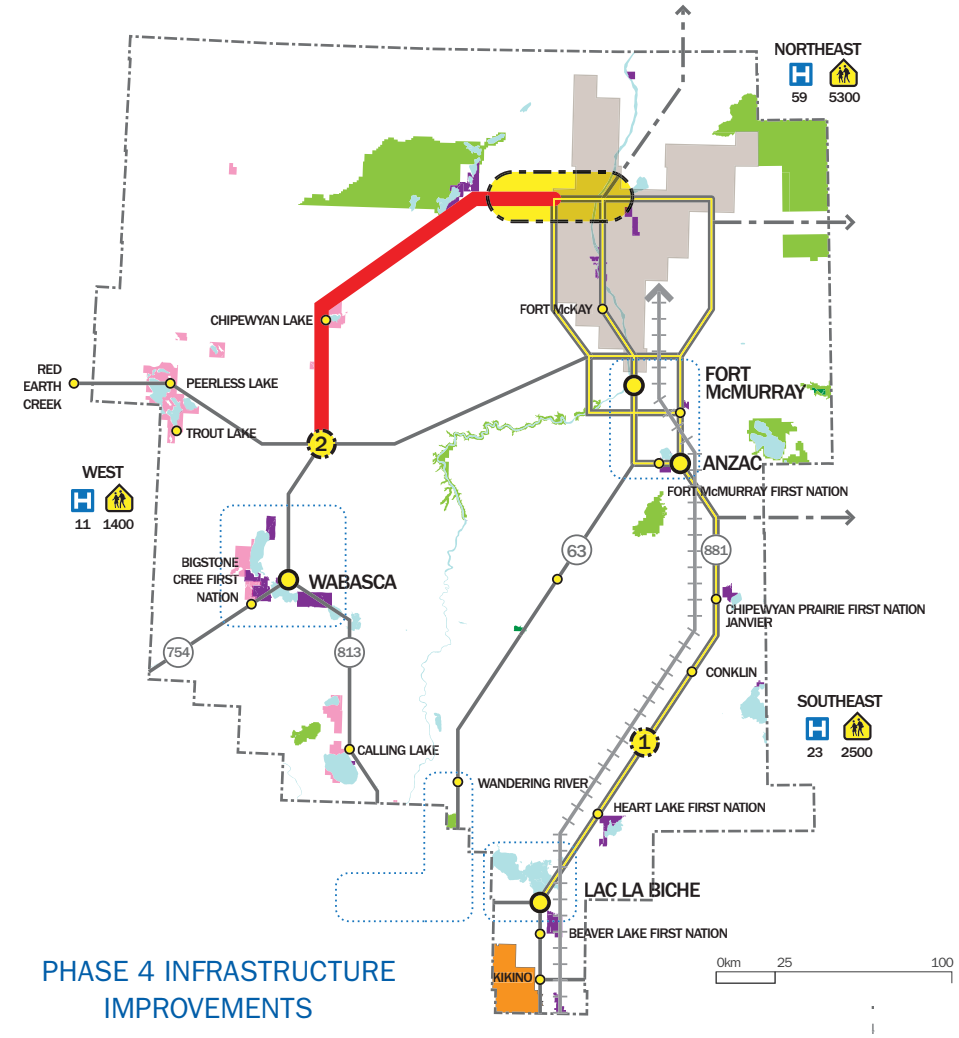


Figure 4.8.1 : Phase 4



PHASE 4 INFRASTRUCTURE IMPROVEMENTS

POPULATION
- AOSA Boundary
- Existing First Nations Reserves
- Proposed First Nation Reserves
- Métis Settlements
- Provincial and Wildland Parks
- Existing Communities
- Approximate Location of New Urban Growth Node
- Approximate Location of Planned Work Camp Community
- Surface Mineable Area

TRANSPORTATION
- Existing Roads
- New and Upgraded Roads
- Possible out-of-region connections
- Existing Bus-Based Rapid Transit
- New Bus-Based Rapid Transit
- Existing Freight Rail
- Possible Commuter/Freight Rail Extension
- New/Upgraded Airports

WATER INFRASTRUCTURE
- New/Upgraded Water Treatment Plant
- New/Upgraded Wastewater Treatment Facility
- Regional Water Service Area

CIVIC INFRASTRUCTURE
- Schools [Additional Desks]
- Additional Health Services Spaces

PHASE 4 ESTIMATED POPULATION

EXISTING COMMUNITIES*	
Fort McMurray	117,600
Anzac	12,200
Conklin	400
Janvier	200
Fort McKay	1,200
Rest of RMWB	1,600
Hamlet of Lac La Biche	16,200
Rest of Lac La Biche	7,800

Wabasca-Demarais	9,400
Chipewyan Lake Area	200
Rest of MD of Opportunity	1,900
FIRST NATIONS / MÉTIS SETTLEMENTS**	
Beaver Lake	750
Whitefish (Goodfish) Lake	2,500
Bigstone Cree	5,700
Fort McMurray #468	550
Chipewyan Prairie	750

Heart Lake	400
Kikino Métis Settlement	2,400
Peerless Trout	1,700
NEW GROWTH AREAS*	
New Urban Growth Node	42,300
Planned Camp Community 1	4,400
Planned Camp Community 2	5,800
TRADITIONAL WORK CAMPS*	4,500
AOSA REGIONAL TOTAL*	240,500

** Based on population modeling undertaken by Applications Management for the Oil Sands Sustainable Development Secretariat, 2010.*
*** Based on applying an average annual growth rate of 2.25% applied to the 2006 Census population.*

PHASE 4 HIGHLIGHTS OF INFRASTRUCTURE IMPROVEMENTS

GROWTH CENTRES	·Continue to accomodate growth in Fort McMurray, Anzac, Lac La Biche, Wabasca and the new planned work camp communities and urban growth node
TRANSPORTATION	·Establish a northwestern highway route to connect the new urban growth node and planned work camp community to project sites related to carbonate development in the northwest of the AOSA
WATER / WASTEWATER	·Introduce and upgrade water and wastewater facilities as required.
EDUCATION	·Approximately 9,200 new spaces at elementary and secondary schools
HEALTH	·Approximately 92 new health care services spaces

4.9 MULTI-USE CORRIDORS

Multi-use corridors represent an opportunity to consolidate a number of land uses within a defined area, thereby reducing land fragmentation and environmental impacts. Assembling multi-use corridors for the siting of future energy and transportation infrastructure is a key element of the *Provincial Energy Strategy* and will involve a process that will engage affected stakeholders. A similar objective is identified in the *Land-use Framework* (LUF), which calls for the development of a transportation and utility corridor strategy.

As oil sands production in the AOSA increases, so too will the demand for new utility corridors. Figure 4.9.2 below illustrates future point sources of new demand for bitumen, diluents, natural gas, electricity, and carbon transmission capacity at 6.0 million barrels per day of production.

Future natural gas and electricity demand will be highest north of Fort McMurray, supporting hot water for bitumen extraction from mineable oil sands and the upgrading of the bitumen to synthetic crude oil. Natural gas demand will also be high in the Conklin area where it is used to generate steam in SAGD operations. Many of these oil sands facilities will use cogeneration facilities and will be both users and producers of electricity. Either way, the region will need to be well connected to the electricity generating hub west of Edmonton.

Synthetic crude oil and bitumen is pipelined out of the region, while bitumen requires diluents to make it pipeline-ready, so there will be a need to expand existing pipeline systems to import diluent. The well-developed hydrocarbon industry cluster in the Edmonton region is the most likely terminus of oil pipelines and origin of diluent pipelines, suggesting one or more multi-use corridors for product and diluents pipelines between Edmonton and the AOSA.

There is also a growing interest in capturing carbon to meet greenhouse gas reduction objectives. The most likely candidates for carbon capture in the AOSA are the upgraders north and south of Fort McMurray, which are large facilities that produce relatively concentrated carbon streams. Opportunity for carbon capture at mine locations is more limited, as it is related to mobile equipment and therefore hard to capture. Similarly, carbon capture at in-situ facilities is possible, but limited in scope due to the relatively small size of individual in situ projects. The first storage facilities for carbon are only now being considered, but getting carbon from the AOSA upgraders to a future storage facility would also require new pipeline capacity.

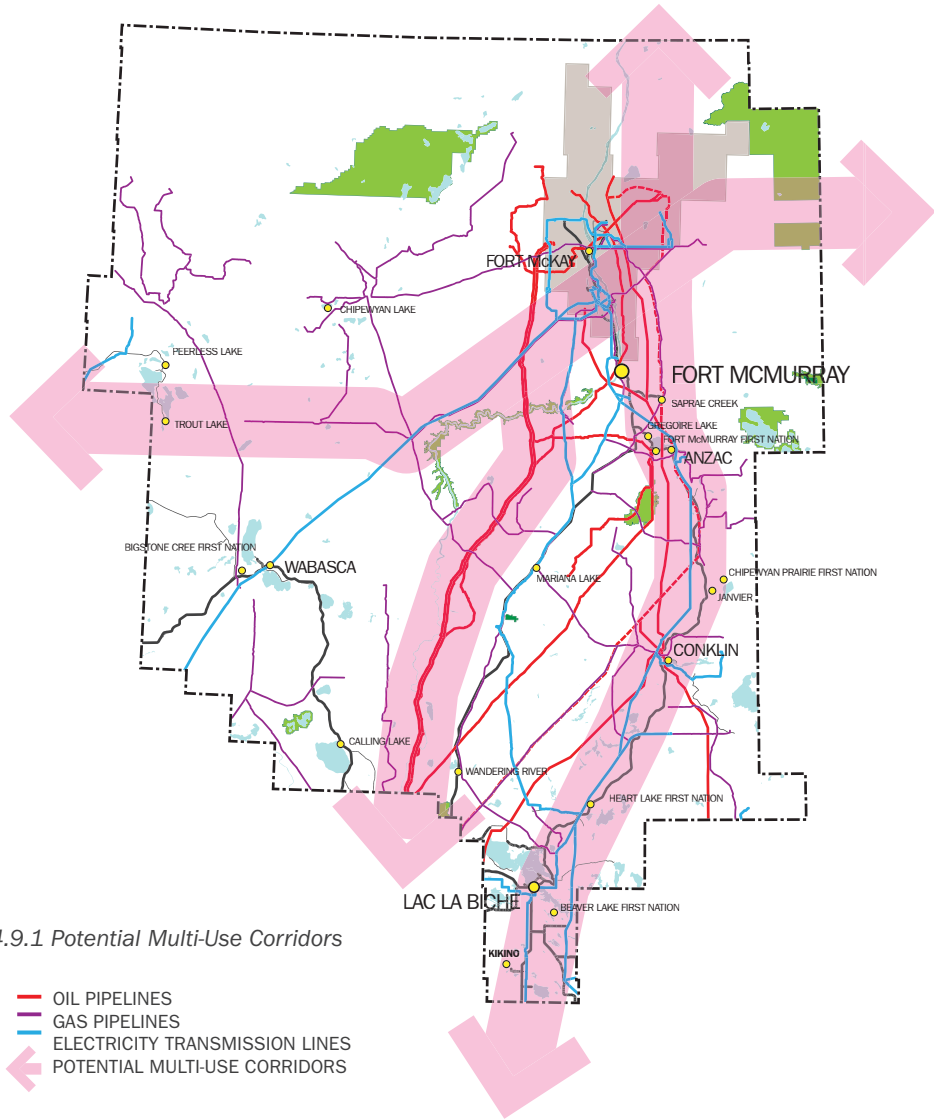
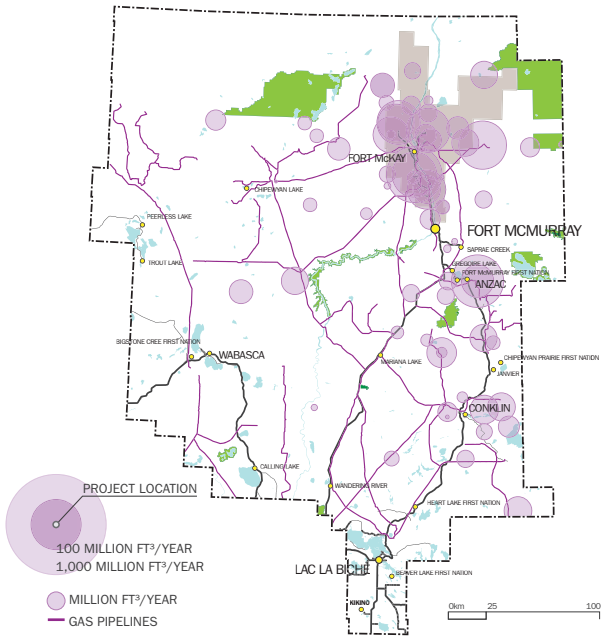


Figure 4.9.1 Potential Multi-Use Corridors

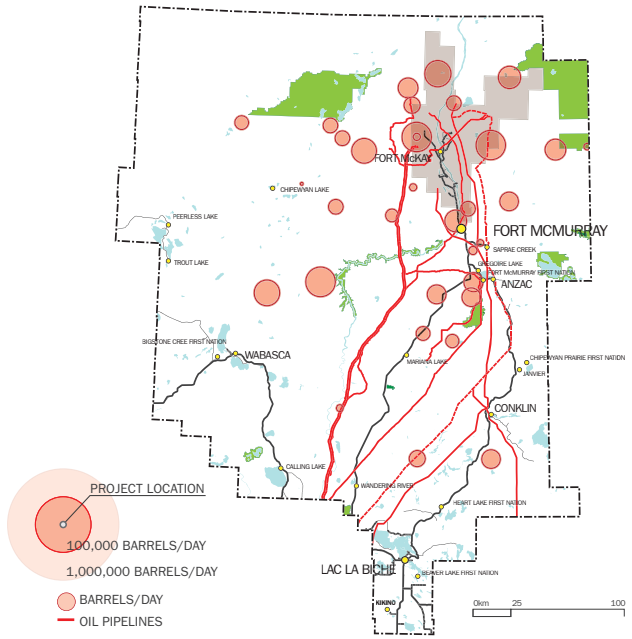
Considering these future new point sources along with the CRISP transportation network, a number of potential opportunities for multi-use corridors emerge, as illustrated in Figure 4.9.1. As detailed planning is undertaken for the linear infrastructure corridors contemplated by the CRISP, opportunities should be explored to minimize land fragmentation and environmental impact through the consolidation of these facilities into multi-use corridors.

Figure 4.9.2
Additional Utility Corridor Requirements
(6.0 million/bpd)

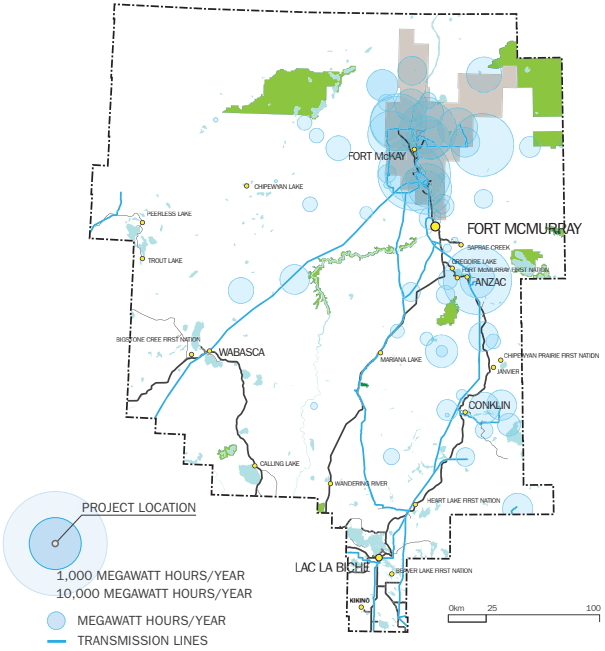
Source: Adapted from CERI data.



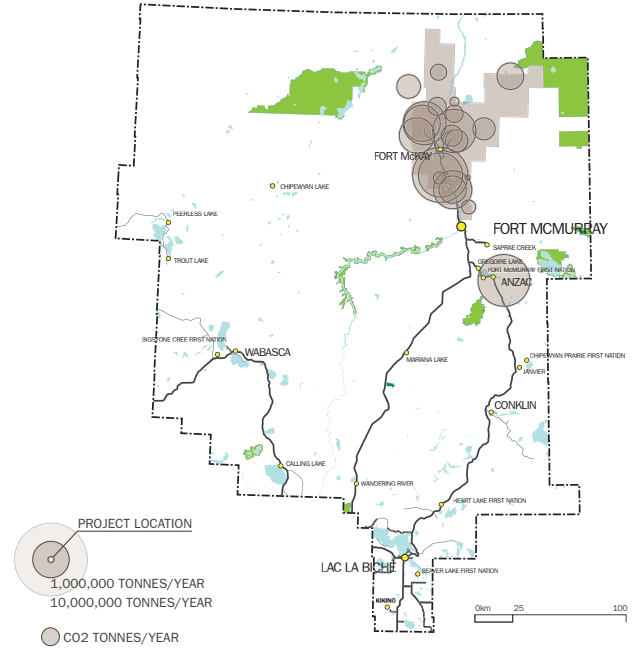
PROJECTED ADDITIONAL NATURAL GAS DEMAND (6.0 m/bpd)



PROJECTED DEMAND FOR ADDITIONAL OIL PIPELINE CAPACITY (6.0 m/bpd)



PROJECTED ADDITIONAL ELECTRICITY DEMAND (6.0 m/bpd)



POTENTIAL CARBON CAPTURE SOURCES (6.0 m/bpd)

5.1 ROLES AND RESPONSIBILITIES

Housing in Fort McMurray

The CRISP represents a different approach to planning for growth in the AOSA and provides a platform for strategic investment that will fully realize the wide range of benefits related to oil sands development. Successful implementation of the CRISP will require extensive coordination across the various departments of the Government of Alberta, as well as between the province, municipalities, the federal government and industry. The roles of these four key partners are described in more detail below.

It is also important to recognize that successful implementation will require the actions of much more than these four partners. Local businesses and entrepreneurs will be essential to the successful growth and development of both new and existing communities in the region. And, perhaps most importantly, the AOSA's residents, including First Nations and Métis populations, will have a critical role in shaping how the region grows and changes over time.

THE GOVERNMENT OF ALBERTA

The Government of Alberta will be the primary coordinating body for the implementation of the CRISP. This includes integrating the CRISP with regional planning efforts under the *Land-use Framework*. The Government of Alberta will also need to regularly bring together affected stakeholders to discuss implementation issues and address any challenges that arise. This includes the continued engagement of all communities in the AOSA, as well as First Nations consultation if potential growth and development could adversely impact the continued practice of treaty rights and traditional uses.

The Government of Alberta will also need to make sure that the CRISP's infrastructure requirements are reflected in the Government's capital planning process. This includes infrastructure projects that the Government of Alberta is directly responsible for, as well as projects that are funded in partnership with municipalities, industry and other parties. The analysis undertaken as part of the development of the CRISP will provide a good basis for informed capital funding decisions and it is expected that infrastructure needs in the AOSA will rank highly against other provincial priorities.

As the primary regulating authority in the region, the Government of Alberta and its agencies will need to ensure that regulatory application and approvals processes are aligned with and support the CRISP's priorities. The Energy Resources Conservation Board (ERCB)'s role will be particularly important in this regard. As part of the CRISP implementation process, consideration will need to be given to the appropriate status that the CRISP should have as part of the ERCB's decision-making process.

Most of the land that will be required for new growth and infrastructure will be Crown lands. As such, the Government will need to take the lead in identifying and protecting lands for the long-term infrastructure needs identified in the CRISP, as well as releasing Crown lands for both growth and infrastructure development in a timely fashion.

MUNICIPALITIES

Much of the detailed planning work associated with the CRISP implementation will be the responsibility of individual municipalities. Municipalities in the AOSA will need to ensure that their local planning efforts, such as Municipal

Development Plans and Area Structure Plans, align with and help to implement the CRISP. Similarly, municipal infrastructure planning for areas of municipal responsibility such as recreation facilities, local roads, and so on, will need to align with the overall vision of the CRISP. Municipalities will also be responsible for delivering a number of key services to meet the needs of the growing population, and to support the establishment of the planned work camp communities and the new urban growth node.

FEDERAL GOVERNMENT

The federal government has a role to play as both a funder and regulator. It will be a key contributor, along with provincial and municipal governments and industry, in finding creative funding solutions for CRISP implementation. Federal regulatory decisions, either through individual department approvals or joint provincial-federal panel reviews, also need to align to support the CRISP. Although it is outside of the scope of the CRISP, the federal government is also the key partner in ensuring that First Nations communities have in place the infrastructure and services that they will need to grow and thrive.

INDUSTRY

Coordination amongst the oil sands industry will be critical to the successful implementation of the CRISP. The CRISP represents a strategic vision that moves away from individual decision making toward coordinated, long-term planning, not just in the public sector but in the private sector as well.

Industry will need to ensure that their project planning is aligned with the CRISP. For example, industry roads and air facilities should be planned and developed to integrate with the broader CRISP transportation network, and to support the completion of that network. Industry will also play a central role in shifting more of its workers from private vehicles to transit. Worker accommodation should also be directed to support the growth areas identified in the CRISP, and industry should be engaged in the growth and development of the communities in the region as visible parts of the communities that they affect.

5.2 MONITORING FRAMEWORK

The CRISP addresses the infrastructure requirements for the AOSA up to a point where the region produces 6.0 million bpd of bitumen. The production path upon which the CRISP is based is described in Section 2.2, but the actual path that will take the region from the present levels of production to 6.0 million bpd could take many courses. Production levels and project start-up dates are particularly difficult to predict in the later years of the CRISP planning horizon; so the AOSA could reach 6.0 million bpd sooner or later than anticipated in the CRISP. Likewise, technologies and productivity levels are likely to change over time, resulting in changes to the employment patterns associated with oil sands production.

The CRISP Monitoring Framework is intended to track trends in bitumen production and population and employment growth over time so that any necessary adjustments can be made to the phasing and implementation of the CRISP. The feedback loop provided by the Monitoring Framework will ensure that the CRISP remains relevant under actual growth conditions. In other words, the CRISP will provide an outline of what infrastructure is needed and when it's needed, while the Monitoring Framework will ensure that initial estimates of the pace of infrastructure development are still valid.

In developing the CRISP Monitoring Framework, a number of important factors were considered. The Monitoring Framework recognizes that the oil sands industry operates in a global context. Currently, much of the product is shipped to the United States and product prices are set in response to global supply and demand. Much of the procurement of capital goods and engineering services is sourced globally as well. As a result, the Monitoring Framework will need to be sensitive to global variables that affect the AOSA's oil sands industry.

The Monitoring Framework must also carefully track industry trends on a regional scale. Individual oil sands projects are relatively slow to move from conception to construction to production. However, projects can and do change in response to economic, corporate and other factors. The CRISP Monitoring Framework will need to track new project information, such as start-up dates and anticipated production rates, which could affect population and employment growth in the region.

The flow of people into the region is another significant factor that must be accounted for by the Monitoring Framework. Population growth is

5.2 MONITORING FRAMEWORK (CONT'D)

typically driven by the relatively predictable demographic forces of fertility and mortality. These change, but slowly. Population growth in the AOSA, however, is dominated by in-migration in response to growth in the oil sands industry. This flow of new people to the region is volatile, especially the non-permanent population made up, in part, of mobile construction workers. The Statistics Canada Census does not recognize people who live and work in the AOSA but who maintain a primary residence elsewhere. Alberta's Official Population List reflects municipal census information which may include non-permanent populations, but which also may have data quality issues. These considerations make tracking and forecasting population growth in the AOSA uniquely complex.

With these factors in mind, Figures 5.2.1 and 5.2.2 present a series of indicators that can be used, in combination, for the CRISP Monitoring Framework. Figure 5.2.1 focuses on regional indicators of industry activity and population growth, while Figure 5.2.2 identifies global indicators that are likely to affect growth in the AOSA.

Other indicators are also possible, such as indicators regarding the state and usage of infrastructure (e.g. school capacity utilization, hospitalization rates, number of emergency visits, etc.) and environmental indicators (e.g. water withdrawals, air emissions, etc.). These infrastructure-specific indicators could be considered at the detailed planning and implementation level by the different Government of Alberta line departments as they prepare their detailed capital funding requests.

The CRISP indicators would need to be monitored annually to ensure that the CRISP is able to anticipate any changes that could affect infrastructure needs in the region, with enough advance warning to adapt and respond to the new conditions. Detailed analysis of these regional and global indicators as a whole will also be required to develop a complete picture of what is likely to happen in the future. No single indicator alone will be able to provide a reasonable projection of what may occur in the short, medium or long-term. The results of the annual monitoring will need to be shared with provincial government departments as well as municipalities in the AOSA.

In addition to keeping the CRISP up-to-date, the Monitoring Framework should track the accomplishments of the CRISP. The implementation of the CRISP would be enhanced by a periodic status report on what infrastructure projects have been completed, what is in the detailed planning stage, and what has received budget commitments and/or allocations.

Much of the information associated with these indicators already exists within Alberta government departments, including Alberta Energy, Alberta Transportation, and Alberta Employment and Immigration (Office of Statistics and Information). Some of the information, however, is not gathered routinely by government departments. Key among these is the list of projects, including construction and operation workforce requirements and realistic start dates. Maintaining such a list is likely to require cooperation between the province and industry, with industry providing and keeping current estimates of construction and operations workers and project scheduling. The list will need to be more than a compilation of industry information. The province will need to interpret and augment the industry information as things change, especially with regards to project timing.

Identifying how the data to address these indicators will be collected, and who will be responsible for collecting and maintaining the data, is an important action that will be necessary to the successful implementation of the CRISP.

Figure 5.2.1 : CRISP Monitoring Framework - Regional Indicators

INDICATOR	SOURCE	INTERPRETATION
Industry		
List of oil sands projects	Various sources: CERI, Oil Sands Developers Group (OSDG), Strategy West, Alberta Energy	An increase in the number of projects indicates vibrancy in the industry and the likelihood of higher bitumen output growth; project delays or cancellations suggest likely reduction in bitumen growth and associated population and infrastructure implications. The Canadian Association of Petroleum Producers (CAPP) produces an annual Canadian Crude Oil Forecast and Market Outlook, which can serve as a proxy indicator for the Monitoring Framework.
Oil sands project approval status	Energy Resources Conservation Board (ERCB), Alberta Utilities Commission, Alberta Environment, Alberta Sustainable Resource Development	Companies require provincial and, under certain circumstances, federal licenses to construct and operate oil sands facilities. The regulatory approval process starts with issuing a public disclosure document. Depending on the scope of the project, it may take between 2.5 and 5 years from the public disclosure to obtain the necessary licenses. It follows that the regulatory status of a project provides an early indication of the timing of its eventual population and infrastructure effects.
Bitumen production rates	Alberta Energy, ERCB	Actual bitumen production is less than the sum of production capacity of all projects in the AOSA due to scheduled and unscheduled maintenance as well as production challenges. Growth in actual bitumen production indicates the oil sands industry's level of success in obtaining the necessary licenses, constructing the facilities and bringing them on stream.
Population		
AOSA population count	Alberta Municipal Affairs Official Population List in combination with other relevant and timely population information	The Alberta Municipal Affairs Official Population List reflects the result of the most recent Statistics Canada Census or the most recent municipal census accepted by the Ministry. Municipalities tend to conduct their own censuses if population is increasing or if there is a substantial number of people in the region that are not counted by the federal census. This information needs to be considered alongside other relevant population data from various government, industry and private sources to ensure an up-to-date picture of population in the area is understood. Population growth in excess of the provincial average (2.04%) indicates a particular need for vigilance with respect to infrastructure needs. Population growth higher/lower than the growth assumed for the CRISP means advance/delay in infrastructure requirements.
Camp population counts	OSDG, Alberta Office of Statistics and Information (OSI)	Mobile workers in construction and operations camps can be a substantial portion of the total people in the region. High construction camp counts (>10,000) indicates near term permanent population pressures as the new projects come on stream.
Other		
Traffic Counts	Alberta Transportation, Industry	Traffic counts reflect actual road usage. Increases that are higher/lower than the growth assumed for the CRISP means advance/delay in road infrastructure requirements.

Figure 5.2.2 : CRISP Monitoring Framework - Global Indicators

INDICATOR	SOURCE	INTERPRETATION
West Texas Intermediate (WTI) (US$) Western Canada Select (WCS) (Can$)	Alberta Energy Sproule	Current and future expected oil prices are a key determinant of project economics. Oil sands projects are very capital intensive and require West Texas Intermediate (WTI) benchmark oil prices in excess of US $75-$85/barrel to make them economical. Oil sands projects produce bitumen, which sells at a discount from WTI. WCS is more reflective of the actual price received at the plant gate. WTI oil prices that are substantially above the US $75-$85/barrel will increase the likelihood that proposed projects will be built and that new projects will come forward. As a result, high oil prices are likely to lead to more rapid population growth and expedited need for new infrastructure. WTI oil prices that are substantially below the US $75-$85/barrel will likely delay project development, and thereby delay infrastructure needs.
Cost of construction	Cambridge Energy Research Associates up and downstream construction cost index	Oil sands projects are highly capital intensive. Strong cost price inflation between 2004 and 2008 contributed to project delays and cancellations in 2008/09. Re-emergence of cost inflation (in excess of 2-4 per cent per year) will reduce project economics unless WTI oil prices are in excess of US $75-$85/barrel. Other things being equal, cost inflation will reduce the number of projects that are actually built.
Cost of carbon	To be determined	Currently the cost of greenhouse gas emissions is low or zero. This is likely to change in the CRISP planning horizon and may add to the operating costs of industry. Other things being equal, high carbon costs (e.g. in excess of CAN $30/tonne of CO2) may affect project economics and slow the rate of bitumen output growth.

5.3 IMPLEMENTATION ACTIONS

Existing Water Treatment Facility in Wabasca-Demarais

Implementation of the CRISP will take place over the next several years, and will require ongoing collaboration and coordination amongst many partners, as described in Section 5.1. This includes close collaboration amongst provincial ministries, municipalities, industry and the federal government, as well as the actions of local businesses, stakeholders and residents.

In the immediate term, there are a number of immediate actions that will need to be undertaken to set the CRISP on a path toward successful implementation. These actions can be grouped according to three broad themes.

1. Continued Planning
2. Exploration of Alternative Financing Mechanisms
3. Coordinated Implementation

Figure 5.3.1 outlines each of these actions, the timeline in which they should be completed and the parties who should be involved in undertaking them. Figure 5.3.1 also highlights the outcomes that each of these actions are intended to achieve, in order to support the implementation of the CRISP.

Figure 5.3.1 : CRISP Priority Implementation Actions

ACTION	TIMELINE	LEAD PARTIES	INTENDED OUTCOME
1. Continued Planning			
a) Develop a coordinated regional Rapid Transit Strategy and industry transportation action plans for road, air and rail.	Fall 2011 Completion	Industry, Government of Alberta (Transportation, Sustainable Resource Development), Federal Government (Transport Canada, NAV Canada), transportation providers and impacted airport authorities/organizations.	·Greater sharing of industry roads to reduce development footprint and fragmentation. ·Ensure industry roads function as precursors to future highway corridors where appropriate. ·Increase the proportion of oil sands workers who travel to work by transit. ·Reduce requirements for private airfields. ·Identify preferred transit technologies (rail/bus) and routing. ·Identify necessary operational and policy measures to increase transit use in the region.
b) Complete siting, governance, financing, servicing, economic development and community sustainability studies for the planned work camp communities and the new urban growth node identified in the CRISP.	Fall 2011 Completion	Government of Alberta, impacted municipalities and industry.	·Identify appropriate locations for these centres. ·Identify appropriate governance, financing and servicing arrangements that address transportation, water, wastewater, schools and hospitals, as well as other forms of infrastructure and servicing that were outside of the scope of the CRISP. ·Ensure that the new urban growth node is a model of environmental sustainability. ·Ensure that establishment of the new urban growth node and planned work camp communities is achieved in time to accommodate expected growth. ·Limit traditional private work camps except within areas that are not serviced by an existing community, planned work camp community or new urban
c) Identify and protect corridors and complete functional planning and design studies for future infrastructure needs.	Fall 2011 Completion	Government of Alberta, impacted municipalities and industry.	·Ensure that lands are protected during licensing and approvals processes for future infrastructure needs such as roads ·Ensure that critical infrastructure projects are “shovel ready” so that the government can respond quickly when future growth triggers demands for new infrastructure
d) Undertake a labour workforce study in collaboration with First Nations and Métis populations to identify training needs and other mechanisms for increasing their participation in the oil sands industry.	2012 Completion	Government of Alberta, Industry, Federal Government (INAC), First Nations and Métis organizations.	·Maximize Aboriginal participation in the oil sands workforce and reduce need for in-migration of new workers

5.3 IMPLEMENTATION ACTIONS (CONT'D)

ACTION	TIMELINE	LEAD PARTIES	INTENDED OUTCOME
e) Ensure that functional planning and feasibility studies for municipal water and wastewater facilities as well as industry water and wastewater servicing plans identify opportunities for industrial use of municipal greywater.	Ongoing	Government of Alberta, impacted municipalities and industry.	• Reduce industry demand for raw water. • Identify potential revenues streams for municipalities.
2. Exploration of Alternative Financing Mechanisms			
a) Undertake discussions regarding creative funding and financing approaches to implement the CRISP.	Ongoing	Government of Alberta, impacted municipalities, Federal Government and industry.	• Ensure appropriate cost sharing amongst federal, provincial and municipal governments as well as private industry.
b) Integrate short-term infrastructure priorities, including existing capacity gaps and state-of-good-repair needs for existing infrastructure as well as the Phase One CRISP priorities into the Government of Alberta Capital Plan and 2012-2015 Budget.	Summer 2011 Completion	Government of Alberta (Oil Sands Sustainable Development Secretariat, Strategic Capital Planning – Alberta Treasury Board and program delivery Ministries).	• Secure funding for immediate CRISP priorities.
3. Coordinated Implementation			
a) Complete the Urban Development Reserve project to create a process for the timely release of Crown Land to support the CRISP's implementation.	October 2011 Completion	Government of Alberta (Oil Sands Sustainable Development Secretariat, Sustainable Resource Development, Alberta Energy, Justice and Municipal Affairs) and municipalities.	• Ensure that a process is in place for timely response to the need for new urban lands to accommodate growth.
b) Establish a formal mechanism to oversee the CRISP's implementation, and to ensure coordination with regional planning under the *Land-use Framework*.	December 2010 Completion	Government of Alberta (Oil Sands Sustainable Development Secretariat and impacted Ministries), impacted municipalities, Federal Government and industry.	• Promote ongoing collaboration between impacted parties. • Ensure that relevant plans and strategies are mutually reinforcing. • Ensure that day-to-day activities of all levels of government as well as industry continue to work towards the implementation of the CRISP, and do not work at cross purposes. • Ensure that monitoring takes place in accordance with the Monitoring Framework, and that the necessary data for the Monitoring Framework is collected.
c) Establish the CRISP Monitoring Framework and identify an appropriate body to oversee the monitoring and to compile the required data.	Spring 2011 Completion	Government of Alberta (Office of Statistics and Information, Oil Sands Sustainable Development Secretariat, Finance and Enterprise, and other affected ministries), industry and impacted municipalities.	• Ensure that the CRISP continues to remain relevant and responsive as conditions in the region change, and that required infrastructure is integrated into the capital planning process.
d) Integrate the CRISP into the Government of Alberta's application and approval processes.	Spring 2011 Completion	Government of Alberta (ERCB, Sustainable Resource Development, Energy, Environment).	• Ensure that current applications and future oil sands projects support directing growth to existing communities, planned work camp communities, and the new urban growth node rather than private work camps. • Ensure that industry infrastructure planning supports the implementation of the CRISP, particularly with respect to transportation planning. • Ensure that appropriate infrastructure as well as operational policies and procedures are in place to maximize transit use.

Road Upgrading in the AOSA

Recreational Area Near Fort McMurray

6.1 WHERE DO WE GO FROM HERE?

Growth in the AOSA is a reality. The CRISP is intended to ensure that the infrastructure requirements that will result from this growth are anticipated, planned for and built before growth happens. As such, the CRISP is both a short-term and a long-term plan. It represents the Government of Alberta's long-term vision and strategic plan for growth and infrastructure in the AOSA. The success of this plan will be measured in years as well as in decades.

To remain current and relevant, the CRISP will need to be reviewed on a regular basis and adapted as required, based on data collected through the Monitoring Framework. It will also need to be supported by a long-term commitment to implementation with an emphasis on collaboration and innovation. This includes ongoing coordination with the development of regional plans under the Government of Alberta's *Land-use Framework*. It will also include continued engagement and consultation with stakeholders including industry, municipalities, First Nations, Métis and the current and future residents of the region.

In the coming months, the Oil Sands Sustainable Development Secretariat will develop CRISPs for the province's two remaining oil sands regions – the Cold Lake Oil Sands Area and the Peace River Oil Sands Area.

Collectively, the CRISPs will lay out a vision for how infrastructure in Alberta's oil sands regions should be planned, so that the growth associated with the oil sands expansion contributes to a livable, sustainable and economically vibrant region that continues to thrive long into the future.

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