DACC

DRILLING AND COMPLETION COMMITTEE

IRP 20: Wellsite Design Spacing Recommendations

An Industry Recommended Practice (IRP)
for the Canadian Oil and Gas Industry

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CAODC
CANADIAN ASSOCIATION OF OILWELL DRILLING CONTRACTORS

CAPP
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This IRP is a set of best practices and guidelines compiled by knowledgeable and experienced industry and government personnel. It is intended to provide the operator with advice regarding the specific topic. It was developed under the auspices of the Drilling and Completions Committee (DACC).

The recommendations set out in this IRP are meant to allow flexibility and must be used in conjunction with competent technical judgment. It remains the responsibility of the user of this IRP to judge its suitability for a particular application.

If there is any inconsistency or conflict between any of the recommended practices contained in this IRP and the applicable legislative requirement, the legislative requirement shall prevail.

Every effort has been made to ensure the accuracy and reliability of the data and recommendations contained in this IRP. However, DACC, its subcommittees, and individual contributors make no representation, warranty, or guarantee in connection with the publication of the contents of any IRP recommendation, and hereby disclaim liability or responsibility for loss or damage resulting from the use of this IRP, or for any violation of any legislative requirements.

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20.0 Preface

20.0.1 Purpose

The Drilling and Completions Committee (DACC) is responsible for the development of recommended technical operating practices for the upstream oil and gas industry in the areas of drilling, completions and servicing of wells. The primary focus of the DACC is to develop technical recommended practices, where the objectives include safety, technical optimization, environmental performance and site productivity.

The purpose of IRP 20 is to provide guidance on practical and efficient wellsite design criteria with the objective of minimizing the overall lease and road footprints while maintaining regulatory spacing requirements. The IRP addresses Oil and Gas operations in Western Canada but the logic can be applied to other jurisdictions. Key focus was given, in order of applicability, to the following jurisdictions:

1. Alberta
2. British Columbia
3. Saskatchewan
4. Manitoba

20.0.2 Audience

The intended audience of this document includes the following:

- Oil and gas company representatives
- Construction, geology, geophysics, drilling, completions and production facilities personnel
- Industry training personnel
- Survey companies
- Local jurisdictional regulators

20.0.3 Scope and Limitations

This IRP contains the following information about wellsite size and spacing:

- Well spacing templates and figures
- Interprovincial spacing requirements
- Checklists to help ensure the wellsite is sized properly

The Wellsite Spacing Committee attempted to ensure consistency between provinces with regard to wellsite size while still maintaining the legal spacing required by the governing regulatory bodies. However, there are still discrepancies between provinces in some areas so spacing requirements relevant to the area of planned operations should be verified with the appropriate local jurisdictional regulator.

20.0.4 Revision Process

IRPs are developed by the Drilling and Completions Committee (DACC) with the involvement of both the upstream petroleum industry and relevant regulators. Enform acts as administrator and publisher.

Technical issues brought forward to the DACC, as well as scheduled review dates, can trigger a re-evaluation and review of this IRP in whole or in part. For details on the IRP creation and revisions process, visit the Enform website at www.enform.ca.

20.0.5 Sanction

The following organizations have sanctioned this document:

Canadian Association of Oilwell Drilling Contractors (CAODC)

Canadian Association of Petroleum Producers (CAPP)

Explorers & Producers Association of Canada (EPAC)

Petroleum Services Association of Canada (PSAC)

20.0.6 Acknowledgements

The following individuals helped develop this edition of IRP 20 through a subcommittee of DACC.

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20.0.7 Range of Obligations

Throughout this document the terms ‘must’, ‘shall’, ‘should’, ‘may’, and ‘can’ are used as indicated below:

Table 2. Range of Obligation

Term	Usage
Must	A specific or general regulatory and/or legal requirement that must be followed.
Shall	An accepted industry practice or provision that the reader is obliged to satisfy to comply with this IRP
Should	A recommendation or action that is advised
May	An option or action that is permissible within the limits of the IRP
Can	Possibility or capability

20.0.8 Background

The original IRP 20 wellsite spacing requirements and subsequent revisions were based on the design characteristics of the drilling, completion and operations technology in use at the time. The use of multistage hydraulic fracturing and drilling of multi-well pads was rare. In cases where historical multi-well pads did exist, spacing between the wells was often dictated by safety requirements arising from sour gas regulations. The changing

scope of work and evolving technologies have made significant changes in surface configuration to minimize overall footprint and consolidate more subsurface development onto a single larger pad.

The purpose of the latest release of IRP 20 is make the document more reflective of current practices for site design and clarify the criteria relevant to construction, drilling, completions and production that should influence site design.

The following are the basic premises for the IRP 20 recommendations:

1. The footprint must be sized in such a manner as to allow for safe and compliant operations inside the berm (working area) while considering potential environmental impacts. For example, significant amounts of equipment and numbers of workers are required to perform fracturing operations. In order to ensure the safety of those workers, the spacing between tanks, flares, drilling, completions and production equipment, site offices (shacks), surface improvements and piping must be sufficient to minimize incidents.
2. Sufficient sizing outside the berm is also required to facilitate the proper sloping of cut and fills and the correct storage of the top and subsoils. Piling soils steeply and close to standing timber impacts rooting zones and promotes erosion and therefore inhibits vegetation growth. Similarly, issues related to the proximity of adjacent vegetation are of concern as wildfires can result from improperly spaced equipment (flare stacks).
3. Site footprints need to be managed in a manner that will achieve the environmental outcomes defined under local jurisdictional regulations. When these outcomes are considered in robust and integrated up-front planning, the application is more likely to be complete and successful in the acquisition of surface dispositions, well licenses and facility licenses.

20.0.9 Symbols and Abbreviations

The symbols and abbreviations used in this IRP are noted below.

EAP Enhanced Approval Process

EFR Environmental Field Reports

FDP Field Development Plan

HSE Health, Safety and Environment

LiDAR Light Detection and Ranging

NGO Non-Government Organizations (e.g., Ducks Unlimited, WWF, Greenpeace, Sierra Club)

NTR Non-Technical Risk

ROW Right of Way

SAGD Steam Assisted Gravity Drainage

SimOps Simultaneous Operations

20.0.10 Definitions

The following terms are used in this document as defined below:

Berm A ridge of placed and compacted construction material (C horizon soil), generally 1 meter high, that defines the boundary of the working area and whose purpose is to contain any fluids or material from leaving the site.

Kit Surface equipment required for oil and gas operations.

Lease Boundary The total surveyed area of planned disturbance submitted for application.

Third Party Agreements The various agreements with external parties or stakeholders that are required for access to the site. Some examples include crossings, road use and encroachments.

Working Area The area required for planned operations (inside the berm).

Waterbody Lake or standing water, including muskegs.

Watercourse Any flowing body of water.

20.1 Introduction

A site construction project can end up being too large or too small for the intended and future operations if planning is not done effectively. An oversized site does not have a negative impact on the subsequent operations, but does involve additional and unnecessary construction (which increases cost) and land disturbance (which has an environmental impact and can aggravate regulators and key stakeholders). An undersized site often results in unsafe and non-compliant operations which puts the site personnel at risk. Safe site operation is the most critical consideration of wellsite design. Additionally, it is key to be aware of what phase your planned activities are in. Exploration (Wildcat) and Development (Harvest) are driven by different priorities that may not align. For example - Exploration requires less of a footprint than Development.

The size of the **working area** of a well site should be driven by the needs of the various functions that require access the site to execute specific tasks with specific kit and personnel. There are many key considerations that will be reviewed in this document, but “right sizing” based on specific needs is the focus for designing a safe, functional and compliant site.

The space outside the working area (within the **lease boundary**) is needed to meet recommended sloping for both stored soils and placed material. Best practice would be that the lease boundary is defined by the room required outside the working area and not driven by a predetermined standard dimension. Checklists in this document (see 20.3 Key Considerations) help identify considerations specific to each site but there are often special conditions either mandated by the regulator and/or stakeholder(s) that will restrict the amount of room allowed outside of the working area.

This IRP includes illustrations to assist in the calculation and planning for appropriate working area and define the lease boundary (see 20.5 Illustrations). Several examples are included to show specific wellsite concerns and how they can be addressed (see 20.6 Site Examples). Using the checklists, illustrations and examples along with company specific requirements can minimize the changes required after access and site construction is underway.

The size of a wellsite is heavily influenced by the various regulations that apply to the Oil and Gas Industry. Section 20.4 Interprovincial Spacing Requirements outlines the minimum spacing requirements for the various local jurisdictional regulators and associated regulation that identifies the specific standard for each province. Given the dynamic changes of these requirements, all spacing must be verified with the local jurisdictional regulator. Ensure provincial Standard Operating Procedures (SOPs) or expectations are clearly understood early on in the planning process. It may be

beneficial to meet directly with the appropriate regulator to present the plan, demonstrate the quality of the planning process and discuss how detailed aspects of the plan were used to determine the site size.

Site design is often overlooked, leading to a force-fit of operations within a prescribed lease boundary in order to accommodate the approved application. This can compromise safety and operational best practices. IRP 20 provides tools to help ensure complete and effective planning for the creation of the wellsite design using justifiable inputs to drive the final footprint needs. Ultimately, it is the applicant's responsibility to create a comprehensive and defendable site design.

20.2 Wellsite Planning

IRP The wellsite planning process should consult all of the internal and external stakeholders for the well during the appropriate planning phase(s).

The wellsite planning process is unique to each organization. Figure 1 shows a typical Wellsite Planning Process. Each stakeholder should be involved in the appropriate planning stage to ensure all the requirements are clearly understood.

Figure 1. Wellsite Planning Process

The following tables explain the phases and stakeholders from the above diagram.

Table 3. Wellsite Planning Phases

Phase	Activities
Subsurface Target	• Review the field development plan (see 20.3.1 Field Development Plan). • Identify the subsurface target location. • Include surface coordinates.
Paper Scout	• Pre-screen potential well pad locations prior to site visit. • Also known as “table top scout”. • Review key non-technical risk (NTR) considerations (see 20.3.2 Non-Technical Risk). • Review key drilling considerations (see 20.3.3 Drilling). • Review key completions considerations (see 20.3.4 Completions). • Review key pipeline and facility considerations (see 20.3.5 Pipelines and Facilities). • Review key production operations considerations (see 20.3.6 Production Operations).
Draft Design	• Determine the overall lease area and working area. • Review key non-technical risks considerations (see 20.3.2 Non-Technical Risk). • Review key drilling considerations (see 20.3.3 Drilling). • Review key completions considerations (see 20.3.4 Completions). • Review key pipeline and facility considerations (see 20.3.5 Pipelines and Facilities). • Review key production operations considerations (see 20.3.6 Production Operations). • Review key construction considerations (see 20.3.7 Construction). • Review topography (e.g., Light Detection and Ranging (LiDAR)).
Field Scout	• A “boots on the ground’ investigation of the location. • Record site specific conditions and constraints. • Verify constructability of the draft design.
Final Design	• Incorporate the field scout information into the design. • Issue design for internal stakeholder review.
Survey	• Survey the well pad location based on final design. • Prepare the survey plan. • Submit survey plan for internal geomatics and construction approval.
Application	• Submit completed application to regulator for surface approval and well license (see 20.7 Regulatory Application).

Table 4. Internal Stakeholder Input to Wellsite Planning

Stakeholder	Input
Geologists	• Subsurface target
Geomatics	• Survey (surface and subsurface coordinates)
NTR Department/Function	• Consultation • Regulatory information • Environmental considerations
Civil Earthworks	• Design • Scouting
Drilling	• Spacing • Footprint • Layout
Completions	• Spacing • Footprint • Layout
Pipelines & Facilities	• Spacing • Footprint • Layout
Operations/Production	• Spacing • Footprint • Layout
Surface Land	• Third party agreements • Application submission

Table 5. External Stakeholder Input to Wellsite Planning

Stakeholder	Input
Regulators	• Non-technical risks • Application review and approval
Landholders and/or leaseholders	• Land use constraints • Environmental impacts
Industry	• Third party agreements
Other Stakeholders E.g., First nations, grazing leases, recreational areas, historical sites	• Land use constraints • Environmental impacts

20.3 Key Considerations

There are several factors to consider when sizing the wellsite.

IRP The size of the working area of a wellsite should be driven by the needs of the various functions that require access the site to execute specific tasks with specific kit and personnel.

All of the following should be considered during wellsite planning.

20.3.1 Field Development Plan

The benefit of using a field development plan (FDP) is that a single site design for the field can be developed and then reused with only minor adjustments for site specific topographical and operational conditions. It is important to relate subsurface targets to this plan to avoid technical challenges with placement of surface locations.

IRP A field development plan should be created initially to drive overall area planning and associated infrastructure to help avoid ineffective site-by-site plans created in isolation and potentially causing more disturbance and impact on the landscape.

An integrated overall plan for field development can be a direct benefit to the operator, stakeholders and contractors with increased certainty on scale and timing of field operations and the associated impacts.

Field development plans should consider the following:

- Activity density and timing (subsurface and surface)
- Exploration or development
- Well type (e.g., gas, oil, mix, SAGD, other)
- Formation geology
- Drilling and completion operations
- Production schedule and type
- Growth plans
- Non-technical risks
- Area infrastructure (pipelines and roads)
- Competitor activity
- Simultaneous operations (SimOps)

20.3.2 Non-Technical Risk

There are several regulatory, environmental and human factors to consider in the wellsite plan. These considerations are generally the responsibility of the person, group or department of an organization responsible for assessing non-technical risk and should be considered during the paper scout, draft design, field scout and application phases of wellsite planning.

Table 6. Non-Technical Risks

Key Consideration	Details
Regulatory Requirements	• Municipal • Provincial (see 20.4 Interprovincial Spacing Requirements) • Federal • Application and Survey Requirements
Approval to Conduct Operations	• Internal • External
Waterbodies	• Setback requirements (based on type: Large Permanent, Small Permanent, Intermittent/Spring, Ephenmeral) • See Appendix B: EAP Wildlife Restrictions Table 16 Waterbodies
Watercourses	• Setback requirements (based on type: Lakes, Permanent Shallow Open Water Ponds, Semi-Permanent Ponds/Wetlands, Non-Permanent Seasonal Wetlands, Non-Permanent Temporary Wetlands, Fens, Bogs) • See Appendix B: EAP Wildlife Restrictions Table 15 Watercourses
Wildlife Zones	• Activity timing windows and restrictions (based restriction aspect: Caribou, Grizzly Bear, Key Wildlife Zones, Migratory Birds, Trumpeter Swans, Water Course Crossings). See Appendix B: EAP Wildlife Restrictions. • Road type restrictions (see Appendix B: EAP Wildlife Restrictions Table 17 Road Classes) • Access and pipeline route restrictions • Alternative access restrictions
3rd Party Infrastructure and Agreements	• Crossings • Road use • Encroachments
Historical Sensitivities	• First Nations • Historical disturbances or developments • Archaeological sites
Land Tenure	• Private • Public • Exiting disposition
Stakeholders	• Land use constraints • Environmental impacts
Non-Government Organizations (NGOs)	• Land use constraints • Environmental impacts

20.3.3 Drilling

There are several drilling factors to consider in the wellsite plan. These considerations are generally the responsibility of the drilling function of an organization and should be considered during the paper scout and draft design phases of wellsite planning.

Table 7. Drilling Considerations

Key Consideration	Details
Well Depth and Length	• Vertical • Horizontal • Slant
Rig Type	• Walking • Umbilical • Standard • Size
Rig Energy Source	• Diesel • Electric • Natural gas
Drilling Fluid System	• Oil based • Salt based • Bentonite based
Drilling Waste Disposal	• Remote sump • Landfill
Equipment Storage	• Size • Type
Flare Requirements	• Stack height • Distance to lease boundary • Equipment spacing (ignition source) • See Figure 3 AER D36, Appendix 6: Wellsite Spacing – Minimum Distance Requirements and BCOGC Well Completion, Maintenance and Abandonment Guideline Section 4.3.4 Recommended Spacing Distances • See Figure 5 Determining the Working Area Footprint • Refer to AER Directive 60: Upstream Petroleum Industry Flaring, Incinerating and Venting Section 7.8 Flare and Incinerator Spacing Requirements, BCOCG Flaring and Venting Reduction Guideline Section 7.3 Flare and Incinerator Spacing Requirements and BCOCG Well Drilling Guideline Section 3.1.2 Ancillary Equipment Requirements.
Subsurface Spacing Requirements	• Field development Plan (see 20.3.1 Field Development Plan) • Well head count
Drilling Sequence	• Batch Drills
Season of Drilling	• Weather implications • Road and site conditions
Escape Lines	• Positioning and footprint

Key Consideration	Details
Simultaneous Operations	• Positioning and offset distances • See IRP 3: In Situ Heavy Oil Operations Appendix A: Minimum Spacing Requirements for Multi-Operational Pads for a sample diagram
On-site Emergency Services (Fire and Medical)	• Positioning and footprint • Wind direction • Access and egress • Supplemental water source • Weather implications • Road and site conditions

20.3.4 Completions

There are several completions factors to consider in the wellsite plan. These considerations are generally the responsibility of the completions function of an organization and should be considered during the paper scout and draft design phases of wellsite planning.

Table 8. Completions Considerations

Key Consideration	Details
Fracturing Type	• Water • Acid • Sand
Number of stimulations	• Stages (amount of equipment and water requirements)
Fluid Supply	• Tank • Piped
Tank Type	• C Rings • 400 barrels
Tank Spacing Requirements	• Positioning and footprint
Completions timeframe	• Amount of equipment and water requirements
Equipment Type	• Positioning and footprint
Equipment Quantities	• Positioning and footprint
Flare Requirements	• Stack height • Distance to lease boundary • Equipment spacing (ignition source) • See Figure 3 AER D36, Appendix 6: Wellsite Spacing – Minimum Distance Requirements and BCOGC Well Completion, Maintenance and Abandonment Guideline Section 4.3.4 Recommended Spacing Distances • Refer to AER Directive 60: Upstream Petroleum Industry Flaring, Incinerating and Venting Section 7.8 Flare and Incinerator Spacing Requirements, BCOCG Flaring and Venting Reduction Guideline Section 7.3 Flare and Incinerator Spacing Requirements and BCOCG Well Drilling Guideline Section 3.1.2 Ancillary Equipment Requirements.

Key Consideration	Details
Guy Wires	• Positioning and space
Simultaneous Operations	• Positioning and offset distances • See IRP 3: In Situ Heavy Oil Operations Appendix A: Minimum Spacing Requirements for Multi-Operational Pads for a sample diagram
On-site Emergency Services (Fire and Medical)	• Positioning and footprint • Wind direction • Access and egress • Supplemental water source • Weather implications • Road and site conditions

20.3.5 Pipelines and Facilities

There are several pipeline and facility factors to consider in the wellsite plan. These considerations are generally the responsibility of the pipeline and facilities function of an organization and should be considered during the paper scout and draft design phases of wellsite planning.

Table 9. Pipeline and Facilities Considerations

Key Consideration	Details
Pipeline and Riser Entry Point	• Positioning and footprint
Pipeline Size and Type	• Pipe bends onsite or prefabricated • Reference field development plan
Facility Layout	• Positioning and footprint
Future Tie-ins	• Expansion • Above and below-ground piping

20.3.6 Production Operations

There are several production operations factors to consider in the wellsite plan. These considerations are generally the responsibility of the production operations function of an organization and should be considered during the paper scout and draft design phases of wellsite planning.

Table 10. Production Operations Considerations

Key Consideration	Details
Intensity of Operation	• Traffic type • Traffic frequency
Access Requirements	• Trucked production • Light Traffic
Nature of Equipment	• Permanent • Temporary

Key Consideration	Details
Flare Requirements	• See Figure 3 AER D36, Appendix 6: Wellsite Spacing – Minimum Distance Requirements and BCOGC Well Completion, Maintenance and Abandonment Guideline Section 4.3.4 Recommended Spacing Distances • Refer to AER Directive 60: Upstream Petroleum Industry Flaring, Incinerating and Venting Section 7.8 Flare and Incinerator Spacing Requirements, BCOCG Flaring and Venting Reduction Guideline Section 7.3 Flare and Incinerator Spacing Requirements and BCOCG Well Drilling Guideline Section 3.1.2 Ancillary Equipment Requirements.
Workovers	• Type • Frequency • Footprint
Simultaneous Operations	• Positioning and offset distances • See IRP 3: In Situ Heavy Oil Operations Appendix A: Minimum Spacing Requirements for Multi-Operational Pads for a sample diagram
On-site Emergency Services (Fire and Medical)	• Positioning and footprint • Wind direction • Access and egress • Supplemental water source • Weather implications • Road and site conditions

20.3.7 Construction

There are several construction factors to consider in the wellsite plan. These considerations are generally the responsibility of the civil earthworks or construction group function of an organization and should be considered during the paper scout, draft design, field scout and final design phases of wellsite planning.

Table 11. Construction Considerations

Key Consideration	Details
Surface Location	• Proximity • Third party agreements
Number of Wellheads	• Single • Multiple
Cellar	• Width • Depth
Working Area	• Inside the berm
Road Entry Point	• Single • Dual
Topography	• Rough • Flat

Key Consideration	Details
Aspect	• Slope facing • Sunny vs. shaded
Proximity to waterbodies and watercourses	• Watercourse setback requirements (based on type: Large Permanent, Small Permanent, Intermittent/Spring, Ephenmeral) • Waterbody setback requirements (based on type: Lakes, Permanent Shallow Open Water Ponds, Semi-Permanent Ponds/Wetlands, Non-Permanent Seasonal Wetlands, Non-Permanent Temporary Wetlands, Fens, Bogs) • See Appendix B: EAP Wildlife Restrictions Table 15 Watercourses and Table 16 Waterbodies
Containment Requirements	• Earthen berms • Manufactured containment
Site Drainage	• Surface grading • Ditches
Construction Material (Soil)	• C horizon on site (common/in place) • C horizon not on site (borrowed/imported)
Salvaged Soil	• Type (A and B horizons) • Amount
Salvaged Soil Storage	• On-site • Off-site
Brush Storage	• Disposal (burn or mulch)
Snow Storage	• Positioning and footprint
Water Storage	• Positioning and footprint
Campsites	• Proximity to location • Footprint
Log Decks	• Proximity to location • Quantity • Short-term vs. long-term
Additional Storage	• Lay down • Pipe • Fluid (water)
Staging Areas	• Emergency response planning • Traffic management

20.4 Interprovincial Spacing Requirements

The following sections discuss the spacing details by province and then a summary table that shows the spacing requirements for all provinces side-by-side.

20.4.1 British Columbia Spacing Regulations

BCOGC Drilling and Production Regulations (DPR) can be found on the Legislation page of the BCOGC website.

Section 4.3.4 Table 4.1 Recommended Spacing Distances from the BCOGC Well Completion, Maintenance and Abandonment Guideline shows a chart of spacing guidelines for British Columbia. That table is reproduced in Figure 2.

Figure 2. BC Recommened Spacing Distances

	WELLHEAD	FLARE OR INCINERATOR	BOILER, STEAM GENERATING EQUIPMENT, TEG*	PRODUCED WATER TANK	OTHER SOURCES OF IGNITABLE VAPOURS	SEPARATOR	FLAME TYPE EQUIPMENT	PRODUCED FLAMMABLE LIQUIDS CRUDE OIL & CONDENSATE TANKS
WELLHEAD		50	25	NS	NS	NS	25*	50
FLARE OR INCINERATOR	50		NS	25	25	25	25	50
BOILER, STEAM GENERATING EQUIPMENT, TEG*	25	NS		25	25	25	25	25
PRODUCED WATER TANK	NS	25	25		NS	NS	25*	NS
OTHER SOURCES OF IGNITABLE VAPOURS	NS	25	25	NS		NS	25*	NS
SEPARATOR	NS	25	25	NS	NS		25*	NS**
FLAME TYPE EQUIPMENT	25*	25	25	25*	25*	25*	T	25*
PRODUCED FLAMMABLE LIQUIDS CRUDE OIL & CONDENSATE TANKS	50	50	25	NS	NS	NS**	25*	

All distances are in metres (m).

* 25 m without flame arrestors, not specified with flame arrestors.

** Separator cannot be in the same dyke.

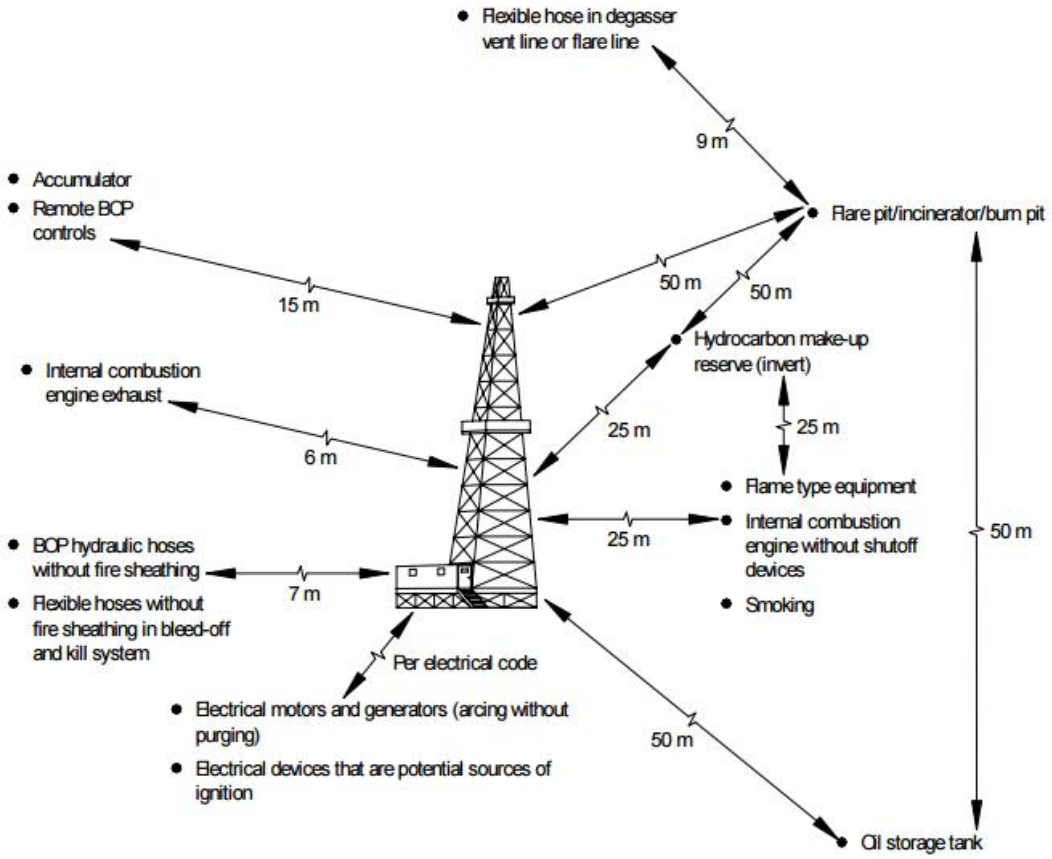
T Treaters should be at least 5 m (shell to shell) from other treaters.

20.4.2 Alberta Spacing Regulations

Alberta Oil and Gas Conservation Rules (OGCR) can be found on the Acts, Regulations and Rules page of the AER website. AER Directive 56: Energy Development and Application Schedules sections 5.9.9 (Setback Requirements) and 5.9.10 (Plot Plans and Spacing Requirements) provide links to the appropriate OGCR regulations and other AER Directives that are relevant to spacing (including Directive 36: Drilling Blowout Prevention Requirements and Procedures and Directive 60: Upstream Petroleum Industry Flaring, Incinerating and Venting).

Appendix 6: Wellsite Spacing – Minimum Distance Requirements from AER Directive 36: Drilling Blowout Prevention Requirements and Procedures shows expected spacing between equipment. That diagram is reproduced in Figure 3.

Figure 3. AER D36, Appendix 6: Wellsite Spacing – Minimum Distance Requirements



20.4.3 Saskatchewan Spacing Regulations

Saskatchewan spacing regulations are found in Saskatchewan Oil and Gas Conservation Regulations (OGCR) and can be found on the Government of Saskatchewan Website under the Publications Centre for the Queens Printer. Publication name is the Oil and Gas Conservation Regulations. There is no pictorial representation of the Saskatchewan spacing requirements in their regulations.

20.4.4 Manitoba Spacing Regulations

Manitoba Drilling and Production Regulations (DPR) can be found on the Government of Manitoba Website under the Manitoba Mineral Resources Acts and Regulations page.

Schedule C from the Manitoba Drilling and Production Regulation shows a table of minimum distance requirements. That table is reproduced in Figure 4.

Figure 4. Manitoba Minimum Distance Requirements

Schedule C
(Subsections 9(1), 75(4), and 85(1))
Table of Minimum Distance Requirements

Note: The distances in the table are expressed in metres.

To:	Well	Flame Type Equipment	Internal Combustion Engine		Flare Pit and Flare Stack	Oil Storage Tank	Surface Improvement Except Well, Flow Line, or Road Allowance	Water Covered Area	Road Allowance - Provincial or Municipal
			Air Shut Off	No Air Shut Off					
From:									
Well	5	25	5	10	25	25	75	100	45
BOP Manifold	3	--	--	--	15	--	--	--	45
BOP Remote Control	15	--	--	--	15	--	--	--	45
Flame-Type Equipment	25	--	--	--	25	25	--	--	45
Drilling Fluid Pit or Tank	5	25	--	--	10	--	75	100	45
Flare Pit and Flare Stack	25	25	5	10	--	--	100	100	45
Emergency Storage Pit	25	25	--	--	25	--	75	100	45
Service or Test Tank	25	25	5	10	25	--	75	100	45
Oil Storage Tank	25	25	5	10	25	--	75	100	45
Vented Salt Water tank	10	5	5	5	25	--	75	100	45
Process Vessel	25	--	--	--	25	25	75	100	45

20.4.5 NEB Spacing Regulations

NEB Information can be found in the following documents (but note that spacing requirements are not well defined):

- Canadian Oil and Gas Drilling and Production Regulations SOR/2009-315 can be found on the Consolidated Regulations page of the Justice Laws section of the Government of Canada Website.

- Canadian Oil and Gas Drilling and Production Regulations C.R.C. , c 1517 can be found on the Consolidated Regulations page of the Justice Laws section of the Government of Canada Website.
- NEB Canadian Oil and Gas Installations Regulations SOR/96-118 (COGIR) can be found on the Consolidated Regulations page of the Justice Laws section of the Government of Canada Website.

20.4.6 Summarized Interprovincial Spacing Requirements

Table 12 compares spacing requirements for Alberta, British Columbia, Saskatchewan and Manitoba as per the regulations noted in the above sections. H_2S release rates may increase setback spacing requirements and additional setback restrictions or exceptions may be dictated by other jurisdictional regulatory authorities.

Table 12. Interprovincial Spacing Requirements

	Alberta (AER)		British Columbia (BCOCG and WCB)		Saskatchewan (SIR)		Manitoba	
Required Distance	**Distance**	**Regulation**	**Distance**	**Regulation**	**Distance**	**Regulation**	**Distance**	**Regulation**
1. Wellhead to Lighted Aerodrome	Notify Transport Canada if within 5 km	OGCR 2.090						
2. Wellhead to Unlighted Aerodrome	Notify Transport Canada if within 1.6 km	OGCR 2.090						
3. Wellhead to Roads (surveyed or road allowances)	40 m	OGCR 2.110	40 m	DPR 5(2)	40 m	OGCR 25(1)b	45 m	DPR Schedule C
4. Wellhead to Surface Improvement	100 m	OGCR 2.110	100 m	DPR 5(2)	75 m	OGCR 25(1)a	75 m	DPR Schedule C
5. Wellhead to Coal Mine (active)	Abide by 6.150 – 6.190 if operating within distances specified in 6.140	OGCR 6.140 - 6.190	3 km	DPR 6			Within 1 km of subsurface mine subject to Mines and Minerals Act and Director of Mines Approval	DPR 9(4)

	Alberta (AER)		British Columbia (BCOCG and WCB)		Saskatchewan (SIR)		Manitoba	
Required Distance	**Distance**	**Regulation**	**Distance**	**Regulation**	**Distance**	**Regulation**	**Distance**	**Regulation**
6. Wellhead to Coal Mine (abandoned)	400 m	OGCR 6.140 - 6.190		DPR 6			Within 1 km of subsurface mine subject to Mines and Minerals Act and Director of Mines Approval	DPR 9(4)
7. Flare to production/rig tank	50 m	Directive 36 Appendix 6 Wellsite Spacing	50 m to crude oil and condensate 25 m to water tank, other source of ignitable vapours, separator, flame type equipment 25 m	Well Completion, Maintenance and Abandonment Guideline Section 4.3.4 Well Completion, Maintenance and Abandonment Guideline Section 4.3.4 WorkSafeBC OHS 23.7(2)	50 m	OGCR 51.7.a.i and iii	25 m	DPR Schedule C
8. Tank to Surface Improvement	60 m	OGCR 8.030 (4)						

	Alberta (AER)		British Columbia (BCOCG and WCB)		Saskatchewan (SIR)		Manitoba	
Required Distance	**Distance**	**Regulation**	**Distance**	**Regulation**	**Distance**	**Regulation**	**Distance**	**Regulation**
9. Flare to Surface Improvement	100 m 40 m	OGCR 8.080 (3) Directive 60 Section 7.8						
10. Wellhead to Flare	50 m 25 m	OGCR 8.080 (5) Directive 36 Appendix 6 Wellsite Spacing Directive 60 Section 7.8	50 m 25 m	Well Completion, Maintenance and Abandonment Guideline Section 4.3.4 WorkSafeBC OHS 23.7(2)	25 m	OGCR 51.7.a.ii	25 m	DPR Schedule C
11. Wellhead to Flare Tank	50 m 25 m	Directive 36 Appendix 6 Wellsite Spacing Directive 60 Section 7.8	50 m Isolation of Ignition sources required	Well Drilling Guideline Section 3.1.2 WorksafeBC OHS 23.44(1)			25 m	DPR Schedule C
12. Wellhead to Boiler			25 m	Well Completion, Maintenance and Abandonment Guideline Section 4.3.4	23 m before 2008 25 m after 2008	OGCR 63(2)	25 m	DPR Schedule C
13. Wellhead to Flame Type Equipment	25 m	OGCR 8.090 (4)						
14. Tank to Flame Type Equipment	25 m	OGCR 8.090 (4)						

	Alberta (AER)		British Columbia (BCOCG and WCB)		Saskatchewan (SIR)		Manitoba	
Required Distance	**Distance**	**Regulation**	**Distance**	**Regulation**	**Distance**	**Regulation**	**Distance**	**Regulation**
15. Wellhead to Wellsite Trailer			25 m	Well Completion, Maintenance and Abandonment Guideline Section 4.3.4	23 m before 2008 25 m after 2008	OGCR 63(2)	25 m	DPR Schedule C
16. Wellhead to Permanent Building	100 m	See #4 Wellhead to Surface Improvement	100 m	DPR 5(2)	100 m	OGCR 19(2)	75 m	DPR Schedule C
17. Wellhead to Public Facility	100 m	See #4 Wellhead to Surface Improvement	40 m	DPR 5(2)	100 m	OGCR 19(2)	75 m	DPR Schedule C
18. Wellhead to Military Installation	100 m	See #4 Wellhead to Surface Improvement	100 m	DPR 5(2)	100 m	OGCR 19(2)	75 m	DPR Schedule C
19. Wellhead to Power Line – Right of Way	100 m	See #4 Wellhead to Surface Improvement	40 m	DPR 5(2)	100 m	OGCR 19(2)	75 m	DPR Schedule C
20. Wellhead to Railway – Right of Way	100 m	See #4 Wellhead to Surface Improvement	40 m	DPR 5(2)	100 m	OGCR 19(2)	75 m	DPR Schedule C
21. Wellhead to Pipeline – Right of Way	100 m	See #4 Wellhead to Surface Improvement	40 m	DPR 5(2)	100 m	OGCR 19(2)	75 m	DPR Schedule C

	Alberta (AER)		British Columbia (BCOCG and WCB)		Saskatchewan (SIR)		Manitoba	
Required Distance	**Distance**	**Regulation**	**Distance**	**Regulation**	**Distance**	**Regulation**	**Distance**	**Regulation**
22. Wellhead to School/Church	100 m	See #4 Wellhead to Surface Improvement	1 km	BC Government News Release	100 m	OGCR 19(2)	75 m	DPR Schedule C
23. Wellhead to Water Well			200 m	DPR 5(3)	100 m	OGCR 19(2)		
24. Well to Gasoline/Liquid Fuel Tank			25 m	DPR 45(2)			25 m	DPR Schedule C
25. Earthen pit for liquid waste storage to the natural boundary of a waterbody			100 m	DPR 51(3)			100 m	DPR Schedule C
26. Earthen pit for liquid waste storage to a water supply well			200 m	DPR 51(3)				
27. Flares and incinerators to any public road, public utility, building, installation, works, place of public concourse or reservation for national defense			80 m	DPR 47(c)			100 M	DPR Schedule C
28. Storage equipment of explosives of every kind and description (in properly constructed magazines) to any place where any drilling, production or processing operation is being undertaken			150 m	DPR 47(g)				

	Alberta (AER)		British Columbia (BCOCG and WCB)		Saskatchewan (SIR)		Manitoba	
Required Distance	**Distance**	**Regulation**	**Distance**	**Regulation**	**Distance**	**Regulation**	**Distance**	**Regulation**
29. Petroleum storage tanks and production equipment for a well or facility to any right of way, easement, road allowance, public utility, building, installation, works, place of public concourse or reservation for national defense			25m	DPR 45(2)				

20.5 Illustrations

The illustrations in this section are meant to aid in wellsite planning. The step by step illustrations visually demonstrate the footprint required based on regulatory spacing requirements and the key considerations outlined in this IRP (see 20.3 Key Considerations).

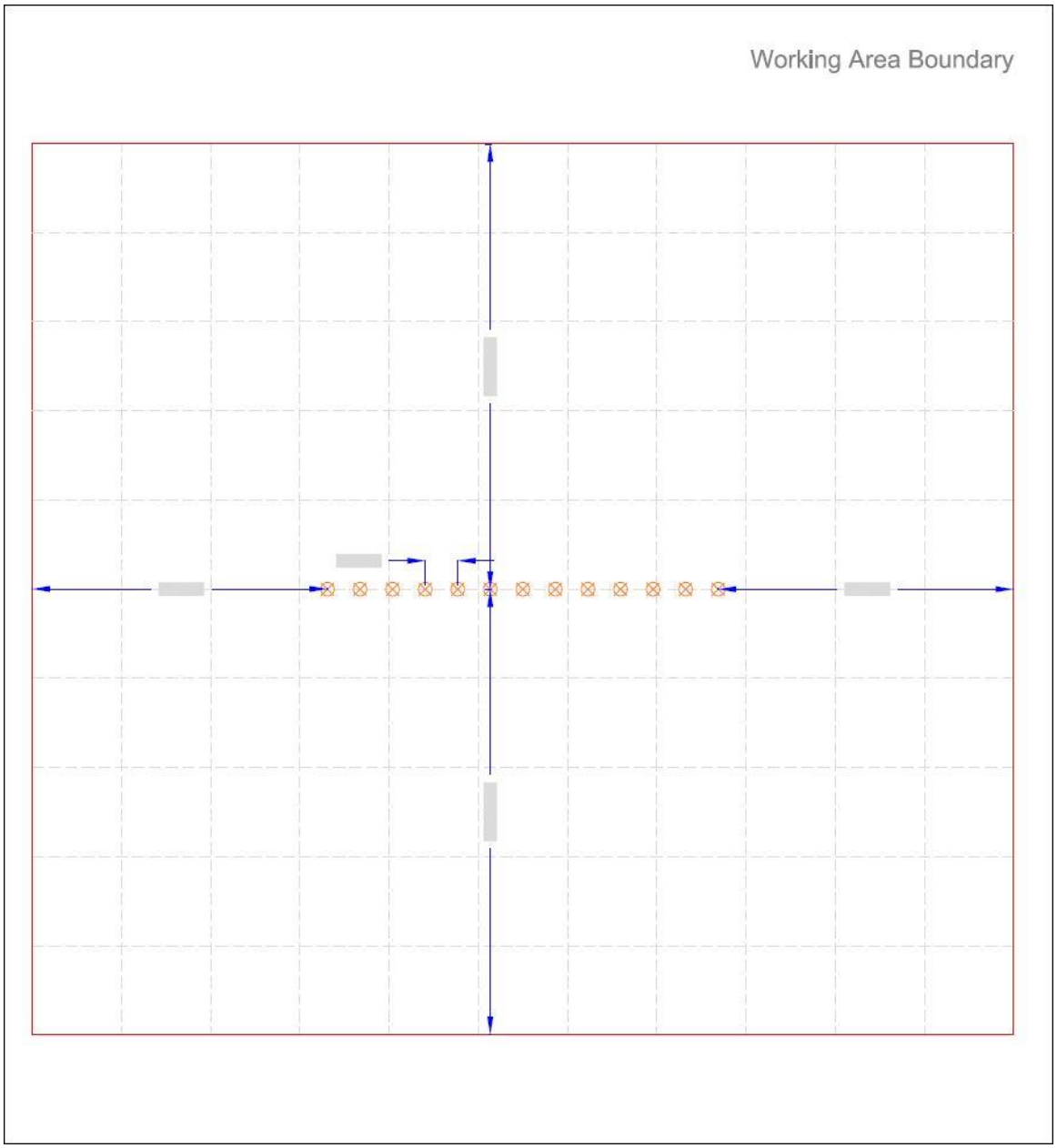
The working area can be calculated using the basic illustration of measurements in 20.4 Interprovincial Spacing Requirements and Figure 5. After the working area is established the room outside the working area to the lease boundary can be determined.

Figures 5 through 14 were developed by Shell Canada Ltd. for IRP 20 as samples to show the logical process to use when designing a site's size. They should not be considered definitive wellsite diagrams.

IRP **Wellsite design shall consider all users and equipment, both temporary and permanent, that the site must support through its life cycle.**

The following illustration shows the five dimensions that must be resolved when establishing the working area as per the wellsite planning process. Wellhead spacing, direction and count are the initial considerations for the calculation of the working area.

Figure 5. Determining the Working Area Footprint

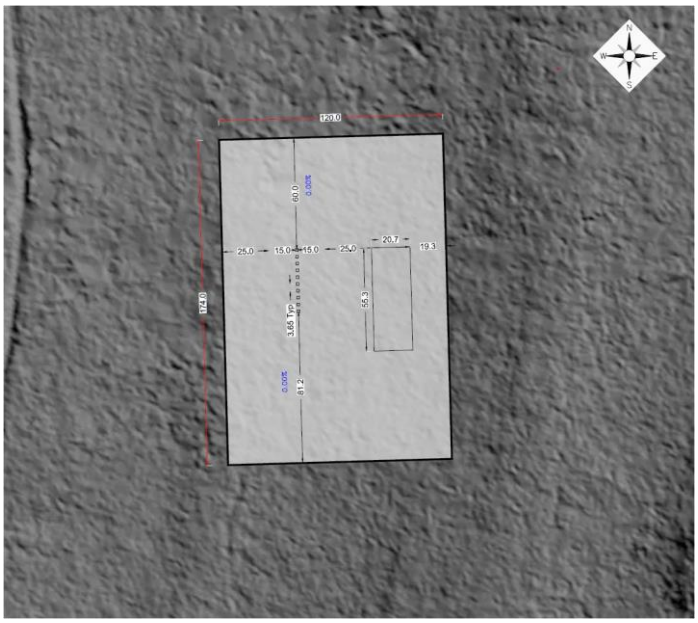


The following are illustrations of a typical footprint development demonstrating the impacts of the key planning considerations (see 20.3 Key Considerations) using the working area footprint shown in Figure 5.

Figures 6 and 7 show the working area overlaid on imagery and topography.

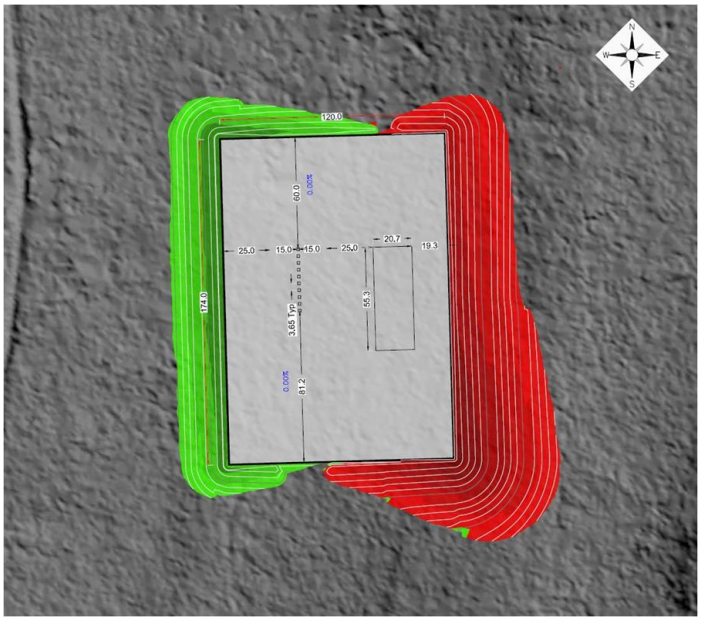
Figure 6. Working Area Overlaid on Imagery

Figure 7. Working Area Overlaid on Topography



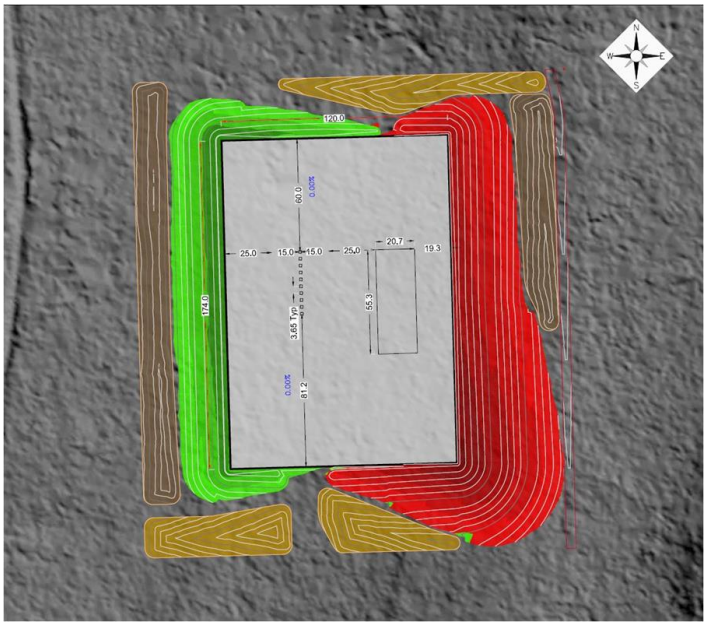
In Figure 8 the cut and fill slopes have been determined.

Figure 8. Cut and Fill Slopes



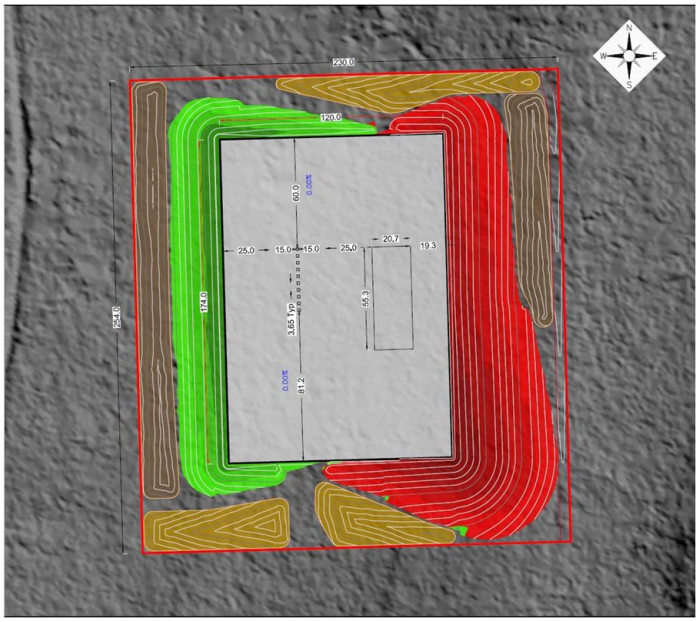
In Figure 9 the topsoil and sub-soil stockpiles have been determined.

Figure 9. Topsoil and Subsoil Stockpiles



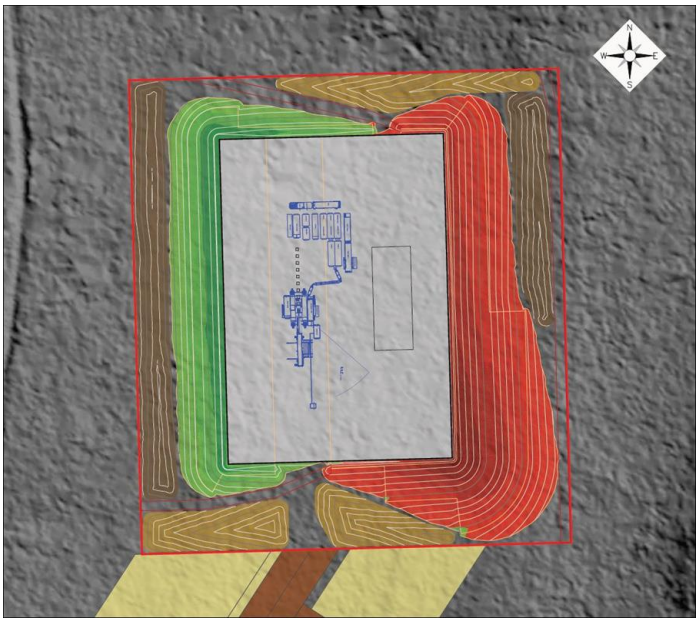
In Figure 10 the lease area has been delineated.

Figure 10. Lease Area



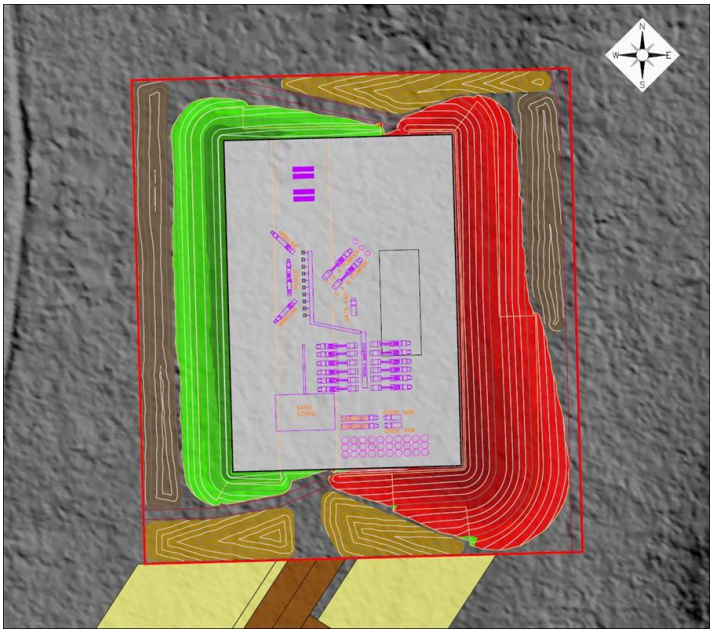
In Figure 11 the drilling activities have been put in place.

Figure 11. Drilling Activities



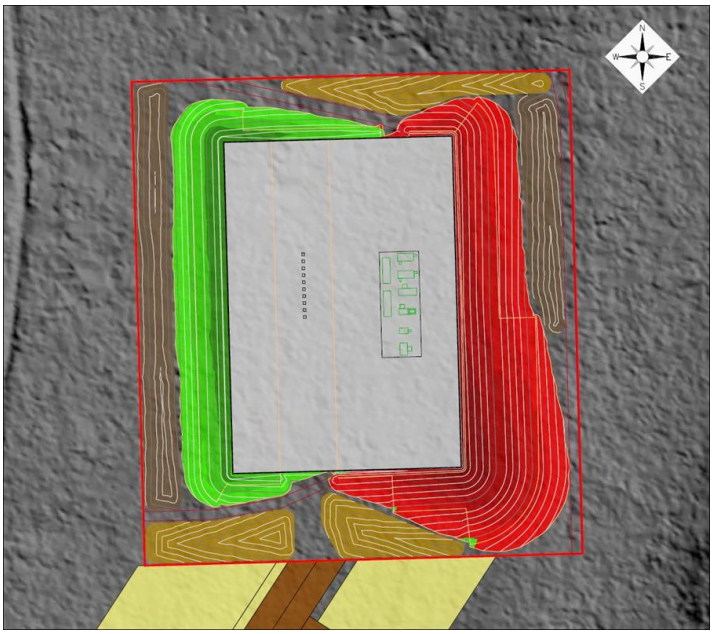
In Figure 12 the completions activities have been put in place.

Figure 12. Completions Activities



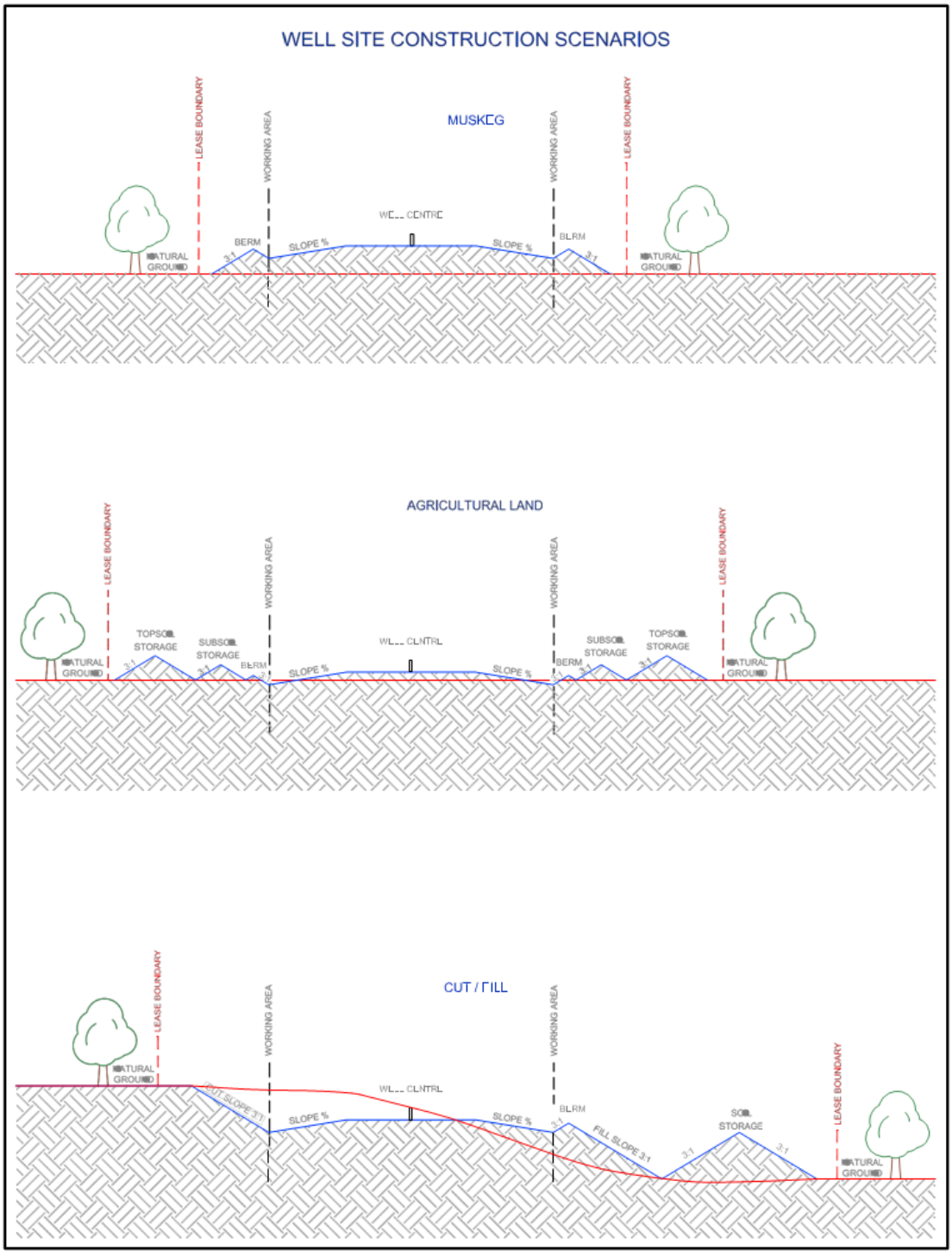
In Figure 13 the facilities activities have been put in place.

Figure 13. Facilities Activities



The following illustration shows how the overall footprint is affected by various terrain conditions while maintaining the same working area.

Figure 14. WellsiteTerrain Scenarios



20.6 Site Examples

This section presents several different wellsite spacing examples that are intended as a high level overview of actual site layouts. Traditional planning methodologies used in designing these sites illustrate the impact equipment and typical operations have on the site footprint. All other key considerations and jurisdictional regulations identified in this document must be taken into account for any individual site situation and design.

20.6.1 Example #1: Single Well Drilling

This example illustrates a single well drilling operation with the following characteristics.

Inside the working area:

- A single access favouring the working side (shack side) of the site.
- A flare tank in use to minimize impact to surrounding vegetation.

Outside the working area:

- Topsoil and subsoil are stored on the sides of the site.
- Minimal room required for cut and fill slopes because there is minimal elevation change across the site.
- A log deck is present and used for additional soil storage.

Figure 15. Single Well Drilling

20.6.2 Example #2: Single Well Completions (LPG Fracturing)

This example illustrates a single well completions operation with LPG fracturing and the following characteristics.

Inside the working area:

- A single access at the corner of the lease.
- Shacks are placed close to the site access for egress and site control.
- Flare requires no further clearing, even with its substantial height, because it is positioned over a low-lying area.
- Propane bullets are placed far away from the flare for safety considerations.

Outside the working area:

- Topsoil and subsoil are stored on the sides of the site.
- Cut and fill slopes required room for sloping.
- No log deck required. There is minimal timber salvage because the site builds out over a low area.

Figure 16. Single Well Completions (LPG Fracturing)

20.6.3 Example #3: Single Well Completions (Water Fracturing)

This example illustrates a single well completions operation with water fracturing and the following characteristics.

Inside the working area:

- A single access parallels the temporary workspace.
- There is a choke point as the road enters the site. This can limit egress during an emergency so effective equipment management is essential.
- Additional space required for three rows of tanks for water storage.
- Flare height is not a significant issue because there is no standing timber in the proximity.
- The flare is positioned away from the site access.

Outside the working area:

- Topsoil and subsoil are stored on the sides of the site.
- Minimal room required for cut and fill slopes.
- No log deck required because temporary workspace is available.

Figure 17. Single Well Completions (Water Fracturing)

20.6.4 Example #4: Single Well Completions (Water Fracturing)

This example illustrates a single well completion with fracturing and the following characteristics.

Inside the working area:

- Single site access but it is shared between two (new and producing) sites.
- The site is matted.
- The shacks and command centre are located close to the site access.
- Site water containment in two rows of 400 bbl tanks.
- The flare height is not a significant issue because distance from surrounding vegetation is adequate.
- Flare is positioned away from the site access.

Outside the working area:

- Topsoil and subsoil are stored on the side of the site.
- Minimal room required for cut and fill slopes.
- Log deck not required due to the agricultural setting.
- Site is placed effectively up against existing road and producing site.

Figure 18. Single Well Completions (Water Fracturing)

20.6.5 Example #5: Multi-Well Drilling and Completions Workover (SIMOps)

This example illustrates a multi-well drilling and completions workover (simultaneous operations) with the following characteristics.

Inside the working area:

- Dual access supporting both operations.
- Operations set apart to ensure there is no conflict or interference.
- Two sets of shacks and command centres are present and coordination of ERP's will be required.
- Both the flare tank (for drilling on the right) and flare stack (for completions on the left) are located on the same side of the site away from the site access for safety (i.e. heat and gas issues).
- Flare height is not a significant issue as there is no mature standing timber in proximity.

Outside the working area:

- Topsoil and subsoil are stored on the side of the site.
- Minimal room required for cut and fill slopes.
- No log deck required because site is located in a cut block.
- Site is placed effectively up against two existing roads and has no buffer.

Figure 19. SimOps Production/Drilling

20.6.6 Example #6: Producing Site with Multi-Well Completions (Water Fracturing)

This example illustrates a producing site with multi-well completions, water fracturing and the following characteristics.

Inside the working area:

- Dual access supporting both operations.
- Operations are in close proximity.
- The shacks and command centre are located close to the site access.
- Site has C-Ring water containment supported by 400 bbl tanks in the corner of the lease.
- The flare height is not a significant issue because distance from surrounding vegetation is adequate.
- Flare is positioned near the site access (on the right).

Outside the working area:

- Topsoil and subsoil are stored on the side of the site.
- Minimal room required for cut and fill slopes.
- Log deck present (left side, wood removed).
- Site is placed effectively up against existing road with some buffer.
- No log deck required because site is located in a cut block.

Figure 20. Producing Site with Multi-Well Completions (Water Fracturing)

20.6.7 Example #7: Multi-Well, Multi-Cluster Production and Completions (SIMOps)

This example illustrates multi-well and multi-cluster production and completions operations with the following characteristics.

Inside the working area:

- Dual site access supporting both operations.
- Operations are in close proximity.
- The shacks and command centre are located close to the site access.
- The site utilizes production water recovery and recycling for completions so there are fewer water tanks required.

Outside the working area:

- Minimal topsoil and subsoil stored on the sides of the mainly muskeg site.
- No room for required for cut and fill slopes because the site is padded.
- A pipeline parallels the site along the left side. Setbacks will need to be maintained.

Figure 21. Multi-Well, Multi-Cluster Production and Completions

20.6.8 Example #8: Emergency Slide and Large Flare

This example illustrates a site with an emergency slide and a large flare. The following characteristics should be noted.

The slide requires enough room to be set at the proper angle and must be anchored but still have room to recover personnel on site.

The flare positioning must consider wind direction and guy wire space requirements.

Figure 22. Emergency Slide and Large Flare

20.6.9 Example #9: Multi-Well Pad with Large Cut and Fill

This example illustrates the preparation of a multi-well site with a large cut and fill requiring significant room for slopes.

The topsoil and subsoil are spread back over 3:1 cut slopes and the site has an irregular shape, by design, to accommodate the area topography.

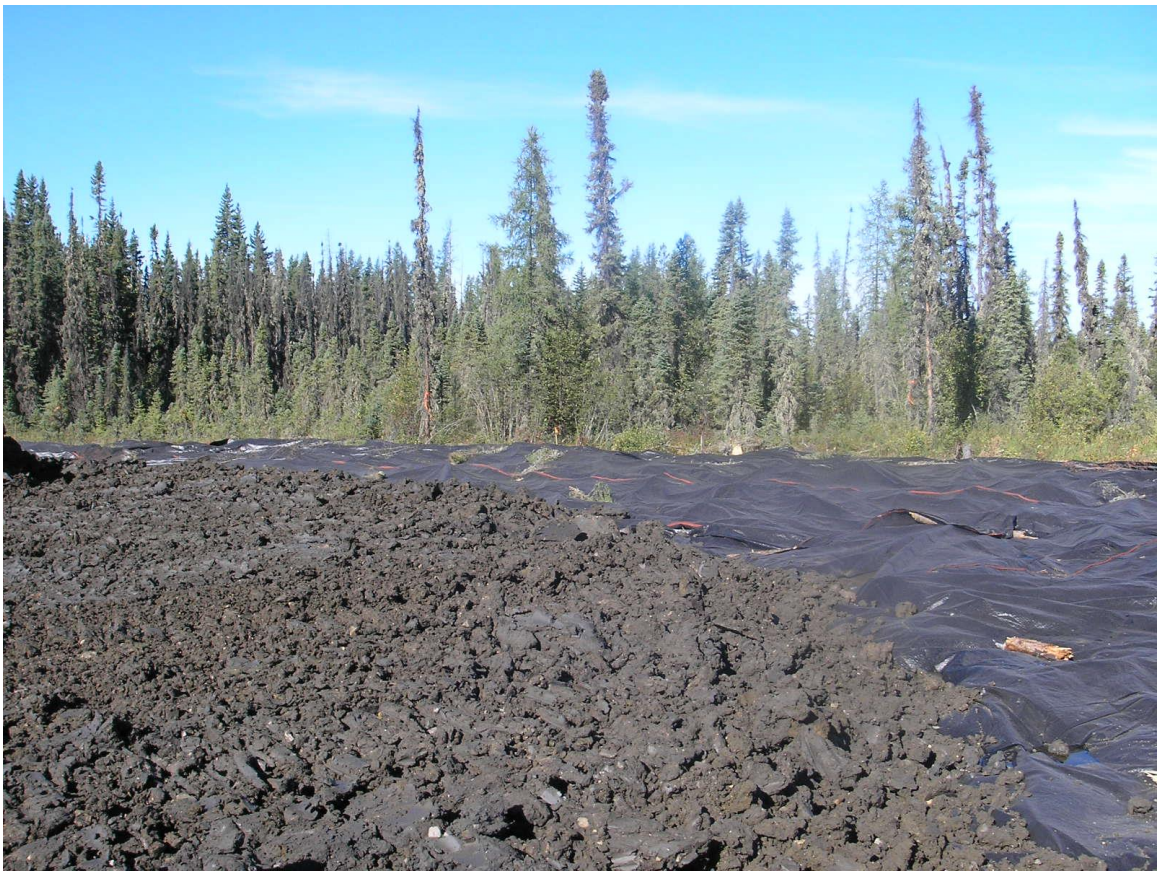
Figure 23. Multi-Well Pad with Large Cut and Fill

20.6.10 Example #10: Multi-Well Pad in Muskeg

This example illustrates the preparation of a multi-well pad in muskeg.

The site is padded so there is no need for storage of topsoil and subsoil and the topography is flat so there is no need for an irregular shape.

Figure 24. Multi-Well Pad in Muskeg



20.7 Regulatory Application

Formal regulatory approval is required for the wellsite and for every well to be drilled. This approval is granted in the form of an approved surface disposition and well license from the applicable provincial regulatory body. The applicant is expected to go through a rigorous planning process to determine exactly what their site requirements are and then submit the appropriate license application. License application requirements will vary depending on the type of operations and whether all of the planned operations and required equipment will fit into a standard lease.

20.7.1 Surface Disposition and Well License Application

It is critical to determine the application process and requirements for the province or territory of operation. Understanding and accounting for the "No Go" issues can increase the likelihood of a successful application.

Key considerations for gaining approval include the following:

- Standard versus non-standard conditions
- Normal versus abnormal sizes
- Typical versus non-typical operations

20.7.2 License Application in Alberta

In Alberta, applications for lease and well licenses fall into three categories:

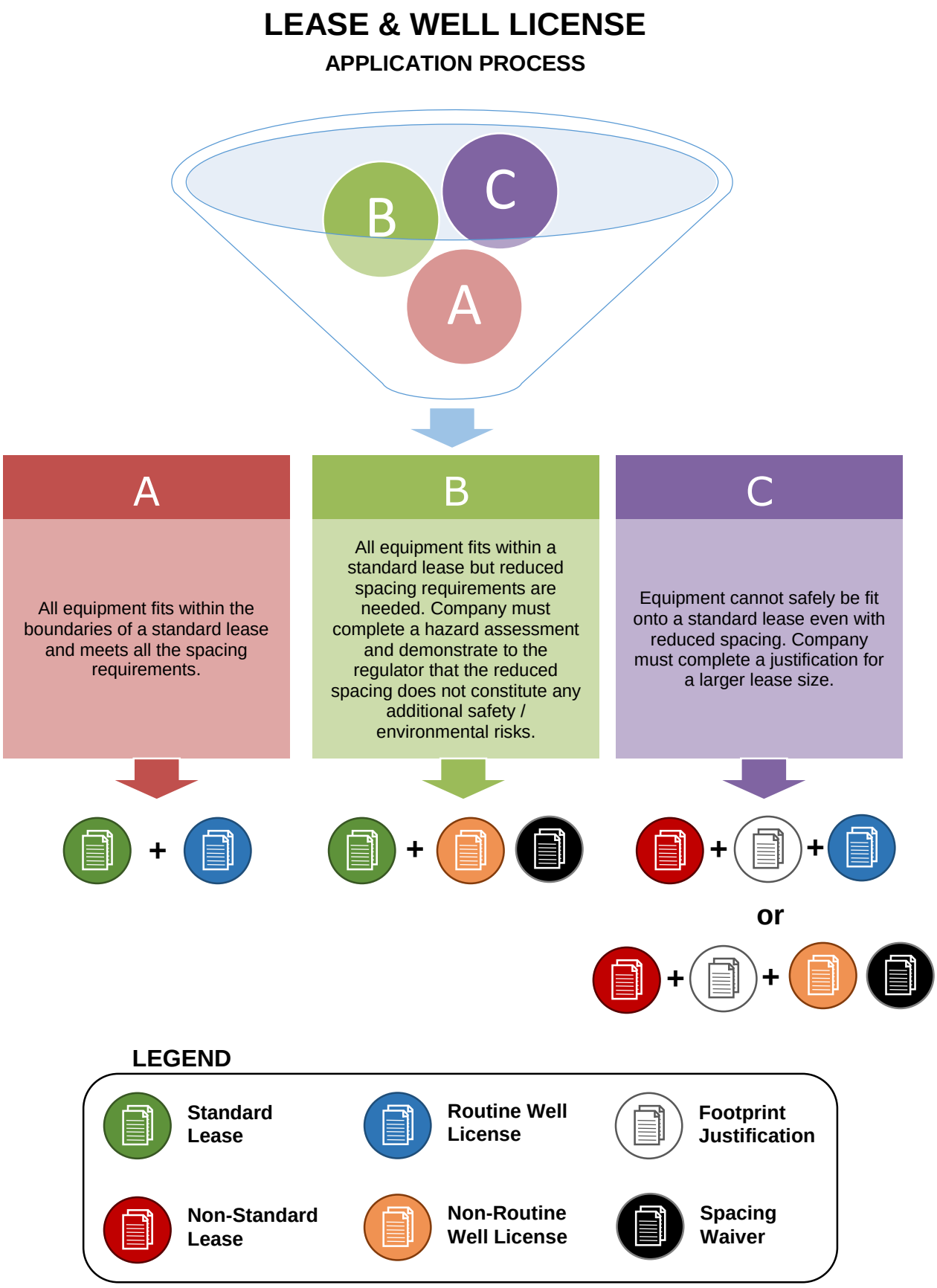
A. All equipment fits within the boundaries of a standard lease and meets all spacing requirements.
B. All equipment fits within the boundaries of a standard lease but reduced spacing requirements are needed.
C. Equipment cannot safely be fit onto a standard lease even with reduced spacing.

It is important to understand which category the license application falls into and include all of the applicable regulatory requirements for that category in the submission.

Figure 25 is a simplified representation of the categories of license application and the specific documentation required for each category of application.

Note: For Category B and C, the license application may be routine or non-routine depending on what doesn't meet the spacing requirements. Spacing waivers are applied for after the license has been obtained.

Figure 25. Lease and Well License Application Requirements



20.7.3 Application Approach

The following proactive approach can help ensure a successful application in any jurisdiction:

- Emphasize front-end planning (i.e., before survey, well and facility licensing).
- Vet plans collaboratively with the regulatory body for the jurisdiction.
- Utilize the central mailboxes (venue to pre apply and receive feedback from regulator) provided by most provincial government agencies.
- Work directly with the regulatory official connected to the area of operation for non-standard or non-routine applications.
- Create documentation to present a clear picture of the proposal and why it is required. The following items should be available for review:
    - Visual aids: Site drawings, pictures, topographical maps and images and equipment layout.
    - Subsurface details: Drilling, completions, facility and production requirements.
    - Setbacks and Spacing requirements: Environmental, proximity and safety considerations.
    - Risk Based Mitigation: Applied best practices, industry examples, spatial trade-offs, on and off-site equipment and production premise.

20.7.4 Application Results

Each wellsite and application is unique so previous successful applications should not be presumed to be supported on future applications. Robust justification is required for all applications and if that justification is not present the application could be rejected.

The following steps should be taken if an application is rejected:

- Review the feedback from the regulator. The regulator may have identified deficiencies in the application.
- Review the application for gaps in the justification.
- Resubmit the application with required updates completed.

Note: The application may need to be resubmitted under a different application category.

Appendix A: Revision History

2015 Review

The purpose of the 2015 review of IRP 20 was to make the document more reflective of current practices for site design and engage the regulators in discussions about appropriate wellsite size in terms of footprint versus health, safety and environment.

Table 13. 2015 Revisions

Section	Remarks and Changes
	Document updated to current DACC Style Guide and Template including: • Preface information (including abbreviations and definitions list) • Heading and footer styles • Grammar and punctuation style, readability • Added Appendix A for revision history
20.1 Well Spacing	Formerly Well Spacing Templates – changed to introduction to describe the document and contents.
20.2 Flare Pits and Stacks (old)	Entire section removed from the document. Flare pits are no longer allowed by the regulators and Flare stacks are covered under key considerations as they configurations vary too greatly
20.2 Wellsite Planning	Added section to describe planning process, phases and stakeholders.
20.3 Interprovincial Spacing Requirements (old)	Moved to 20.4, added individual provincial charts and diagrams and updated the summary sheet.
20.3 Key Considerations (new)	Incorporated items from the lease construction spacing checklist (formerly 20.4) and critical concerns (formerly 20.5) into this new section. This new section is a checklist of items to consider in the planning.
20.4 Interprovincial Spacing Requirements	• Updates to Alberta info and references as per the AER • Updates to distances and references specified by BCOGC in added 24-29 • Updates to Saskatchewan Regulations that were incorrect in items several items • Removed NEB information from table as nothing could be found to reference • Added Manitoba information to table
20.5 Illustrations (formerly 20.6 Templates)	Modified to reflect overlay of site size regulations and footprint depiction with various phase of the life cycle.
20.6 Examples (formerly 20.6 Templates and Photographs)	The number of photos/examples was reduced to a more generic and manageable number and descriptive information provided to outline what the pictures represent.
Figure 12.1: Weblink Locations (old)	Information moved to the References section

Section	Remarks and Changes
Appendix A: Lease Construction Spacing Information Checklist (old)	Section removed
Appendix A: Revision Log	New section added
Appendix B: EAP Wildlife Restrictions (new)	New section added

Original Draft

The first edition of IRP 20 was developed by the Wellsite Spacing Committee, a subcommittee of the Drilling and Completions Committee (DACC). In March 2003, the committee released a draft “Wellsite Spacing Recommendations” document to industry and government for feedback. The IRP 20 Development Committee then developed the recommendations into an IRP.

After the release of the Wellsite Spacing Recommendations in March 2003, Alberta Sustainable Resource Development (ASRD) incorporated the Lease Spacing Information Checklist and the Spacing Overlays into the newly structured Environmental Field Reports (EFR). The Oil and Gas Commission (OGC) - British Columbia planned to including the information for new well applications in their Well Authority (WA) forms in British Columbia by the summer of 2005.

Enform updated changes to its Lease Development and Reclamation course to incorporate the Wellsite Spacing Recommendations into the course. Enform also added an Environmental Field Report (EFR) Workshop in Spring 2005 which addresses Wellsite Spacing Recommendations.

As of winter 2005, there were no changes to the wording in the regulations regarding flare pits and stacks. However, ASRD was drafting a discussion paper on proposed changes for legislative planning purposes. The Act and regulations were due for a major overhaul. ASRD planned to submit issues such as those provided by the Wellsite Spacing Committee to the legislative planning personnel to prepare a discussion paper. This paper was to be circulated to all internal (government) and external (industry) stakeholders for input within the two years. The Wellsite Spacing Committee identified a need for more consistent wording regarding Flare Pit and Flare Stack regulations between ASRD and the ERCB regulations.

Appendix B: EAP Wildlife Restrictions

The following information is summarized or reproduced from the EAP Integrated Standards Guide (Dec 1, 2013) on the Alberta Environment and Sustainable Resource Development website and the Government of Canada Migratory Birds Convention Act and Regulations (and related provincial regulations).

Waterbody, watercourse and road class information from the EAP Integrated Standards Guide has been reproduced in the Reference Tables section below for easy reference.

Timing Windows Summary

Table 14. Timing Windows

Restriction Aspect	Restricted Time Period	Setbacks	Exceptions
Caribou	February 15th to July 15th	None	Many, see Caribou below
Grizzly Bear	None just general guidance to use	Projects not to parallel watercourse banks within 200 metres	Many, see Grizzly Bears below
Key Wildlife Zones	January 15th to April 30th	Projects not to parallel watercourse banks within 200 metres	Some, see Key Wildlife and Biodiversity Zones below
Migratory Birds	April 1st to August 31st May 1st to July 31st	Depends on the water body Refer to Migratory Bird Act	Many, see Migratory Birds below
Trumpeter Swans	April 1st to September 30th	500 m all year round 800 m during restricted period	None See Trumpeter Swans below
Water Course Crossings	September 1st to July 15th	See Watercourse table below	A few but need to be verified case by case on maps

Caribou

Standard 100.9.2.1: Initiate industrial activity as early as possible in the winter to limit late winter activities. New site preparation or construction shall not be initiated between February 15th and July 15th, with the following exceptions:

- Site preparation or construction initiated on a disposition before February 15th can continue until adverse ground conditions are encountered. Site preparation must be at least 50% completed prior to February 15th.
- Well tie-in activities commenced before February 15th can continue until adverse ground conditions are encountered.
- All wellsites or pipeline installations accessed using Class V (low grade access) routes can be initiated at any time (including after February 15th) provided ground conditions are favorable, and may continue until adverse ground conditions are encountered.
- All developments planned within 100 m of existing arterial all-weather roads can be initiated at any time (including after February 15th), provided ground conditions are favorable, and may continue until adverse ground conditions are encountered.

Grizzly Bears

Avoid development within key habitats (local and landscape scales) and key seasons.

Standard 100.9.3.1: Develop access using Class III, IV or V routes, unless specified in a higher level access (i.e. Integrated Landscape Management) plan.

Standard 100.9.3.2: Design all access routes as dead-ends, unless specified in a higher level access (i.e. Integrated Landscape Management) plan. Routes which loop through the area are not permitted.

Standard 100.9.3.3: Access and pipeline routes shall not parallel permanent watercourses/riparian habitat by at least 200 m, except for vehicle or pipeline crossings.

Standard 100.9.3.4: If new access, which is attached to the existing arterial all-weather access road, is less than 100 m from the arterial all-weather access road then the new access can be developed using Class III to Class V access.

a) If new access, which is attached to the existing arterial all-weather access road, is greater than 100 m in distance from the arterial all-weather access road, then access control is required to restrict unauthorized traffic at all stages of construction, operation and reclamation of the road. The access control will be placed within the 100 m distance from the start of the new access.

Key Wildlife and Biodiversity Zones

Standard 100.9.6.1: For all areas North of Highway (HWY) #1, no activity is permitted from January 15th to April 30th; and South of HWY #1, west of HWY #2, no activity is permitted from December 15th to April 30th; with the following exceptions under favorable (non-adverse) ground conditions:

a. Well tie-in activities which can be initiated and completed while ground conditions are favorable.
b. All wellsites or pipeline installations accessed using Class IV or V roads.
c. All activities planned within 100 m of existing arterial all-weather roads can be initiated at any time provided ground conditions are favourable, and may continue until adverse ground conditions are encountered.

Standard 100.9.6.2: Wellsites, pipeline installations, plant sites and camps shall maintain a minimum 100 meter buffer to the edge of valley breaks. In the absence of well-defined watercourse valley breaks a 100 m buffer from the permanent watercourse bank applies.

Standard 100.9.6.3: Develop access using Class IV or V routes only with the following exceptions:

a. Alternative access standards are specified in an approved higher level access plan (e.g., Integrated Landscape Management).
b. Wells licensed as sour gas with a suspended/producing release rate of > 2.0 m^3/s can be accessed using Class III, IV or V routes.
c. When drilling a well through sour zones, but not for production of sour > 2.0 m^3/s, may use Class IV routes designed to provide adequate egress.
d. Class III routes can be used for single well bores requiring > 100 days drilling/completion, where it can be demonstrated and documented that Class IV routes cannot be constructed to provide assured access.
e. If new access, which is attached to the existing arterial all-weather access road, is less than 100 m from the arterial all-weather access road then the new access can be developed using Class III to V access.
f. If new access, which is attached to the existing arterial all-weather access road, is greater than 100 m in distance from the arterial all-weather access road, then access control is required to restrict unauthorized traffic at all stages of construction, operation and reclamation of the road. The access control will be placed within the 100 m distance from the start of the new access.

Standard 100.9.6.4: Access routes and pipeline routes shall not parallel permanent watercourses/riparian habitat by at least 200 m, except for vehicle or pipeline crossings.

Standard 100.9.6.5: Where materials are available, place rollback across the entire pipeline/easement width for at least 40% of the linear distance or the length of the ROW. No individual section of rollback shall exceed 250 m in length. The break between sections of rollback shall be a minimum of 25 m.

Standard **100.9.6.6:** Design all access routes as dead-ends unless specified in a higher level access (e.g., Integrated Landscape Management) plan. Routes which loop through the area are not permitted.

Migratory Birds

The following apply to migratory birds (as per the Migratory Birds Convention Act and Regulations and the Canadian Wildlife Service:

- Habitat destruction activities (e.g. vegetation clearing, flooding, etc.) should avoid, at minimum, the period between May 1st and July 31st in areas up to 50 hectares (or less than 1/4 section) in size.
- For areas greater than 50 hectares (equal to or greater than 1/4 section), habitat destruction avoidance dates should extend to at minimum between April 1st and August 31st to minimize population level effects to breeding birds.
- If an individual has a prior knowledge of an active nest, at any time during the year, it must be protected with a suitable species appropriate buffer until the young have fledged.
- If habitat destruction (vegetation clearing, flooding, etc.) must proceed during the migratory bird breeding season, the habitat to be cleared/destroyed should not exceed 1 hectare in size. The lands should be thoroughly surveyed for active nests within 7 days of destruction/clearing by an avian biologist or naturalist with experience with migratory birds and migratory bird behavior indicative of nesting (e.g. aggression or distraction behavior; carrying of fecal sacs, nesting material or food). Nest surveys should follow widely accepted protocols. Any nests found (or indicated nests) should be protected with a species appropriate buffer until the young have fledged.
- Wetlands attractive to breeding migratory birds (e.g., those containing water) should not be cleared/destroyed at minimum between April 1st and August 31st. Canada Geese and Mallards may nest early and broods of waterfowl and water bird species are dependent upon wetlands throughout August and beyond. An effort should be made to protect wetlands from habitat destruction, irrespective of whether they are wet or dry. Wetlands should be avoided with a 100 m buffer where possible.

Trumpeter Swans

Standard 100.9.4.1: Activities (roads, wells, pipelines etc.) shall not occur within 500 m of the bed and shore on identified waterbodies and/or watercourses.

Standard 100.9.4.2: Activities shall not occur within an 800 m buffer from the bed and shore of identified waterbodies and/or watercourses between April 1st and September 30th.

Reference Tables

Table 15. Watercourses

Type	Width	Channel Characteristics	Setback Requirements[1]
Large Permanent[2]	> 5 m	Defined channel	100 m
Small Permanent[2]	0.7 – 5 m	Defined channel	45 m
Intermittent/Spring[2]	< 0.7 m	Defined channel	45 m
Ephemeral		No defined channel	15 m

Table 16. Waterbodies

Type	Basin Characteristics	Setback Requirements[3]
Lakes	Open water (> 2 m depth)	100 m
Permanent Shallow Open Water Ponds (S&K V[4])	Open water (> 2 m depth) Deep marsh margin	100 m
Semi-permanent Ponds/wetlands (S&K IV[4])	Emergent deep marsh throughout	100 m
Non-permanent Seasonal Wetlands (S&K III[4])	Shallow marsh	45 m
Non-permanent Temporary Wetlands (S&K II[4])	Wet meadow	15 m setback requirement for wellsites and pipelines
Fens	No defined channel Slow flowing	No specific setback Attempt to leave undisturbed
Bogs	Peatland Acidic wetland No flow	No specific setback

[1] The setback for watercourses is measured from top of break (valley), or where undefined, from the top of the bank.

[2] May or may not contain continuous flow.

[3] The setback is from the defined bank of the waterbody or the outer margin of the last zone of vegetation that is not defined/bounded by upland vegetation communities.

[4] Stewart, R.E., and H.A. Kantrud. 1971. Classification of natural ponds and lakes in the glaciated prairie region. Resource Publication 92, Bureau of Sport Fisheries and Wildlife, U.S. Fish and wildlife Service, Washington, D.C. Northern Prairie Wildlife Research Centre Online, found at Northern Prairie Wildlife Research Center.

Table 17. Road Classes

Class	Right of Way Width	Description
Class I	≤ 40 m	• All weather primary road. • ROW width should be minimum required to allow travel while addressing safety and environment concerns.
Class II	≤ 30 m	• All weather or dry weather secondary road. • ROW width should be minimum required to allow travel while addressing safety and environment concerns.
Class III	• 15 m ROW where terrain or other conditions allow • Up to 20 m when constrained by terrain conditions • Not to exceed 35% of length of route	• All weather or dry tertiary road. • ROW width should be minimum required to allow travel while addressing safety and environment concerns. • Site-specific cuts, fills and widening may be required (bends, slope, etc.).
Class IV	• ≤ 15 m with variable allowance for terrain conditions • Up to 20 m where required for watercourse approaches(to enable water management), corners and side slopes • All not to exceed 20% of length of route	• Frozen or dry conditions. • Stripping of topsoil permitted. • No ditch development, however drainage control and borrow material may be required on site-specific basis to enable water management. • Can be constructed and used year round when conditions are suitable. • Should a portion of the route become impassable due to wet conditions, drainage problems or rutting, site specific improvements (i.e., matting, padding, culverts etc.) to the problematic area(s) may be implemented. • Some access improvements required to support specific well servicing work (e.g., wire line) should be temporary only and removed after the activity is over. • ROW width should be minimum required to allow travel while addressing safety and environment concerns. • Roads will typically follow contours of the landscape more closely than do higher standard routes. • Cuts and fills should be minimized.

Class	Right of Way Width	Description
Class V	• 10 m with variable allowance for terrain conditions • Up to 20 m where required for watercourse approaches (to enable water management), corners and side slopes • All not to exceed 20% of length of route	• Minimal disturbance – frozen or equivalent to frozen (e.g. rig matting). • Allows for winter operations, extends the winter drilling season and/or emulates frozen ground access when frost conditions are not adequate or not present. • Access will minimize ground disturbance under non-frozen ground conditions and will mimic frozen ground access. • Ground disturbance, surface vegetation disturbance, ROW clearing and surface improvements will be minimized. • Can be constructed and used during favourable ground conditions. Use during unfavourable ground conditions requires cessation of use or mitigation measures (e.g. rig matting). • May require adjustments to well drilling/completions schedules and require use of alternative vehicles for production monitoring. • Road width will be minimized wherever possible by sharing space with pipeline ROWs, seismic lines and through the use of vehicle pullouts. • Route construction may not be feasible for all terrain conditions. A combination of padding, geo-textile, matting, road culverts, corduroy or other drivable surfaces may be required during non-frozen ground conditions. • Gravel may be used in site-specific situations for safety or environmental protection of water crossings, but its use should be minimal.
Class VI (Prairie and Parkland)	≤ 10 m	• Minimal disturbance – dry or frozen ground. • Ground disturbance, surface vegetation disturbance, grade development, ROW clearing and surface improvements should be minimized. No grading should occur. • Can be constructed and used year round; during unfavourable ground conditions cessation of use or mitigation measures are required. • May require adjustments to well drilling/completions schedules and require use of alternative vehicles for production monitoring. • Road width should be minimized, wherever possible, by sharing space with pipeline ROWs or other existing linear disturbances.

References

Table 18. Regulatory References for Wellsite Spacing

Province	Documentation	Organization	Link/Reference
Alberta	Alberta Energy Regulator	AER	www.aer.ca
	Enhanced Approval Process	Alberta Environment and Sustainable Resource Development (ESRD)	www.esrd.alberta.ca
	Integrated Standards and Guidelines	Alberta Environment and Sustainable Resource Development (ESRD) AER	www.esrd.alberta.ca
	Enform Industry Recommended Practices	Enform	www.enform.ca
British Columbia	BC Oil and Gas Commission		www.bcogc.ca
	WorkSafeBC		www.worksafebc.com
	Petroleum and Natural Gas Act	Government of BC	www.bclaws.ca
Saskatchewan	Saskatchewan Oil and Gas Conservation Regulations	Government of Saskatchewan	www.publications.gov.sk.ca
	Enform Industry Recommended Practices	Enform Saskatchewan	www.enform.ca
Manitoba	Manitoba Innovation, Energy and Mines	Government of Manitoba	www.manitoba.ca/iem
Northwest Territories	Industry, Tourism and Investment	Government of NWT	www.iti.gov.nt.ca
	National Energy Board	Government of Canada	www.neb-one.gc.ca
	NWT Water Board	Government of NWT	www.nwtwb.com
Canada	Migratory Birds Convention Act and Regulations	Government of Canada	www.ec.gc.ca