DACC

DRILLING AND COMPLETION COMMITTEE

IRP 20: Wellsite Design Spacing Recommendations

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

Volume 20 – 2022

EDITION: 3
SANCTION DATE: November 2022

CAOEC
CANADIAN ASSOCIATION OF ENERGY CONTRACTORS
EST. 1949

CAPP
CANADIAN ASSOCIATION OF PETROLEUM PRODUCERS
Canada's Oil and Natural Gas Producers

EPAC
CANADA'S OIL & GAS ENTREPRENEURS™

ENSERVA™

Copyright/Right to Reproduce

Disclaimer

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 general advice regarding the specific topic. It was developed under the auspices of the Drilling and Completions Committee (DACC). IRPs are provided for informational purposes. Users shall be fully responsible for consequences arising from their use of any IRP.

The recommendations set out in this IRP are meant to allow flexibility and must be used in conjunction with competent technical judgment. It is recognized that any one practice or procedure may not be appropriate for all users and situations. It remains the responsibility of the user of this IRP to judge its suitability for a particular application and to employ sound business, scientific, engineering and safety judgment in using the information contained in this IRP.

If there is any inconsistency or conflict between any of the recommended practices contained in this IRP and an applicable legislative or regulatory requirement, the legislative or regulatory requirement shall prevail. IRPs are by their nature intended to be applicable across industry, but each jurisdiction may have different or unique legal requirements. Users of this IRP should consult with authorities having jurisdiction. Users are advised to consider if their operations or practices and this IRP comply with the legal requirements in any particular jurisdiction in which they operate.

Every effort has been made to ensure the accuracy and reliability of the data and recommendations contained in this IRP. However, DACC, its subcommittees, individual contributors and affiliated persons and entities make no representation, warranty, or guarantee, either express or implied, with respect to the accuracy, completeness, applicability or usefulness of the information contained in any IRP, and hereby disclaim liability or responsibility for loss or damage resulting from the use of this IRP, or for any violation of any legislative, regulatory or other legal requirements.

IN NO EVENT SHALL DACC, ENERGY SAFETY CANADA, ANY SUBMITTING ORGANIZATION NOR ANY OF THEIR EMPLOYEES, DIRECTORS, OFFICERS, CONTRACTORS, CONSULTANTS, COMMITTEES, SUBCOMMITTEES, VOLUNTEERS, OR OTHER AFFILIATED OR PARTICIPATING PERSONS BE LIABLE

TO OR RESPONSIBLE FOR ANY PERSON USING AN IRP OR ANY THIRD PARTY FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL OR CONSEQUENTIAL DAMAGES, INJURY, LOSS, COSTS OR EXPENSES, INCLUDING BUT NOT LIMITED TO LOST REVENUE OR GOODWILL, BUSINESS INTERRUPTION, OR ANY OTHER COMMERCIAL OR ECONOMIC LOSS, WHETHER BASED IN CONTRACT, TORT (INCLUDING NEGLIGENCE) OR ANY OTHER THEORY OF LIABILITY. This exclusion shall apply even if DACC has been advised or should have known of such damages.

Availability

This document, as well as future revisions and additions, is available from

Energy Safety Canada Canada
Unit 150 – 2 Smed Lane SE
Calgary, AB T2C 4T5
Phone: 403.516.8000
Fax: 403.516.8166
Website: www.EnergySafetyCanada.com

Table of Contents

List of Figures

List of Tables

20.0 Preface

20.0.1 Purpose

The purpose of IRP 20 is to provide guidance for practical and efficient wellsite design to create a wellsite that meets regulatory requirements and accommodates the services required in a manner that allows for the protection of workers, the public and the environment.

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

The focus of this IRP is wellsite spacing requirements and planning for on-shore operations in western Canada with focus on the following jurisdictions:

- British Columbia
- Alberta
- Saskatchewan
- Manitoba

While the IRP addresses operations in western Canada the logic can be applied to other jurisdictions.

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. Energy Safety Canada 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 Energy Safety Canada website at www.EnergySafetyCanada.com.

20.0.5 Sanction

The following organizations have sanctioned this document:

Canadian Association of Oilwell Energy Contractors (CAOEC)

Canadian Association of Petroleum Producers (CAPP)

Enserva

Explorers & Producers Association of Canada (EPAC)

20.0.6 Range of Obligations

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

Table 1. Range of Obligation

Term	Usage
Must	A specific or general regulatory and/or legal requirement that must be followed. These IRP statements are bolded for emphasis.
Shall	An accepted industry practice or provision that the reader is obliged to satisfy to comply with this IRP. These IRP statements are bolded for emphasis.
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.

20.0.7 Background

The original IRP 20 wellsite spacing requirements was 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 made significant changes in surface configuration to minimize overall footprint and consolidate more subsurface development onto a single larger pad. This triggered the revisions for Edition 2 to make the document more reflective of current practices for site design and clarify the criteria relevant to construction, drilling, completions and production that influence site design.

For Edition 3 of the document, CAPP and Enserva felt that information about the impact of simultaneous operations needed to be expanded to reflect the current working environment. A full scope review of the content was included in this edition.

20.1 Introduction

Wellsite design considers both the working area for operations and the space required outside the working area (within the lease boundary) for sloping and soil/material storage. Effective wellsite design balances the requirements of the local jurisdictional regulations with the spacing necessary for safe operations in order to protect workers, the public and the environment.

An oversized site may not have a negative impact on the subsequent operations but can involve additional construction and land disturbance. Both have an environmental impact and can harm relationships with key external stakeholders.

An undersized site often results in unsafe or non-compliant operations that can require changes to the plan after access and site construction are underway, put personnel or the public at risk or compromise environmental stewardship.

It is important to consider all phases of development and activities planned for the life cycle of the well when designing the wellsite. What is required for one phase may not be the same as the requirements for another phase.

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. It includes the following:

- Checklists of key considerations for each phase in the life cycle of the well (20.3 Key Considerations).
- Detailed regulatory compliance information (20.4 Jurisdictional Spacing Requirements).
- Examples of wellsites and their characteristics (20.5 Site Examples).
- Sample illustrations of the calculation and planning for appropriate working area footprint and defining the lease boundary (Appendix B).

Using all of these tools along with company or site-specific requirements can help design a safe, functional, environmentally friendly wellsite that is compliant with local jurisdictional regulations.

20.2 Wellsite Planning

20.2.1 Objectives

The size of the wellsite is a balance between the smallest possible environmental impact (smallest footprint) and the space required to safely perform consecutive or simultaneous operations (SimOps) while following the local jurisdictional regulations.

The following are key objectives for the wellsite spacing design:

- Sizing the working area to allow for safe and regulatorily compliant operations while considering the potential environmental impacts.
- Sizing that accommodates berms, the proper sloping of cut and fills and the correct storage of the top and subsoils.
- Managing the site footprint in a manner that achieves the environmental outcomes defined under local jurisdictional regulations in terms public safety and the protection of the environment.

IRP The lease boundary should be defined by the room required inside and 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 phase in the life cycle of the well but there are often special conditions either mandated by the regulator and/or stakeholder(s) that can restrict the amount of room allowed outside of the working area.

20.2.2 Process

The wellsite planning process and personnel will be unique to each organization. Figure 1 shows a typical wellsite planning process that identifies planning phases and stakeholders.

For purposes of this IRP, stakeholders are any person, group or organization that may have input to, or be affected by, the wellsite spacing design.

IRP The wellsite planning process shall consider all users and equipment, both temporary and permanent, that the site needs to support throughout the life cycle of the well.

IRP The wellsite planning process should include review of all the considerations outlined in 20.3 Key Considerations.

IRP The wellsite planning process should consult all of the internal and external stakeholders for the well (see Figure 1 and Tables 2 and 3).

Figure 1. Wellsite Planning Process

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

Table 2. Wellsite Planning Phases

Phase	Activities
Subsurface target	• Review the field development plan (see 20.3.2 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 20.3.3 Non-Technical Risk). • Review key drilling considerations (see 20.3.5 Drilling). • Review key completions considerations (see 20.3.6 Completions and Well Servicing). • Review key pipeline and facility considerations (see 20.3.7 Pipelines and Facilities). • Review key production operations considerations (see 20.3.8 Production Operations). • SimOps considerations for all groups involved (see 20.3.9 Simultaneous Operations).
Draft design	• Determine the overall lease area and working area. • Review key non-technical risks considerations (see 20.3.3 Non-Technical Risk). • Review key drilling considerations (see 20.3.5 Drilling). • Review key completions considerations (see 20.3.6 Completions and Well Servicing). • Review key pipeline and facility considerations (see 20.3.7 Pipelines and Facilities). • Review key production operations considerations (see 20.3.8 Production Operations). • Review key construction considerations (see 20.3.7 Construction). • Review topography (e.g., Light Detection and Ranging (LiDAR)). • Review noise implications for all phases of the well life cycle and proximity of external stakeholders.
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 the completed application to the local jurisdictional regulator for surface approval and well license.

Table 3. 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 • SimOps
Completions and well servicing	• Spacing • Footprint • Layout • SimOps
Pipelines and facilities	• Spacing • Footprint • Layout
Operations/production	• Spacing • Footprint • Layout
Surface land	• Third party agreements • Application submission

Table 4. External Stakeholder Input to Wellsite Planning

Stakeholder	Input
Regulators	• Application review and approval • Authorizations and licensing conditions
Landholders and/or leaseholders	• Land use constraints • Environmental impacts
Industry	• Third party agreements (e.g., neighbouring partners, mineral rights)
Other non-governmental stakeholders such as: • Ducks Unlimited • First Nations Council • Indian Oil and Gas Canada	• Land use constraints (e.g., trap lines, grazing leases, forestry leases, recreation areas, historical sites) • Environmental impacts

20.3 Key Considerations

There are several considerations when sizing the wellsite. These range from regulatory requirements to the functions or services that will be required on the site.

20.3.1 Regulations

There are Occupational Health and Safety (OH&S), Jurisdictional Electrical Codes, municipal, provincial and federal regulations that can impact wellsite spacing design.

IRP **At minimum, all spacing requirements of the local jurisdictional regulator must be followed.**

Note: Regulations for conventional may be different from those for in-situ heavy oil or thermal operations. Consult the regulations appropriate to the operation and well type.

Note: The jurisdictions do not all share the same terminology or requirements for site sizing. Consult the well licensing regulations for requirements for the specific jurisdiction.

Note: Jurisdictional orders regarding noise control may also be in place. Consult with the local jurisdictional regulator for requirements specific to the planned site.

Section 20.4 Jurisdictional Spacing Requirements outlines the requirements of the various jurisdictional regulators in western Canada and of the Canada Energy Regulator (CER). A comparison across jurisdiction is provided in 20.4.6 Summarized Jurisdictional Spacing Requirements. Information specific to in situ heavy oil operations is provided in 20.4.7 Heavy Oil Spacing Requirements.

IRP **All wellsites must be approved by the local jurisdictional regulator.**

Note: License application requirements vary by jurisdiction and planned operation(s). Consult the local jurisdictional regulations identified in Appendix D for specific requirements.

This approval is granted in the form of an approved surface disposition and well license.

20.3.2 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. This can provide stakeholders with increased certainty around scale and timing of field operations and reduce the environmental impact of the site.

The field development plan can be a full or partial plan and may be for a single well or multi-well pads.

Table 5. Field Development Plan

Key Consideration	Notes
Activity density and timing of surface and subsurface operations	• Subsurface target(s) in and implications of proximity to planned surface facilities (see 20.3.7 Pipelines and Facilities) • Subsurface targets and implications for drilling or completions (e.g., collision risk – see 20.3.5 Drilling and 20.3.6 Completions and Well Servicing) • Implications of reservoir development plans (e.g., optimal well positioning to access maximum reserves from a single location) • Implications of multi-well pads • Safety of personnel and optimal operating conditions • Potential for pad extension • Operational efficiency
Adjacent activity	• Implications of adjacent operations (e.g., likelihood of fracturing and offset communication, natural surface conditions and potential need to maintain a buffer from existing operations)
Anticipated drilling and completion operations	• Vertical, horizontal, slant, re-drill • Fracturing and re-fracturing • See 20.3.5 Drilling, 20.3.6 Completions and Well Servicing and 20.3.9 Simultaneous Operations
Area infrastructure	• Urban centres • Pipelines • Roads • Airports • Schools • Churches • Coal mines
Formation geology	• Multiple production or geological targets • Multiple horizons
Future development plans	• Planned execution/timing of each hydrocarbon-bearing target
Production schedule and type	• Tie-in and surface equipment timing • Priority and timing of production from each formation • Equipment spacing if returning for subsequent drilling operations
Surface geography	Implications of the regulations around surface geography (see 20.3.3 Non-Technical Risk) • Waterbodies • Watercourses • Wildlife corridors and zones • Right of way requirements
Well type	• Exploration vs. development • Fluid type (gas, oil, mix) • Conventional vs. thermal/heavy oil

20.3.3 Non-Technical Risk

Non-technical risks are the environmental and human factors to consider in the wellsite spacing design.

Table 6. Non-Technical Risks

Key Consideration	Notes
Access restrictions	• Wildlife and biodiversity zones, activity timing (e.g., migratory birds, bears, caribou) • Road type restrictions and setbacks • Access and pipeline route restrictions • Alternative access restrictions
Land tenure	• Private vs. public land • Existing disposition of site (e.g., a pipeline right-of-way, reclaimed sites)
Other non-governmental stakeholders such as: • Ducks Unlimited • First Nations Council • Indian Oil and Gas Canada	Land use/access constraints (e.g., trap lines, grazing leases, forestry leases)
Sensitive areas	May require additional approvals. • First Nations Settlement Land • Metis Settlement Land • Traditional Lands • Archaeological sites • Protected areas
Third party infrastructure and agreements	May influence placement of site components. • Crossings (infrastructure - pipelines, power lines, fibre-optics) • Road use • Encroachments • Shared leases • Right of ways
Waterbodies	Jurisdictional setback requirements
Watercourses	Jurisdictional setback requirements

20.3.4 Construction

There are several construction factors to consider in the wellsite spacing design.

Table 7. Construction Considerations

Key Consideration	Notes
Additional storage	• Lay down • Pipe • Fluid (water, fracturing fluids)
Area outside the berm	• Proximity of adjacent vegetation (e.g., wildfires can result from improperly placed equipment such as flare stacks)
Aspect	• Slope facing • Sunny vs. shaded
Brush storage	• Disposal (burn or mulch)
Campsites	• Proximity to location • Footprint
Cellar	• Width • Depth • Conductor requirements
Construction efficiency	• Lease construction practices that accommodate the extended time spent on the pad, the intensity of heavy traffic and long-term requirements which may be affected by ineffective pad planning • Impacts on neighbours (e.g., traffic, noise, light)
Construction material (soil)	• Clay (C horizon) on site (common/in place) • C horizon not on site (borrowed/imported) • Silt and/or sand on site • Pad support (for stability e.g., shale, soil cement, access matting, geotextiles)
Containment requirements	• Earthen berms • Manufactured containment
Grade	• Drainage requirements for life cycle of the pad
Log decks	• Proximity to location • Quantity
Number of wellheads	• Single • Multiple
Road entry point	• Single • Dual • Shared • Traffic considerations for line of sight off main access/approach placement • Prevailing winds (egress considerations)
Salvaged soil	• Type (A and B horizons) • Amount

Key Consideration	Notes
Salvaged soil storage	• On site vs. offsite • Piling soils steeply and close to standing timber impacts rooting zones, promotes erosion and can inhibit vegetation growth
Season	• Ability to achieve compaction (if required)
Site drainage	• Surface grading • Ditches
Snow storage	• Positioning and footprint
Staging areas	• Emergency response planning • Traffic management
Surface location	• Road use, access, egress • Traffic plan • Line of sight and sound considerations for residents • Proximity to other infrastructure (e.g., power lines), other company's wells, existing pipelines • Third party agreements (e.g., for sharing access roads)
Timber salvage	• Species determines salvage or disposal • Time of clearing based on wildlife constraints
Topography	• Rough • Flat • High ground vs. muskeg • Cut fill locations • Padded locations with offsite borrow material • Landslide risk assessment
Water storage	• Positioning and footprint
Working area	• Sufficient space for all planned operations

20.3.5 Drilling

There are several drilling factors to consider in the wellsite spacing design.

Collision during drilling is a potential risk for multi-well pads. Placement of surface facilities can make it more difficult to create a proper collision avoidance plan. See IRP 03: In Situ Heavy Oil Operations for detailed discussion about collision risk and avoidance.

Placement of surface facilities can also make it more difficult to execute future drilling and completions operations (e.g., fracturing or refracturing operations, redrills, multiple campaigns).

Table 8. Drilling Considerations

Key Consideration	Notes
Drilling fluid system	• Hydrocarbon based • Water based • Brine based
Drilling sequence	• Batch drills • Phased drilling (e.g., wells in different years, seasons, redrills).
Drilling waste management	• Remote sump • Disposal options (e.g., land-spray, landfill) • See IRP28: Wellsite Waste Management for more information
Equipment storage	• Size • Type
Flare requirements and regulations	• Stack height • Distance to lease boundary • Equipment spacing (ignition source) • SimOps and flares for multiple services
Number of wellheads or drilling rigs	• Single • Multiple
On-site emergency services (fire and medical)	• Positioning and footprint • Proximity to offsite emergency services and implications of any railroad crossings • Wind direction identification • Access and egress • Supplemental water source • Road and site conditions
Rig energy source	• Diesel • Electric • Natural gas • Existing riser or well tie-in placement

Key Consideration	Notes
Rig type	• Walking • Umbilical • Standard • Size • OH&S emergency egress system requirements (e.g., slides, anchors, spacing relative to flare stacks)
Season of drilling	• Weather implications • Road and site conditions
Simultaneous operations	• Positioning and offset distances • SimOps plan • See 20.3.9 Simultaneous Operations
Site Characteristics	• Ring roads to facilitate service access/egress
Subsurface spacing requirements	• Field development Plan (see 20.3.1 Field Development Plan) • Wellhead count • Existing propped fracturing communication
Well characteristics	• Depth • Length • Orientation (vertical, horizontal, slant)

20.3.6 Completions and Well Servicing

There are several completions and well servicing factors to consider in the wellsite spacing design.

Placement of surface facilities can make it more difficult to execute future drilling and completions operations (e.g., fracturing or refracturing operations, redrills, multiple campaigns).

A significant amount of equipment and personnel are required to perform some completion and well servicing operations (e.g., fracturing). In order to ensure the safety of those workers, the spacing between equipment needs to be sufficient to minimize incidents (e.g., tanks, flares, drilling, completions and production equipment, site offices (shacks), surface improvements, piping).

Table 9. Completions Considerations

Key Consideration	Notes
Completions timeframe	• Amount of equipment and water requirements
Completions waste management	• See IRP 28: Wellsite Waste Management

Key Consideration	Notes
Equipment type	• Positioning and footprint • Exhaust from power equipment (e.g., power swivels) has to vent no closer than 6 metres from any well and be directed away from any well • Service units with a diesel engine have different distance requirements depending on whether they have positive air shut off (PASO)
Equipment quantities	• Positioning and footprint
Flare requirements and regulations	• Stack height • Distance to lease boundary • Equipment spacing (ignition sources) • SimOps and flares for multiple services
Fluid storage	• C Rings • 400 barrels • Bladders • Minion tanks • Pits
Fluid supply	• Tank • Piped • Pits
Fracturing sand storage	• Positioning and footprint
Fracturing type	• Water • Acid • Sand
Guy wires	• Positioning and space • Anchor blocks
Number of stimulations	• Stages (amount of equipment and water requirements)
Number of wellheads or service rigs	• Single • Multiple • Rigless services • OH&S emergency egress system requirements (e.g., slides, anchors, spacing relative to flare stacks)
On-site emergency services (fire and medical)	• Positioning and footprint • Proximity to emergency services • Wind direction detection • Access and egress • Supplemental water source • Road and site conditions
Simultaneous operations	• Positioning and offset distances • SimOps plan • See 20.3.9 Simultaneous Operations
Site Characteristics	• Ring roads to facilitate service access/egress

Key Consideration	Notes
Tank spacing requirements	• Positioning and footprint

20.3.7 Pipelines and Facilities

For purposes of this IRP, pipeline(s) refer to permanent piping. It may take product through the site to the facilities or from the facilities off the site. This is separate from temporary pipework which leaves the site when an operation is completed. The considerations discussed here are for permanent pipelines. Any spacing considerations for temporary pipework are defined in 20.3.5 Drilling and 20.3.6 Completions and Well Servicing.

Placement of surface facilities can make limit the space available for the equipment required for future operations (e.g., drilling, servicing, fracturing or refracturing operations, redrills, multiple campaigns) and lead to shutting in of facilities or expanding the lease to accommodate the operation.

Table 10. Pipeline and Facilities Considerations

Key Consideration	Notes
Facility layout and placement	• Positioning and footprint • Local jurisdictional electrical code implications • Implications for multiple campaigns • Future operational requirements
Flare requirements and regulations	• Stack height • Distance to lease boundary • Equipment spacing (ignition sources) • SimOps and flares for multiple services
Future tie-ins	• Expansion • Above and below-ground piping
Pipeline and riser entry point	• Positioning and footprint
Pipeline ownership	• Pipelines (owned by licensee or others) can transverse the site • Crossing and proximity agreements may be required
Pipeline size and type	• Pipe bends onsite or prefabricated • Reference field development plan
Pipeline status	• Active • Inactive • Regulations regarding placement of components near pressurized pipe (e.g., flare stacks, site entrance) • Implications for safety zone • Implications for temporary pipework design components (e.g., flanges)
Simultaneous operations	• Positioning and offset distances • SimOps plan • See 20.3.9 Simultaneous Operations

Key Consideration	Notes
Timing of facility construction	• Existing pipelines and facilities can complicate drilling or completions planning and operations

20.3.8 Production Operations

There are several production operations factors to consider in the wellsite spacing design.

Table 11. Production Operations Considerations

Key Consideration	Details
Access requirements	• Trucked production vs. light traffic •
Flare requirements and regulations	• Stack height • Distance to lease boundary • Equipment spacing (ignition sources) • SimOps and flares for multiple services
Intensity of operation	• Traffic type • Traffic frequency
Nature of equipment	• Permanent • Temporary
On-site emergency services (fire and medical)	• Positioning and footprint • Proximity to emergency services • Wind direction detection • Access and egress • Supplemental water source • Road and site conditions
Simultaneous operations	• Positioning and offset distances • SimOps plan • See 20.3.9 Simultaneous Operations
Workovers	• Type • Frequency • Footprint

20.3.9 Simultaneous Operations

Multi-well pads with drilling activity in different stages or planned/anticipated servicing operations can lead to SimOps at a site. While it may not be possible to predict every possible activity that might be required, considerations from the field development plan, offset well activity and formation parameters can help to determine the type of services to plan for.

For purposes of this IRP, SimOps refers to multiple operations with separate job scopes occurring at a location at a single time. Events of any one operation may impact the safety or performance of personnel or equipment of another operation. There is no

minimum number of operations that defines SimOps. Risk varies depending on type of operation(s) being conducted and the distance they are apart from each other.

Examples of operations include the following

- Hot work (e.g., welding)
- Pumping flammable fluids
- Well testing
- Fracturing
- Cementing
- Drilling
- Snubbing (rigless or with service rig)
- Wireline operations
- Fishing operations
- Facility construction

IRP Wellsite spacing design should consider potential SimOps and how to fit all of the equipment and personnel required into the planned site in a manner that ensures the safety of the workers on site, the public and the environment.

Each activity can impact the site development plan as noted in the key considerations in the table below.

Table 12. Simultaneous Operations Considerations

Key Consideration	Details
Fracturing operations	• Equipment requirements (e.g., high pressure lines) • Storage requirements (e.g., sand, produced fluids) • Safety zone requirements
Rig operations	• Drilling vs. service rig • Snubbing requirements (see IRP 15: Snubbing Operations) • High pressure pumping • Coiled tubing equipment requirements (rig vs, truck)
Site characteristics	• Single vs. multi-well pad • Distances between wells on a multi-well pad and double well spacing • Status of well(s) and facility construction • Safety zone(s) • Site egress • Well barricade requirements • Ring roads to facilitate service access/egress

Key Consideration	Details
Type of services planned or anticipated	• Equipment requirements (i.e., need enough space to get all the equipment on the site) including trucks/skids, restraining equipment/anchors, electrical/grounding equipment, delivery trucks • Equipment positioning and orientation (i.e., keep people and equipment out of the line of fire - don't direct release valves from one service at another service or rig) • Personnel requirements (which can in turn impact safety zone planning • Safety zone requirements • Storage requirements (e.g., fracturing fluids or sand, produced water, drilling waste) • Implications of hot work • Service rig vs. rigless (derrick height may impact safety zone requirements and spacing of wells) • Flare requirements (i.e., different services may require their own flare) • Equipment egress requirements • Commissioning the well and/or facilities (e.g., implications of vented gases) • Operation egress (i.e., egress from a service may be via another service area)
Well status (producing vs. shut in)	• Number of barriers in place/available impacts what other operations can take place around the well • Safety zone requirements • Equipment requirements (e.g., emergency shut down (ESD) device location, flare line pilots, restraints and anchors)
Well type and fluids	• Sweet vs. sour • Oil vs. gas • Flammable vs. non-flammable
Wireline operations	• Type of service (wireline, slickline, e-line, fishing) • Equipment requirements (e.g., trucks, cranes, service trailers, skids) • Blast radius and detonation systems • Explosives storage • Safety zone requirements

20.4 Jurisdictional Spacing Requirements

The size of a wellsite is heavily influenced by the regulations of the various jurisdictions. This section outlines the minimum spacing requirements for the various local jurisdictional regulators. These standards are summarized in 20.4.6 Summarized Jurisdictional Spacing Requirements. References for this information can be found in Appendix D.

IRP **Jurisdictional spacing requirements shown in this section are accurate as of IRP publication but accuracy must be reverified with the appropriate local jurisdictional regulator.**

There are many possible drilling and well servicing scenarios and combinations of equipment that may be required for a specific well site or pad. It is not always possible to have a definitive regulation or recommendation for spacing. It is the responsibility of the licensee to ensure that all local jurisdictional spacing requirements, even if not identified explicitly in this IRP, are followed.

Note: When the spacing refers to a wellhead, it is referencing the well centre.

Note: When referring to spacing distances to the wellhead, the distances apply to any well on site for multi-well operations.

20.4.1 British Columbia Spacing Regulations

British Columbia spacing regulations are defined by the BC Oil and Gas Commission (BCOGC) and WorkSafeBC.

The following chart of spacing distances is reproduced from the BCOGC Oil and Gas Activity Operations Manual Section 9.6.15 Table 9E.1.

Figure 2. British Columbia Recommened Wellsite 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.

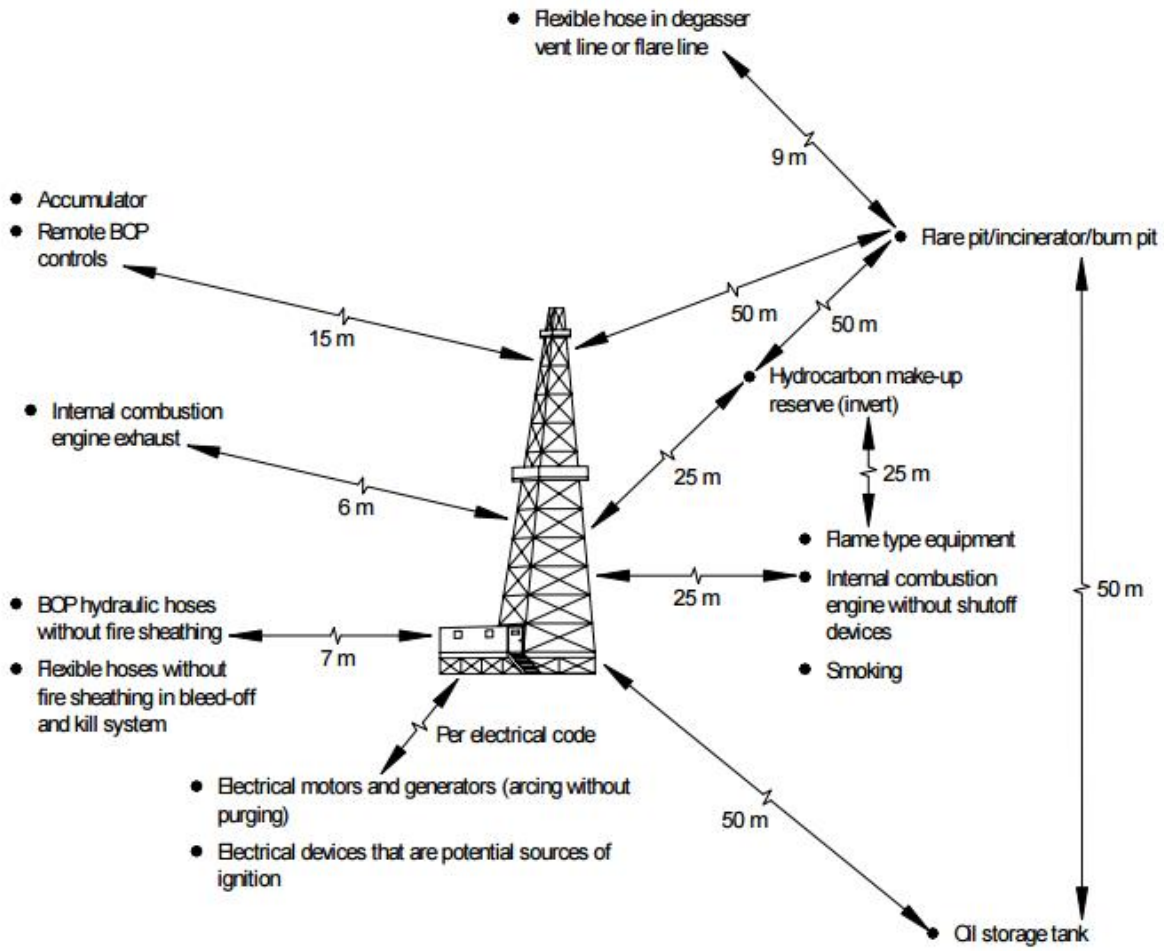
IRP Wellsite, pipeline and facility spacing must be assessed for setbacks and approved by the local jurisdictional regulator.

20.4.2 Alberta Spacing Regulations

Alberta Oil and Gas Conservation Rules (OGCR) can be found on the AER website. AER D056: Energy Development Applications and Schedules sections 5.6.9 (Setback Requirements) and 5.6.10 (Plot Plans and Spacing Requirements) provide links to the appropriate OGCR regulations and other AER Directives that are relevant to spacing (including D036: Drilling and Blowout Prevention Procedures, D037: Service Rig Inspection Manual and D060: Upstream Petroleum Industry Flaring, Incinerating and Venting).

AER D036: Drilling and Blowout Prevention Procedures, Appendix 6: Wellsite Spacing – Minimum Distance Requirements shows expected spacing between equipment in conventional operations. That diagram is reproduced in Figure 3.

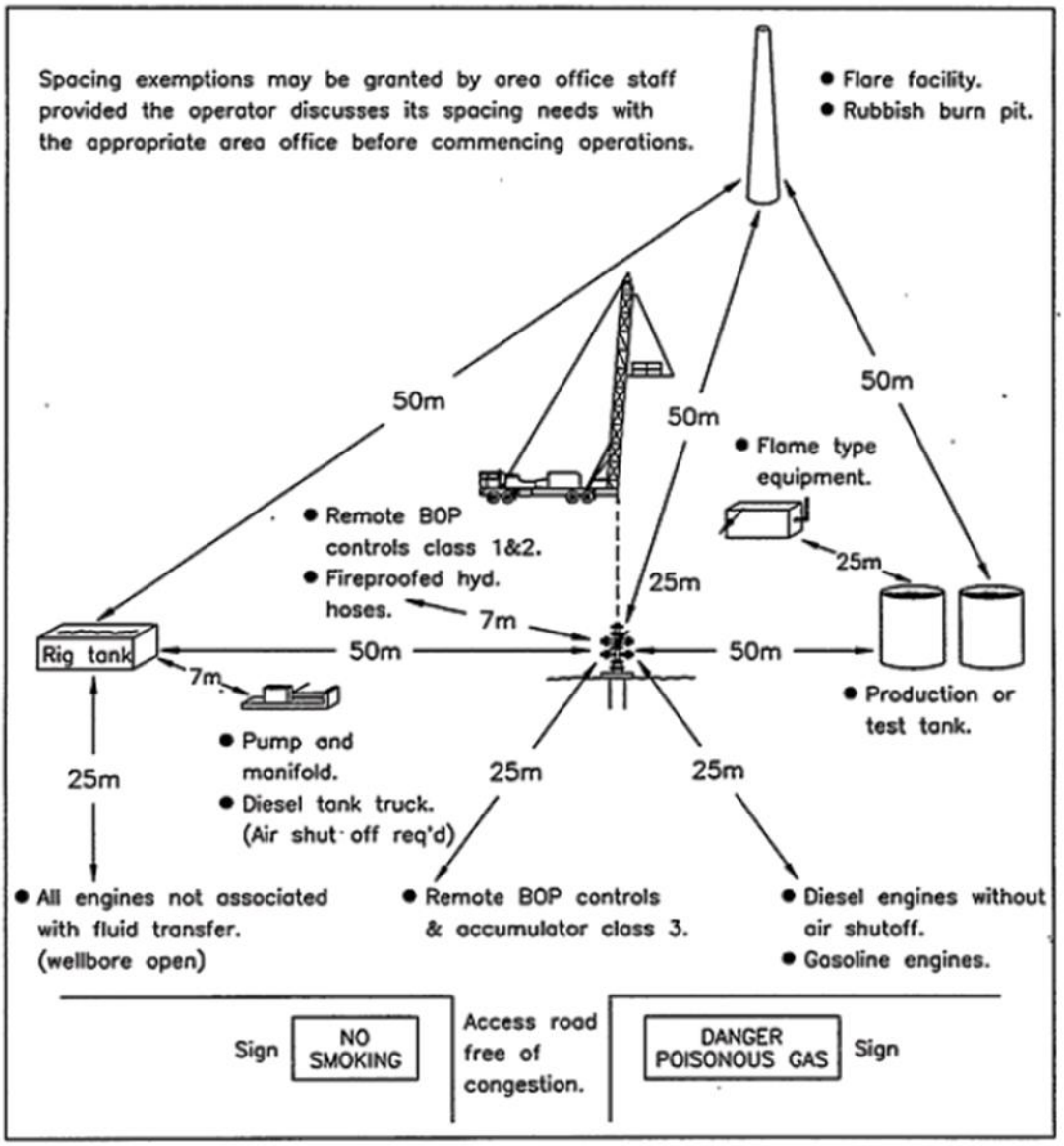
Figure 3. AER D36, Appendix 6: Wellsite Spacing – Minimum Distance Requirements



D037: Service Rig Inspection Manual, Schedule 11 shows expected spacing between servicing equipment in conventional operations. That diagram is reproduced in Figure 4.

Figure 4. AER D037, Schedule 11: Equipment Spacing for Well Servicing

SCHEDULE 11
REFERRED TO IN SECTION 8.148 OF THE OIL AND GAS CONSERVATION REGULATIONS
EQUIPMENT SPACING FOR WELL SERVICING CONVENTIONAL WELLS

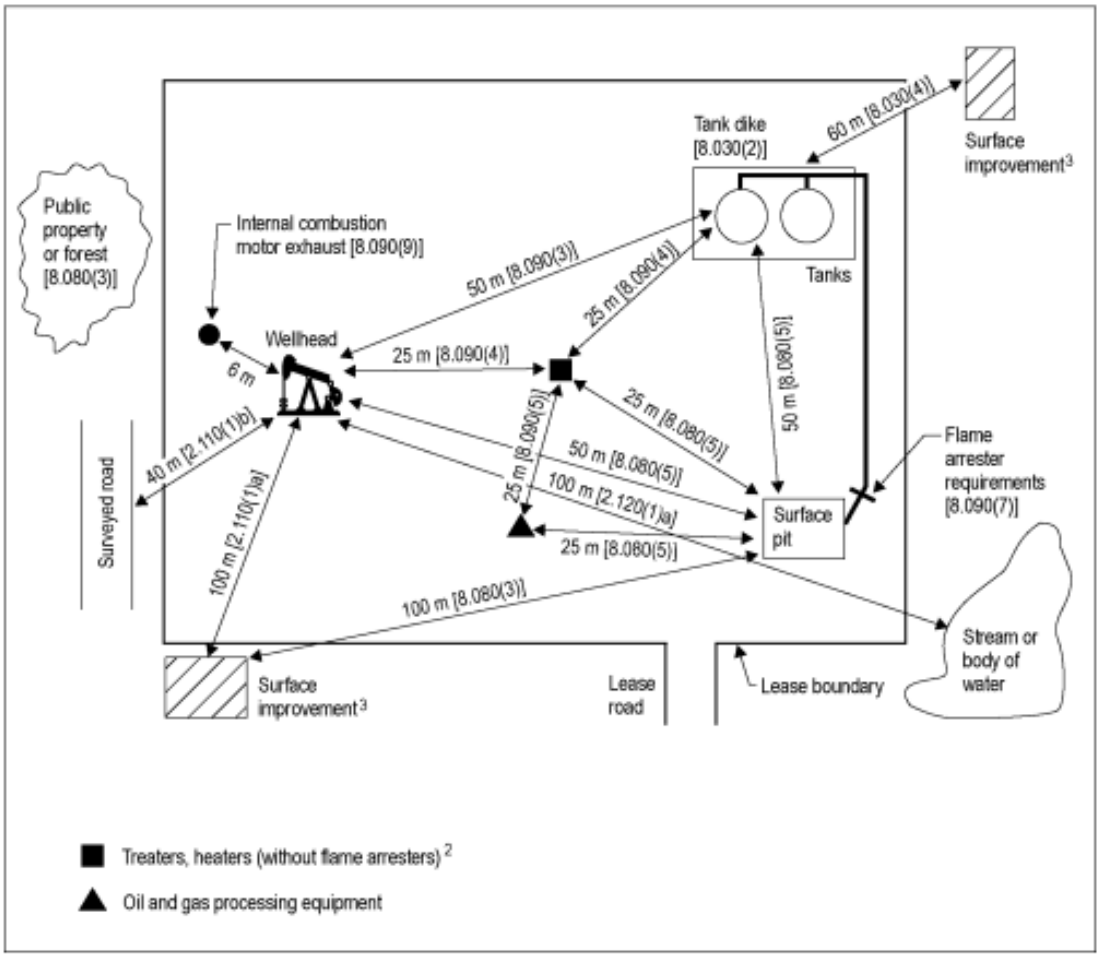


NOTE: The doghouse and light plant must be positioned in accordance with smoking and open flame regulations, and regulations under the Electrical Protection Act.
All distances shown are minimum distances.

Appendix 2 in AER Manual 012: Energy Development; Procedures and Schedules shows additional spacing detail. That diagram is reproduced in Figure 5.

Figure 5. AER Manual 012 Appendix 2 Spacing Diagram

Appendix 2 Spacing Diagram



[1] The spacing requirements illustrated here are as specified in the *OGCR* sections indicated within square brackets alongside or underneath each measurement.
"No person shall smoke within 25 m of a well, separator, oil storage tank or other unprotected source of ignitable vapour or on a rig or derrick at a well site" [section 8.120(1)].

[2] No flame type equipment shall be placed or operated within 25 metres of any process vessels unless, where such is applicable, the flame type equipment is fitted with an adequate flame arrester [8.090(5)]. No flame type equipment shall be located in the same building as any process vessel or other source of ignitable vapour, unless (a) the air intakes and flues of all burners are located outside the building, (b) relief valves, safety heads, and other sources of ignitable vapours are vented outside the building and discharged above roof level, and (c) the building is adequately cross ventilated [8.090(6)a,b,c].

[3] "Surface improvement" means a railway, pipeline, or other right-of-way, road allowance, surveyed roadway, dwelling, industrial plant, aircraft runway or taxiway, building used for military purposes, permanent farm building, school or church [1.020(1)28].

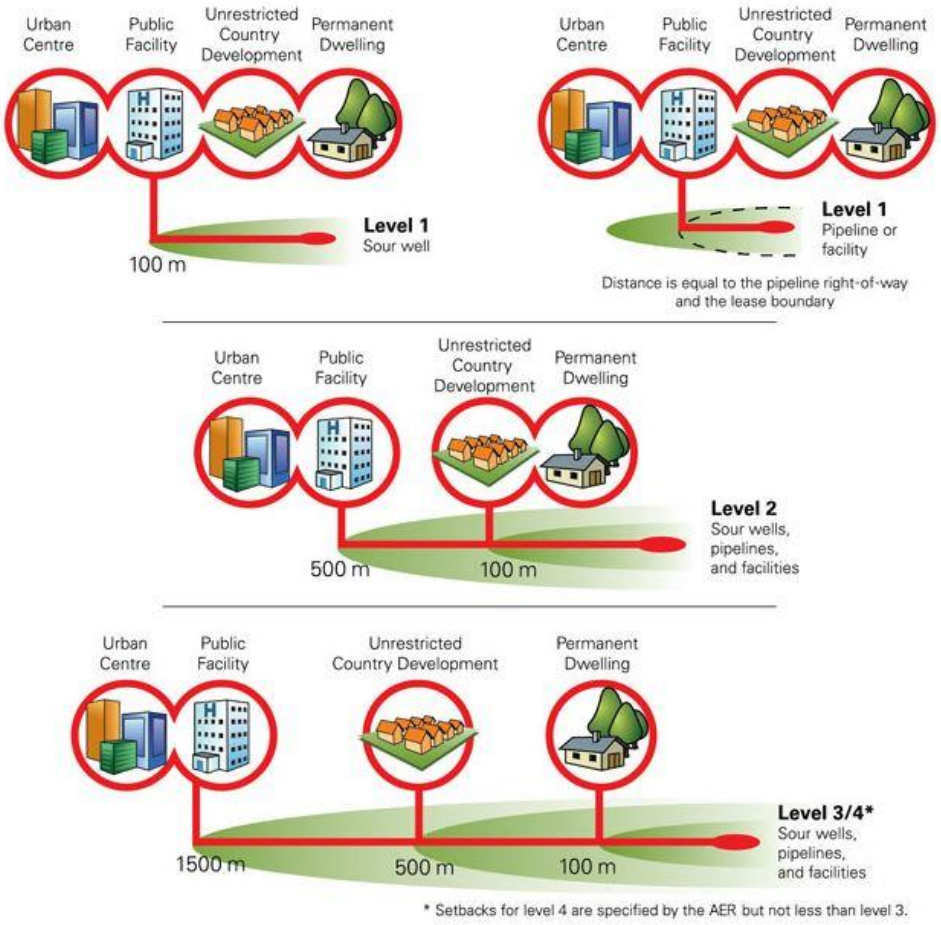
Compressors (electrically or engine driven) that are permanent and housed in a building must be located 25 m from wells, oil storage tanks, or unprotected sources of ignitable vapours. Compressors that are nonpermanent (on wheels or skid mounted) must be placed such that the air intakes and exhaust must be no closer than 6 m from a well. Nonpermanent electrically driven compressors must comply with the current edition of *Code for Electrical Installations at Oil and Gas Facilities*, Safety Codes Council (Alberta).

The AER EnerFAQ webpage explains the setback requirements for the AER. That information is reproduced in Figure 6. The specific distances as per AER directives are shown in Tables 13, 14 and 15 below the diagram.

Figure 6. AER Setback Diagram

What is a setback?

A setback is the absolute minimum distance that must be maintained between any energy facility (for example, a drilling or producing well, a pipeline, or a gas plant) and a dwelling, rural housing development, urban centre, or public facility. Setbacks vary according to the type of development and whether the well, facility, or pipeline contains sour gas.



AER D056: Energy Development Application Schedules section 5.6.9 Setback Requirements Table 6 shows setback requirements for category C, D or E facilities with pipelines containing H_2S. That table is reproduced below.

Table 13. Alberta Setback Requirements for Category C, D or E Facilities with Pipelines Containing H_2S

Level	H_2S Release Volume (m^3)	Minimum Distance
1	< 300	• Lease boundary
2	≥ 300 to < 2000	• 0.1 km to individual permanent dwellings and unrestricted country developments • 0.5 km to urban centres or public facilities
3	≥ 2000 to < 6000	• 0.1 km to individual permanent dwellings up to 8 dwellings per quarter section • 0.5 km to unrestricted country developments • 1.5 km to urban centres or public facilities
4	≥ 6000	• As specified by the AER, but not less than those given for Level 3

AER D056: Energy Development Application Schedules section 6.6.2 Setback Requirements Table 8 shows setback requirements for gas/oil effluent pipelines containing > 10 mol/kmol H_2S. That table is reproduced below.

Table 14. Alberta Setback Requirements for Gas/Oil Effluent Pipelines Containing > 10 mol/kmol H_2S

Level	H_2S Release Volume (m^3)	Minimum Distance
1	< 300	• Pipeline right-of-way
2	≥ 300 to < 2000	• 0.1 km to individual permanent dwellings and unrestricted country developments • 0.5 km to urban centres or public facilities
3	≥ 2000 to < 6000	• 0.1 km to individual permanent dwellings up to 8 dwellings per quarter section • 0.5 km to unrestricted country developments • 1.5 km to urban centres or public facilities
4	≥ 6000	• As specified by the AER, but not less than those given for Level 3

AER D056: Energy Development Application Schedules section 7.7.13 Setback Requirements Table 12 shows setback requirements for wells containing H_2S. That table is reproduced below.

Table 15. Alberta Setback Requirements Wells Containing H_2S

Level	H_2S Release Volume (m^3/s)	Minimum Distance
2	≥ 0.01 to < 0.3	• 0.1 km as stated in section 2.110 of the OGCR
2	≥ 0.3 < 2.0	• 0.1 km to individual permanent dwellings and unrestricted country developments • 0.5 km to urban centres or public facilities
3	≥ 2.0 to < 6.0	• 0.1 km to individual permanent dwellings up to 8 dwellings per quarter section • 0.5 km to unrestricted country developments • 1.5 km to urban centres or public facilities
4	≥ 6.0	• As specified by the AER, but not less than those given for Level 3

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. Publication name is the Oil and Gas Conservation Regulations.

Additional requirements are found in Directive S-01: Saskatchewan Upstream Petroleum Industry Storage Standards.

The chart shown in Figure 7 below is from S-01 Appendix 2 – Equipment Spacing Requirements.

The diagram shown in Figure 8 below is from S-01 Appendix 1 – Isolation Distance for Facilities and Wells.

Figure 7. S-01 Appendix 2: Equipment Spacing Requirements

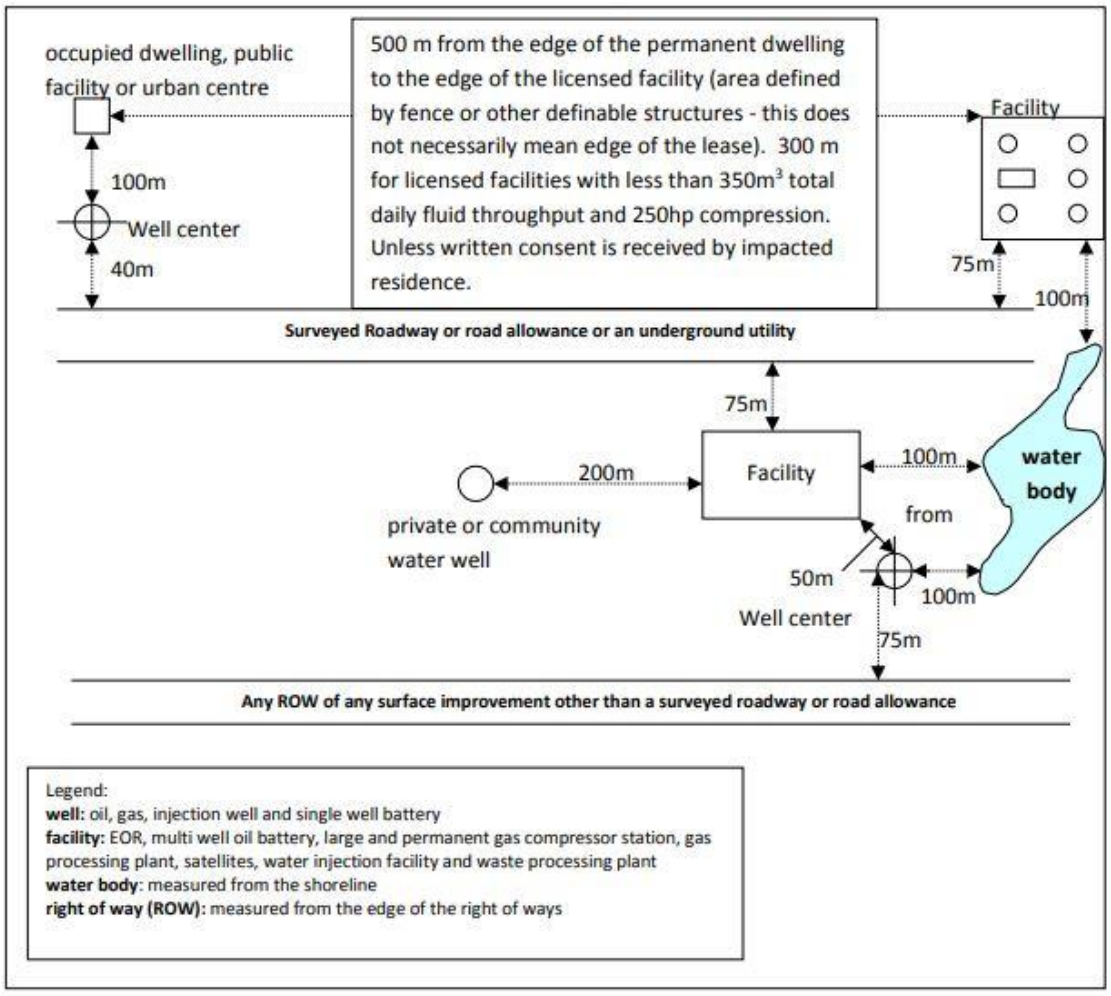
Equipment Spacing Distances (m)	Oil or Gas well	Water supply of Water source well	Flare	Oil Storage tanks	Salt water storage tanks	***Portable water tanks	**Process Equipment	*Flame type equipment with flame arrester	*Flame type equipment without flame arrester	Compressor with permanent footing	Internal combustion engine exhaust
Oil or gas well		na	50	50	50	25	25	25	25	50	6
Water supply, water injection or water disposal well	na		25	50	na	na	na	na	na	25	na
Flare	50	25		50	50	50	25	25	25	25	na
Oil storage tanks	50	50	50		na	na	na	25	25	25	na
Salt water storage tanks	50	na	50	na		na	na	25	25	25	na
***Portable water tanks	25	na	50	na	na		na	25	25	25	na
**Process Equipment	25	na	25	na	na	na		na	25	na	na
*Flame type equipment with flame arrester	25	na	25	25	25	25	na		25	na	na
*Flame type equipment without flame arrester	25	na	25	25	25	25	25	25		25	na
Compressor with permanent footing	50	25	25	25	25	25	na	na	25		na
Internal combustion engine exhaust	6	na	na	na	na	na	na	na	na	na	

* Flame type equipment includes any open flame equipment, other heating device or electrical device that has open ignition and/or could potentially cause a fire or explosion. For the purpose of equipment spacing, flame type equipment includes, but is not limited to, steam boilers, free water knock-outs, dehydrators, generators, heaters, treaters, diesel engines without automatic air shut offs and heated water tanks on a skid.

** Process equipment includes any non-flame type equipment used in the upstream petroleum recovery or treatment process such as, but not limited to, amine tank, pop tank, flare knockout drum (N/A with appropriate overfill protection and flame arrestor), scrubber, sweetener and separator. Process equipment generally does not have a permanent footing.

*** Portable water tanks are skid mounted, less than 65 m^3 and are not heated.

Figure 8. S-01 Appendix 1: Isolation Distance for Facilities and Wells



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.

Manitoba workplace safety and health information can be found on the Government of Manitoba website under the Workplace Safety and Health (WSH) page of Labour and Regulatory Services.

Schedule C from the Manitoba Drilling and Production Regulation shows a table of minimum distance requirements. That table is reproduced in Figure 9.

Figure 9. Manitoba Minimum Distance Requirements

SCHEDULE C
(Subsections 9(1), 75(4), and 85(1)
Drilling and Production Regulation Table of Contents

Table of Minimum Distance Requirements
Note: The distances in the table are expressed in metres

To:	Well	Flame Type Equipment	Internal Compustion 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 Vessell	25	--	--	--	25	25	75	100	45

20.4.5 CER Spacing Regulations

Canada Energy Regulator Information can be found on the Government of Canada Website in the following documents:

- Canadian Oil and Gas Drilling and Production Regulations SOR/2009-315
- Canadian Oil and Gas Drilling and Production Regulations C.R.C., c 1517
- NEB Canadian Oil and Gas Installations Regulations SOR/96-118 (COGIR)

20.4.6 Summarized Jurisdictional Spacing Requirements

Table 16 compares spacing requirements for British Columbia, Alberta, 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 authorities.

Note: The definition of surface improvement (see row 4) varies by jurisdiction. For this reason, there are several other entries in this table for items that are considered surface improvements in some jurisdictions. These include entries 16 through 22 for permanent buildings, public facilities, military installations, schools, churches and powerline, railway or pipeline right of ways. Refer to local jurisdictional regulations for the definition of surface improvements for each jurisdiction.

Table 16. Jurisdictional Spacing Requirements

	British Columbia		Alberta		Saskatchewan		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	DPR 5(2)	40 m	OGCR 2.110 Manual 012 Appendix 2	40 m	OGCR 25(1)b	45 m	DPR Schedule C
4. Wellhead to Surface Improvement	100 m	DPR 5(2)	100 m	OGCR 2.110 Manual 012 Appendix 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 through 6.190			Within 1 km of subsurface mine subject to Mines and Minerals Act and Director of Mines Approval	DPR 9(4)
6. Wellhead to Coal Mine (abandoned)			400 m	OGCR 6.140 through 6.190			Within 1 km of subsurface mine subject to Mines and Minerals Act and Director of Mines Approval	DPR 9(4)

	British Columbia		Alberta		Saskatchewan		Manitoba	
Required Distance	**Distance**	**Regulation**	**Distance**	**Regulation**	**Distance**	**Regulation**	**Distance**	**Regulation**
7. Flare to production/rig tank	50 m to crude oil and condensate 25 m to water tank, other source of ignitable vapours, separator, flame type equipment 25 m	Oil and Gas Activity Operations Manual 9.6.15 Oil and Gas Activity Operations Manual 9.6.15 WorkSafeBC OH&S 23.7(2)	50 m	D036 Appendix 6 D060 Section 7.8	45 m if installed prior to January 1, 2008 50 m if after January 1, 2008	OGCR 51(7) and S-01	25 m	DPR Schedule C
8. Tank to Surface Improvement			60 m	OGCR 8.030 (4) Manual 012 Appendix 2			75 m	DPR Schedule C

	British Columbia		Alberta		Saskatchewan		Manitoba	
Required Distance	**Distance**	**Regulation**	**Distance**	**Regulation**	**Distance**	**Regulation**	**Distance**	**Regulation**
9. Flare to Surface Improvement			100 m Surface improvement (excluding below) 40 m (Surveyed roads and roadways)	OGCR 8.080 (3) D060 Section 7.8			100 m	DPR Schedule C
10. Wellhead to Flare	50 m 25 m	Oil and Gas Activity Operations Manual 9.6.15 WorkSafeBC OH&S 23.7(2)	50 m conventional 25 m for heavy oil	OGCR 8.080 (5) D036 Appendix 6 D060 Section 7.8	50 m	S-01	25 m	DPR Schedule C
11. Wellhead to Flare Tank	50 m Isolation of Ignition sources required	Oil and Gas Activity Operations Manual 8.3.5 WorksafeBC OHS 23.44(1)	50 m conventional 25 m for Class I for heavy oil	D036 Appendix 6 ID 91-3 Section 2.2 D060 Section 7.8			25 m	DPR Schedule C

	British Columbia		Alberta		Saskatchewan		Manitoba	
Required Distance	**Distance**	**Regulation**	**Distance**	**Regulation**	**Distance**	**Regulation**	**Distance**	**Regulation**
12. Wellhead to Boiler	25 m	Oil and Gas Activity Operations Manual 9.6.15	25 m	Follow requirements related to flame type equipment	23 m if installed prior to January 1, 2008 25 m after January 1, 2008	OGCR 63(2)	25 m	DPR Schedule C
13. Wellhead to Flame Type Equipment	25 m	Oil and Gas Activity Operations Manual 9.6.15	25 m	OGCR 8.090 (4)	25 m	S-01 Appendix 2	25 m	DPR Schedule C
14. Hydrocarbon Storage Tank to Flame Type Equipment	25 m	Oil and Gas Activity Operations Manual 9.6.15	25 m	OGCR 8.090 (4)	25 m	S-01 Appendix 2	25 m	DPR Schedule C
15. Wellhead to Wellsite Trailer	25 m	Treat as flame type equipment	25 m	D036 Appendix 6 (flame type equipment)	23 m if installed prior to January 1, 2008 25 m after January 1, 2008	Wellsite trailers treated as flame-type equipment OGCR 63(2)	25 m	DPR Schedule C

	British Columbia		Alberta		Saskatchewan		Manitoba	
Required Distance	**Distance**	**Regulation**	**Distance**	**Regulation**	**Distance**	**Regulation**	**Distance**	**Regulation**
16. Wellhead to Permanent Building	100 m	DPR 5(2)	100 m	See #4 Wellhead to Surface Improvement	100 m if installed prior to July 1, 2013 125 m after July 1, 2013	PNG 004 Section 2	75 m	DPR Schedule C
17. Wellhead to Public Facility	40 m	DPR 5(2)	100 m	See #4 Wellhead to Surface Improvement	100 m if installed prior to July 1, 2013 125 m after July 1, 2013	PNG 004 Section 2	75 m	DPR Schedule C
18. Wellhead to Military Installation	100 m	DPR 5(2)	100 m	See #4 Wellhead to Surface Improvement	See #16 Wellhead to Permanent Building		75 m	DPR Schedule C
19. Wellhead to Power Line – Right of Way	40 m	DPR 5(2)	100 m	See #4 Wellhead to Surface Improvement	75 m if above ground 40 m if underground	PNG 004 Section 2	75 m	DPR Schedule C
20. Wellhead to Railway – Right of Way	40 m	DPR 5(2)	100 m	See #4 Wellhead to Surface Improvement	75 m	PNG 004 Section 2	75 m	DPR Schedule C

	British Columbia		Alberta		Saskatchewan		Manitoba	
Required Distance	**Distance**	**Regulation**	**Distance**	**Regulation**	**Distance**	**Regulation**	**Distance**	**Regulation**
21. Wellhead to Pipeline – Right of Way	40 m	DPR 5(2)	100 m	See #4 Wellhead to Surface Improvement	75 m if above ground 40 m if undergrou nd	PNG 004 Section 2	75 m	DPR Schedule C
22. Wellhead to School/Church	1 km	Any proposed wells within 1 km of a school undergo an enhanced review by the Commission. See Exclusion zones implemented for schools | BC Gov News	100 m	See #4 Wellhead to Surface Improvement	100 m if installed prior to July 1, 2013 125 m if after July 1, 2013	PNG 004 Section 2	75 m	DPR Schedule C
23. Wellhead to Water Well					100 m if installed prior to July 1, 2013 125 m if after July 1, 2013	PNG 004 Section 2		
24. Well to Gasoline/Liquid Fuel Tank	25 m	DPR 45(2)					25 m	DPR Schedule C

	British Columbia		Alberta		Saskatchewan		Manitoba	
Required Distance	**Distance**	**Regulation**	**Distance**	**Regulation**	**Distance**	**Regulation**	**Distance**	**Regulation**
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 from public road 100 m from any permanent building, installation or works that is not associated with oil and gas activity, and any place of public concourse	DPR 47(c)	40 m for surveyed roadways or road allowances 100 m for others	D060 Ssection 7.8 D060 Section 7.8 and D056			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)						

	British Columbia		Alberta		Saskatchewan		Manitoba	
Required Distance	**Distance**	**Regulation**	**Distance**	**Regulation**	**Distance**	**Regulation**	**Distance**	**Regulation**
29. Oil 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			50 m	D036 Appendix 6			75 m	DPR Schedule C
30. Oil storage tanks and production equipment for a well or facility to an existing well for heavy oil production			25 m	ID 91-03 Section 4				
31. Petroleum storage tanks and production equipment for a well or facility to any public road	80 m	DPR-48					45 m	DPR Schedule C
32. Oil/Petroleum storage tanks and production equipment for a well or facility to any permanent building, installation or works that is not associated with oil and gas activity, and any place of public concourse	100 m	DPR-48	60 m	OGCR 8.030			75 m	DPR Schedule C
33. Rig tank to wellhead			50 m conventional 15 m heavy oil	D037 Schedule 11 IRP 03: In Situ Heavy Oil Operations	50 m conventional 25 m heavy oil	S-01	25 m	DPR Schedule C

	British Columbia		Alberta		Saskatchewan		Manitoba	
Required Distance	**Distance**	**Regulation**	**Distance**	**Regulation**	**Distance**	**Regulation**	**Distance**	**Regulation**
34. Wellbore to swab tanks (regardless of well class)	50 m	WorkSafeBC OH&S 23.67 Drillstem Testing, Swabbing and Well Stimulation	50 m	OH&S	45 m	OH&S	24 m	WSH
35. Diesel, gas or propane engine exhaust to any wellhead			6 m	OGCR 8.090 D036 D037			5 m	WSH
36. Diesel, gas or propane engine (that needs to remain running during operations) without PASO to wellhead			25 m	D036 D037				
37. Diesel engine (that needs to remain running during operations) with PASO that does **not** have remote controls to wellhead			25 m	D036 D037				
38. Engines that need to remain running during operations with PASO and remote controls to wellhead			As per exhaust (#35)	D036 D037				

	British Columbia		Alberta		Saskatchewan		Manitoba	
Required Distance	**Distance**	**Regulation**	**Distance**	**Regulation**	**Distance**	**Regulation**	**Distance**	**Regulation**
39. High pressure pumpers with PASO to wellhead (e.g., flameless nitrogen units, cementers, acidizers, fracturing units) **Note:** Some fluids require a distance of 50 m (i.e., fluids with density under 920 kg/m^3). See IRP 03: In Situ Heavy Oil Operations for more information.			15 m for Class IIA As per exhaust for other classes (#35)	D037				

20.4.7 Power Lines

IRP Service rig or continuous rod rigs must be mast height plus 3 m away from overhead power lines or power poles and anchor lines must not pass over or under a live power line.

IRP Production tanks containing hydrocarbons must be 7 m from overhead power lines or poles.

20.4.8 Heavy Oil Spacing Requirements

The requirements for heavy oil spacing apply to Alberta and Saskatchewan heavy oil operations. Refer to IRP 03: In Situ Heavy Oil Operations for more information.

The type of fluid being handled during operations can impact the spacing requirements. Refer to IRP 04: Well Testing and Fluid Handling and IRP 08: Pumping Flammable Fluids for more information.

IRP Bailing tanks may be placed adjacent to a well but must be removed as soon as bailing operations are completed.

The following chart is adapted from IRP 03: In Situ Heavy Oil Operations and updated to current regulations, particularly in regards to spacing from vehicle exhaust, PASO devices and remote controls.

Note: Measurement is from well centre line to air intake.

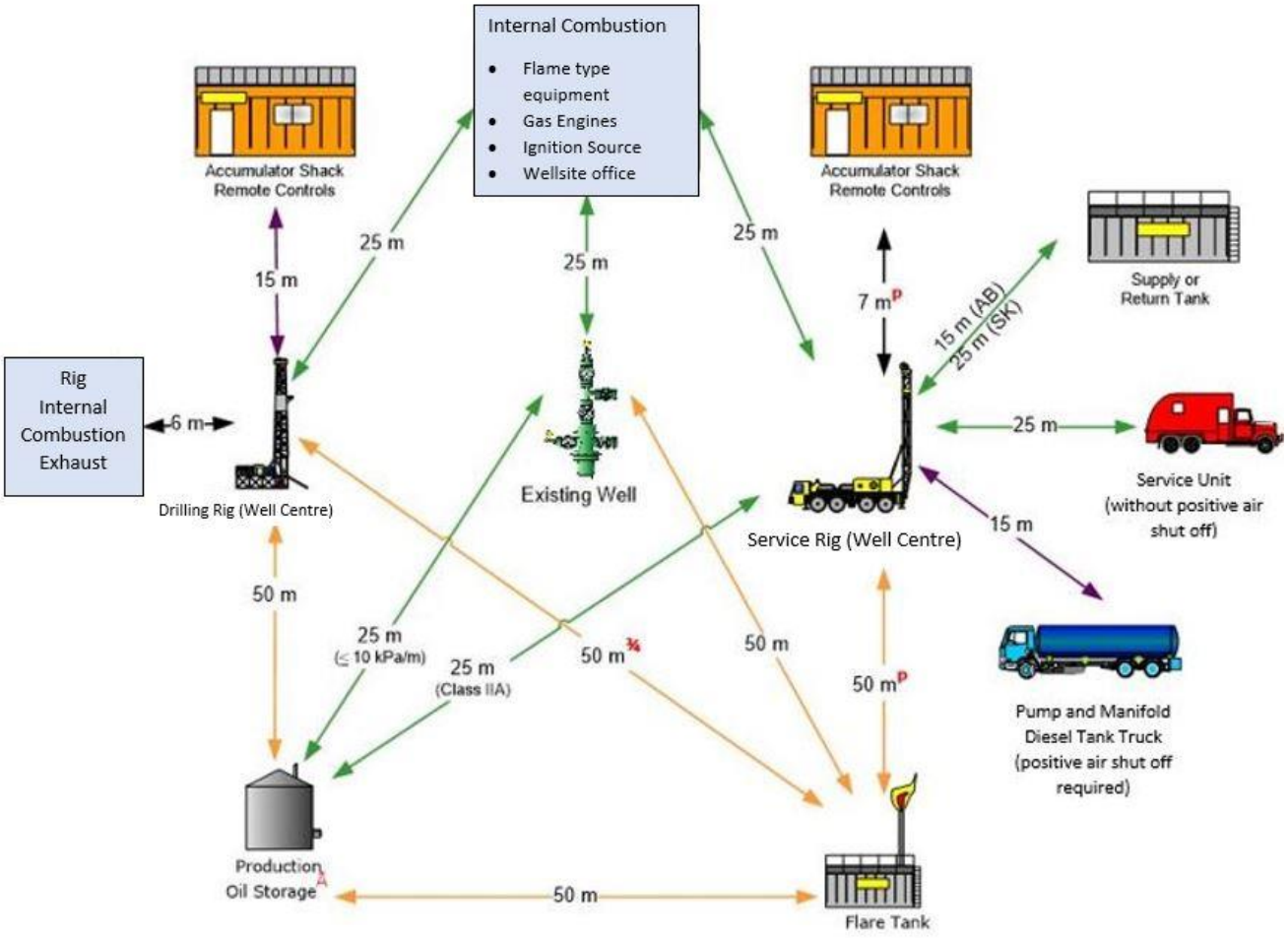
Note: Diesel engines with PASO and remote controls have different spacing requirements than those without.

Table 17. Heavy Oil Well Servicing Spacing Requirements

Equipment	Production Tanks (Contain Hydrocarbons)	Rig Tank	Service Rig/ Continuous Rod Rig
	Distance (metres)		
Coiled Tubing Unit		15 m	
Combustion engines Without PASO	25 m	25 m	
Flame type equipment (e.g., Nitrogen Unit with flame vaporizer, boiler, continuous rod welder)	25 m	25 m	
Internal combustion engine exhaust	6 m	6 m	
Pressure Truck with PASO			If being used for the rig pump and tank 15 m
Production Tanks (Contains Hydrocarbons)		25 m (Sk)	25 m
Rig Tank	25 m (Sk)		15 m
Service Rig/ Continuous Rod Rig	25 m		Closest guyline + mast height + 3 m
Steamer/Hot Oiler	25 m		
Trailers/ Doghouse	25 m	25 m	
Service truck or flushby unit with PASO			Closest guyline + mast height + 3 m

The following diagrams are adapted from IRP 03: In Situ Heavy Oil Operations and updated to current regulations, particularly in regards to spacing from vehicle exhaust, PASO devices and remote controls. Figure 10 illustrates spacing for a heavy oil multi-operational pad and Figure 11 illustrates spacing for a heavy oil well servicing with coiled tubing.

Figure 10. Heavy Oil Multi-Operational Pad

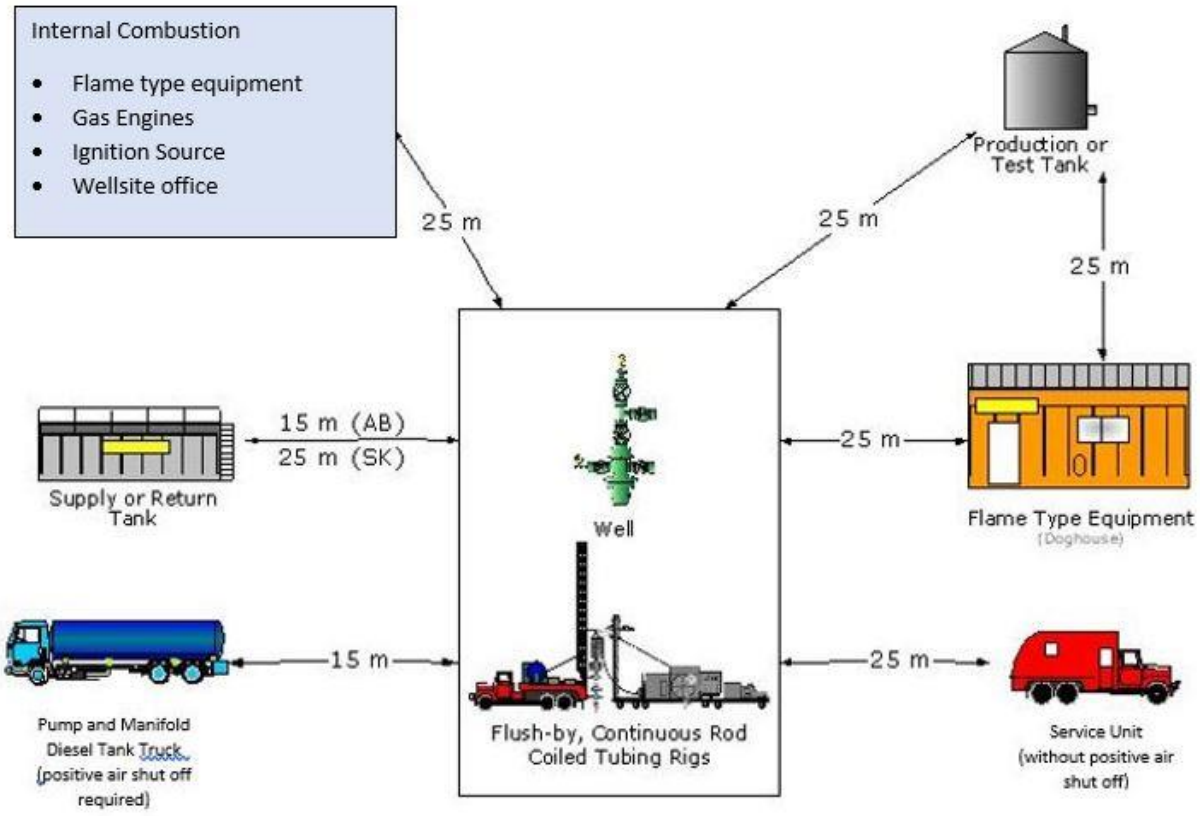


Note: Spacing distances apply to any well on site.

Table 18. Characteristics for Heavy Oil Multi-Operational Pad

Location	Characteristics
Site	• SimOps plan would be required. • Heavy oil spacing regulations to be followed.
Inside the working area	• Service units with a diesel engine without a positive air shutoff must be at least 25 m from the well. Units a positive air shutoff may be closer. • Exhaust from power equipment (e.g., power swivels) has to vent no closer than 6 metres from any well and be directed away from the well.
Alberta	• Distances marked ¾: 50 m as per AER D036 or D037. However, if D008 Section 4 (drilling) or ID 91-03 (servicing) requirements are met, an operator may opt to drill or service with a Class I BOP and reduce spacing between the well and the flare tank to 25 metres. • Distances marked P: For a Class III BOP or critical sour well spacing must be 50 m as per AER D037.
Saskatchewan	• Distances marked Â: Multi-well pads that require facility license or are a licensed facility must have 50 m spacing between the production oil storage and the well (as per Saskatchewan Oil and Gas Conservation Regulations and Directive S-01).

Figure 11. Heavy Oil Well Servicing with Coiled Tubing



Note: Spacing distances apply to any well on site.

Table 19. Characteristics for Heavy Oil Well Servicing with Coiled Tubing

Location	Characteristics
Site	• SimOps plan may be required for multiple operations. • Heavy oil spacing regulations to be followed.
Inside the working area	• Service units with a diesel engine without a positive air shutoff must be at least 25 m from the well. Units a positive air shutoff may be closer. • Exhaust from power equipment (e.g., power swivels) has to vent no closer than 6 metres from any well and be directed away from the well.
Alberta	• Class IIA Primary: A well with a sandface reservoir pressure equal to or less than the hydrostatic pressure that would be exerted at the sandface if the well were filled with formation fluids. BOP pressure test as per IPR 21: Coiled Tubing Operations. • Class IIA Secondary: A well with a sandface reservoir pressure greater than the hydrostatic pressure that would be exerted at the sandface if the well were filled with formation fluids. It occurs by virtue of injection into the formation of fluid(s) other than water at ambient temperatures. This includes all wells that are part of an active EOR project and approved by the AER and any offset wells within 1000 m of an EOR well. BOP Pressure test as per IRP 21: Coiled Tubing Operations.
Notes	• All diagram distances are minimums between equipment. • All measurements are from the nearest point of any equipment. • Fluids pumped that are lighter than 920 kg/m^3 must be pumped at a distance of 50 m from the wellhead. • Adapted from AER D037 and Saskatchewan Directive S-01.

20.5 Site Examples

This section shows several different wellsite spacing examples of actual site layouts for conventional operations. These are provided as an overview of actual site layouts with notes that relate back to the key considerations.

Spacing diagrams for heavy oil operations are shown in section 20.4.8 Heavy Oil Servicing Requirements.

20.5.1 Example #1: Conventional Single Well Drilling

This example is a single well conventional drilling operation.

Figure 12. Conventional Single Well Drilling

Table 20. Characteristics for Conventional Single Well Drilling

Location	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.

20.5.2 Example #2: Conventional Single Well Completions with Fracturing

This example is a single well conventional completions operation with water fracturing on a uniquely shaped site. This may be considered SimOps depending on what other operations are occurring on site.

Figure 13. Conventional Single Well Completions with Fracturing

Table 21. Characteristics for Conventional Single Well Completions with Fracturing

Location	Characteristics
Site	• Uniquely shaped site to accommodate fracturing operations (regulatory approval may be required). • Size of fracturing operation will play a role in determining lease size requirements. • SimOps plan may be required.
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 may be required for three rows of tanks or AWSS (e.g., C-Rings, minion tanks (not shown)) 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.

20.5.3 Example #3: Conventional Completion Adjacent to Producing Site

This example is a conventional water fracturing operation adjacent to a producing site. This would be considered SimOps.

Figure 14. Conventional Completion Adjacent to Producing Site

Table 22. Characteristics for Single Well Conventional Completions Adjacent to Producing Site

Location	Characteristics
Site	• SimOps plan would be required (production operations and water fracturing).
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.

20.5.4 Example #4: Conventional Multi-Well Drilling and Completions Workover

This example illustrates conventional multi-well drilling and completions workover taking place simultaneously. This would be considered SimOps.

Figure 15. Conventional Multi-Well Driling and Completions

Table 23. Characteristics for Conventional Multi-Well Drilling and Completions

Location	Characteristics
Site	• SimOps plan would be required (multi-well drilling and completions).
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 so coordination of Emergency Response Plans (ERPs) 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.

20.5.5 Example #5: Conventional Producing Site with Multi-Well Completions

This example illustrates a conventional producing site with multi-well water fracturing operations. This would be considered SimOps.

Figure 16. Conventional Producing Site with Multi-Well Completions

Table 24. Characteristics for Conventional Producing Site with Multi-Well Fracturing Operations

Location	Characteristics
Site	• SimOps plan would be required (multi-well fracturing).
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. • Site is placed effectively up against existing road with some buffer. • Log deck present (left side, wood removed) but log deck may be excluded because site is located in a cut block.

20.5.6 Example #6: Conventional Multi-Well, Multi-Cluster Production and Completions

This example illustrates multi-well and multi-cluster production and completions operations. This would be considered SimOps.

Figure 17. Conventional Multi-Well, Multi-Cluster Production and Completions

Table 25. Characteristics for Multi-Well, Multi-Cluster Production and Completions

Location	Characteristics
Site	• SimOps plan would be required (multi-well production and completions).
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.

Appendix A: Revision History

Edition 3

The purpose of the review for edition 3 of IRP 20 was to make the document more reflective of current practices for site design and include more detailed information for simultaneous operations. Edition 3 was sanctioned in November 2022.

Table 26. Edition 3 Revisions

Section	Remarks and Changes
General	Updates to current IRP template: • Disclaimer • Range Update Enform to Energy Safety Canada • Range of obligation terminology • Revision log/acknowledgments • Moved definitions and acronyms to an Appendix for Glossary (Appendix C) • Terminology and style updates to match current IRPs and DACC Style guide
20.2.1 Objectives	New section added
20.3 Key Considerations	• Review and update of all sections • Reorder of sections to follow actual flow of work • Addition of Regulations section (20.3.1) • Addition of a SimOps section (20.3.9)
20.4 Jurisdictional Spacing Requirements	• All spacing updated by regulators, including updates to regulations referenced • Addition of setback information for each jurisdiction (as relevant) • Added a section for Heavy OIl spacing (based on information pulled from IRP 03: In Situ Heavy Oil Operations)
20.5 Illustrations	• Moved to an Appendix (B)
20.5 Site Examples	• Removed some examples that were redundant or no longer relevant • Added/updated descriptive information about each
Appendix B: EAP Wildlife Restrictions	• Removed all of the detail that was regurgitated from EAP and other sources and replaced with general considerations for wildlife zones and timings as part of 20.3.3 Non-Technical Risk. This data was Alberta specific and didn't apply for all jurisdictions. • Added all resources originally referenced in this section to the References and included references for other jurisdictions (Appendix D).

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

Table 27. Edition 3 Development Committee

Name	Company	Organization Represented
Tyler Cherry	Canadian Natural Resources Ltd.	CAPP
Brad Chipman (co-chair)	Snubco Pressure Control Ltd.	Enserva
Yiingli Chu	BC Oil and Gas Commission	Regulator
Tom Cook (co-chair)	Canlin Energy	EPAC
David Cookey-Gam	CNOOC Ltd.	CAPP
Glenn Dorian	Ideal Completion Services	Enserva
Gary Ericson	Ministry of Energy, Government of Saskatchewan	Regulator
Duane Fairhurst	DynaEnergetics Canada Inc.	CAPP
Landon Fraser	Government of Manitoba	Regulator
Abul Kabir	Canada Energy Regulator	Regulator
Brent Kawalilak	Alberta Energy Regulator	Regulator
Scott Marshall	(formerly with Ideal Completion Services)	
Preston Reum	Precision Well Servicing	CAOEC
Darcy Strate	Suncor	CAPP
Brian Walsh	Bonnetts Energy Corp.	Enserna
Jonathan Wiseman	Imperial Oil	CAPP
Mark Woitt	Vertex	Enserva

Edition 2

The purpose of the review for edition 2 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 28. Edition 2 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
Appendix A: Lease Construction Spacing Information Checklist (old)	Section removed
Appendix A: Revision Log	New section added

Section	Remarks and Changes
Appendix B: EAP Wildlife Restrictions (new)	New section added

The following individuals helped develop Edition 2 of IRP 20 through a subcommittee of DACC.

Table 29. Edition 2 Development Committee

Name	Company	Organization Represented
Dan Berry	Shell Canada Ltd.	CAPP
Daniel Martindale	Shell Canada Ltd.	CAPP
Sean Beattie	CNRL Ltd.	CAPP
Craig Marshall	PSAC	PSAC
Lisa Clark	Alberta Energy Regulator	AER
Ron McDonald	Alberta Energy Regulator	AER
Kevin Parsonage		BC OGC
Wayne Holland		AESRD
James McGratton	Canyon Tech	
Adam Lecce	Encana	CAPP
Craig Zenner		CAPP
Jon Schroter		CAODC
Tom Farwell		CAODC
Preston Reum		CAODC
Mark Miller	CNRL Ltd.	CAPP
Benjamin RIngrose		CAPP
Gordon Haycroft		PSAC
Joy Piehl	WorkSafe BC	WorkSafeBC
Gary Ericson	Government of Saskatchewan	
Brett Swanston	Canyon Tech	
John Andrews	Canyon Tech	
Lorne Barsness	Government of Manitoba	
Shawna McGovern Burke	Enform, Facilitator/Technical Writer	
Laurie Andrews	Enform, Technical Writing Assistance	
Carole Sterenberg	Enform, DACC Secretariat	

Edition 1

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 on 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: Site Footprint Illustrations

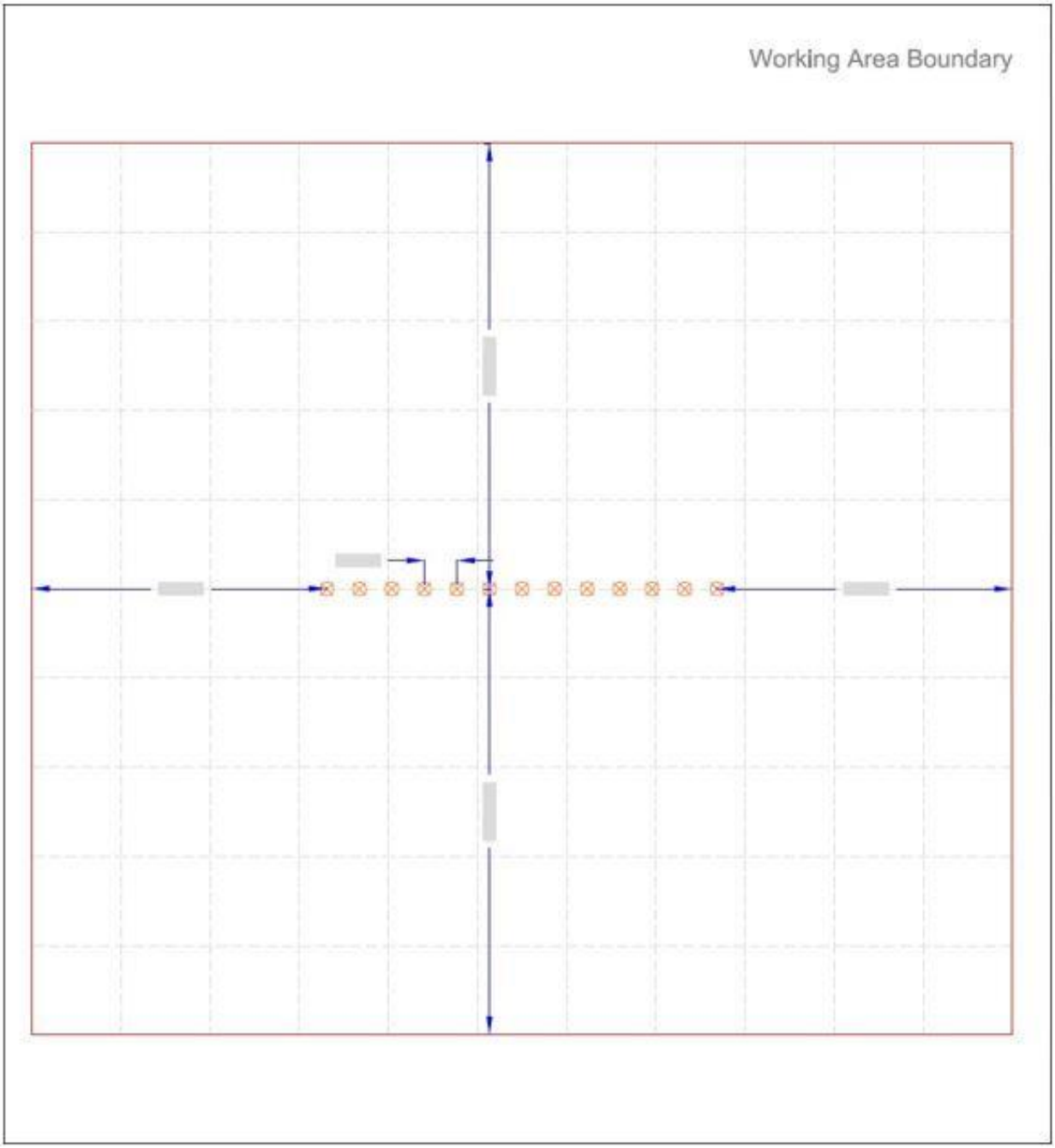
The step-by-step illustrations visually demonstrate the footprint required for a single well pad based on regulatory spacing requirements and the key considerations outlined in this IRP. They show the five dimensions that need to be resolved when establishing the working area as per the wellsite planning process. Wellhead spacing, direction and count are the initial considerations for the calculation of the working area.

The working area can be calculated using the basic illustration of measurements in 20.4.6 Summarized Jurisdictional Spacing Requirements and Figure 18. After the working area is established the room outside the working area to the lease boundary can be determined.

Figures 18 through 27 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 are examples only and are not be considered definitive wellsite diagrams.

Ideal Completions Services Inc. have provided a generic pad completions site plan showing the stages of pad development. They are provided as examples only and are not be considered definitive wellsite diagrams. These diagrams are available on the IRP 20 landing page from Energy Safety Canada as a separate downloadable document titled IRP 20 Generic Site Plan Example Stages 1-8. A sample of the first stage is shown in Figure 28.

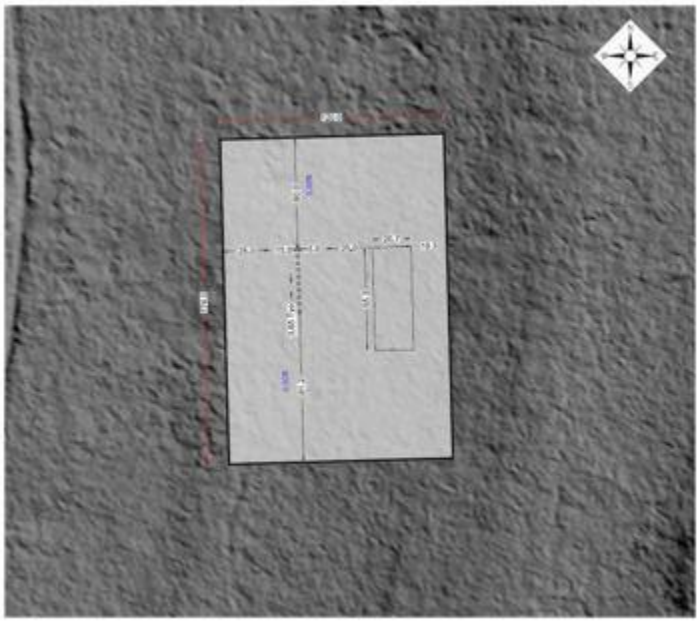
Figure 18. Determining the Working Area Footprint



Figures 19 and 20 show the working area overlaid on imagery and topography.

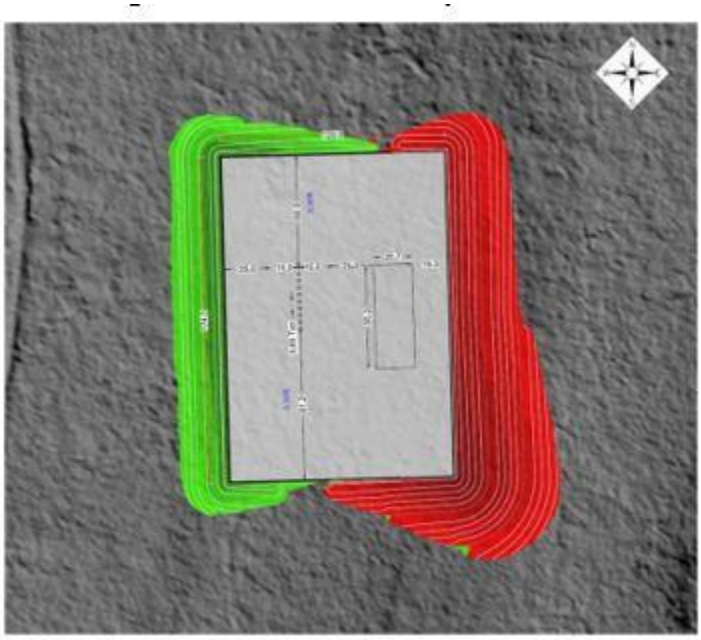
Figure 19. Working Area Overlaid on Imagery

Figure 20. Working Area Overlaid on Topography



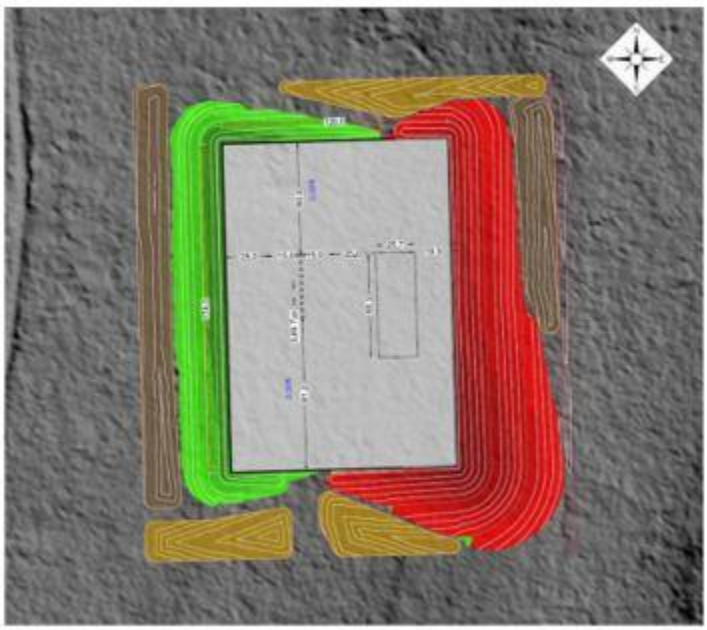
In Figure 21 the cut and fill slopes have been determined.

Figure 21. Cut and Fill Slopes



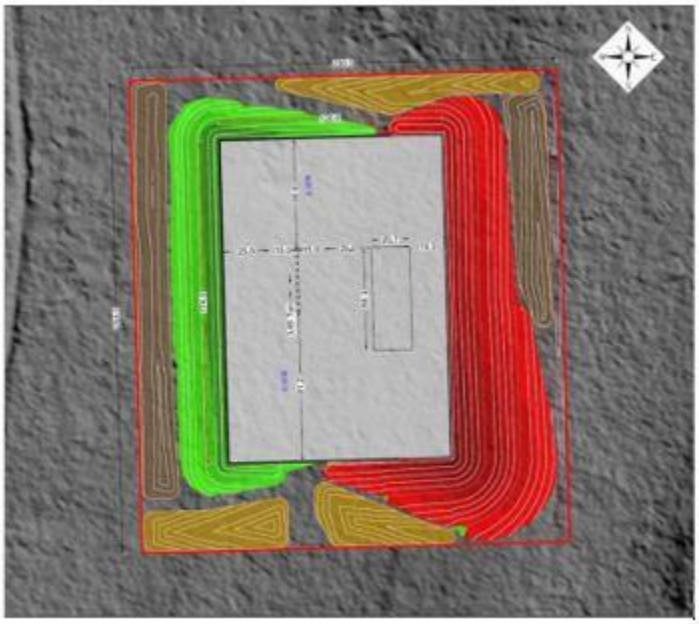
In Figure 22 the topsoil and sub-soil stockpiles have been determined.

Figure 22. Topsoil and Subsoil Stockpiles



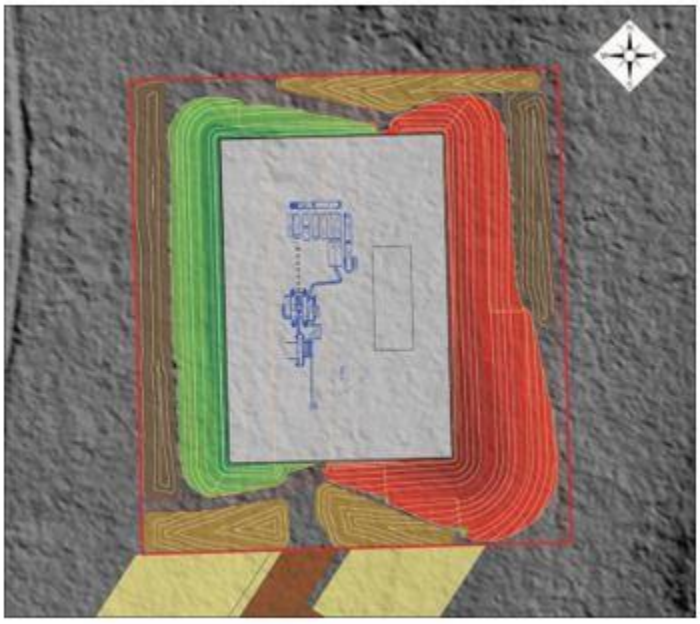
In Figure 23 the lease area has been delineated.

Figure 23. Lease Area



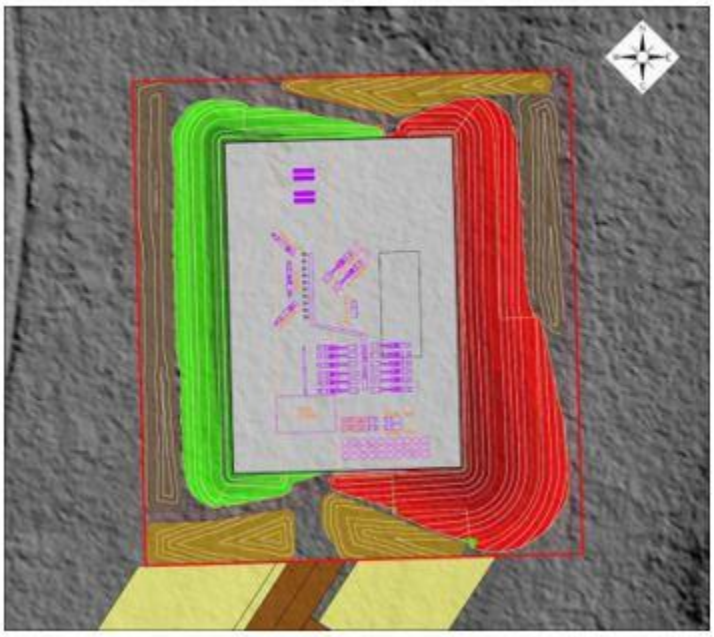
In Figure 24 the drilling activities have been put in place.

Figure 24. Drilling Activities



In Figure 25 the completions activities have been put in place.

Figure 25. Completions Activities



In Figure 26 the facilities activities have been put in place.

Figure 26. Facilities Activities

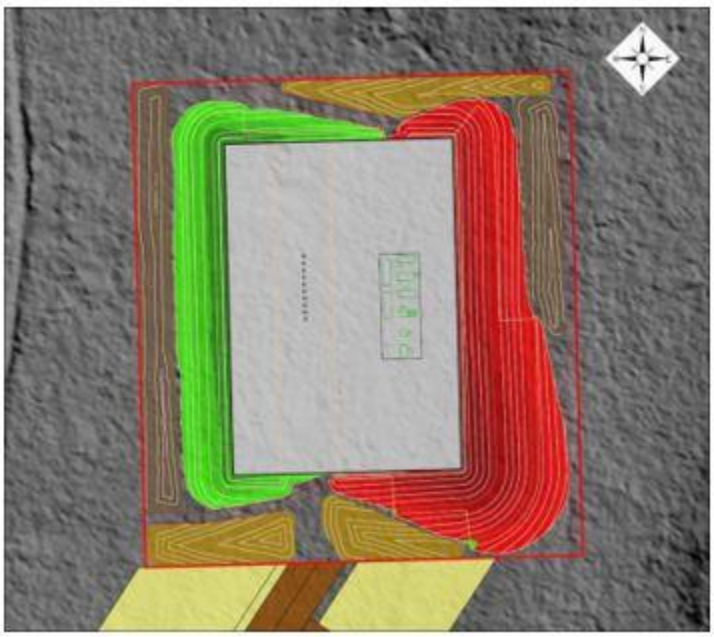


Figure 27 shows how the overall footprint is affected by various terrain conditions while maintaining the same working area.

Figure 27. WellsiteTerrain Scenarios

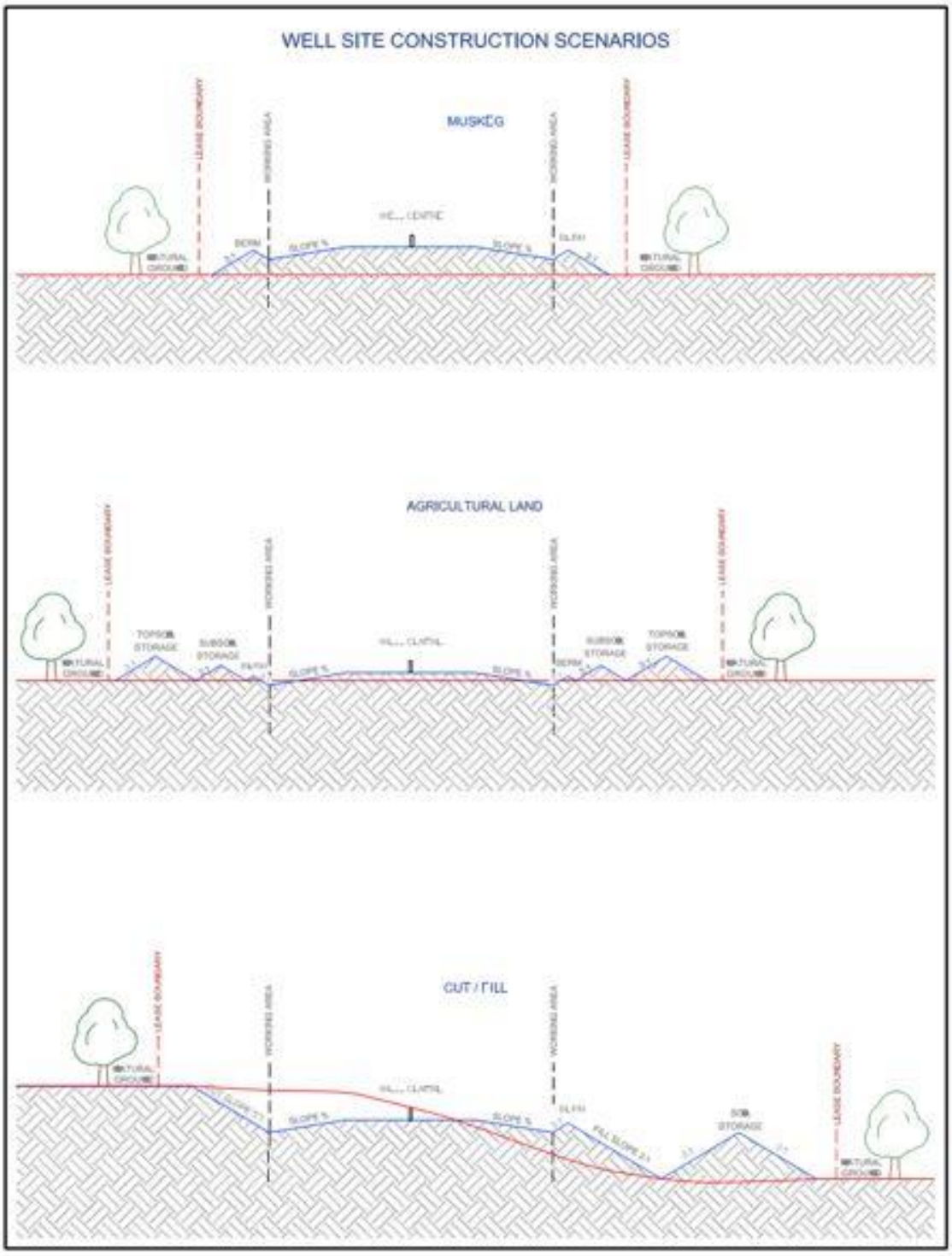
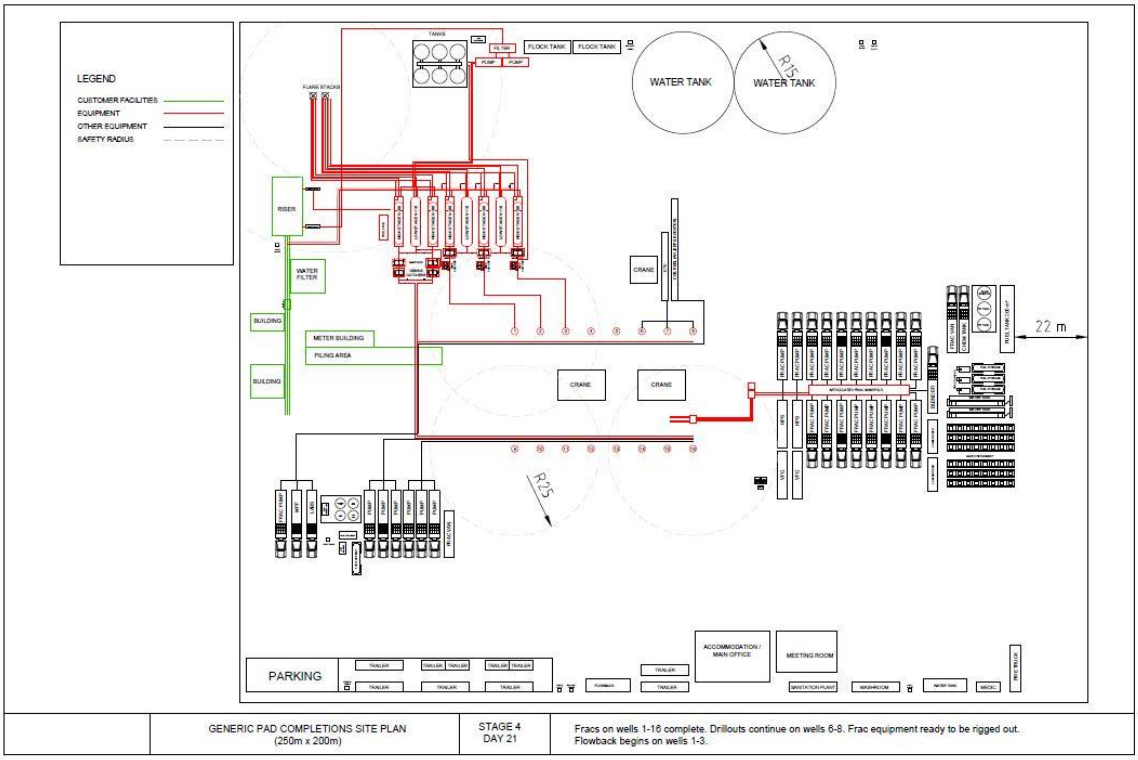


Figure 28 shows a sample of stage 1 of a generic pad completion site plan. Download the complete file from the IRP 20 landing page to see the full-sized image and remaining stages.

Figure 28. Generic Pad Completion Stage 1 Sample



Appendix C: Glossary

AER Alberta Energy Regulator

AWSS Aboveground Synthetically Lined Walled Storage Systems

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.

BOP Blowout Preventer

DPR Drilling and Production Regulation (British Columbia, Manitoba)

ERP Emergency Response Plan

ESD Emergency Shut Down (Device, valve)

Horizon Soil Type of soil. A is topsoil, B is subsoil, C is clay.

ID Internal Diameter

EAP Enhanced Approval Process

EFR Environmental Field Reports

FDP Field Development Plan

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

LiDAR Light Detection and Ranging

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

NTR Non-Technical Risk

OGCR Oil and Gas Conservation Regulations

OH&S Occupational Health and Safety

PASO Positive Air Shut Off (for diesel engines)

ROW Right of Way

SAGD Steam Assisted Gravity Drainage

SimOps Simultaneous Operations

Stakeholder Any person, group or organization that may have input to or be affected by the wellsite spacing design.

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.

WSH Workplace Safety and Health (Manitoba)

Appendix D: References

Canada Energy Regulator

Available from www.canada.ca

- Canadian Oil and Gas Drilling and Production Regulations SOR/2009-315
- Canadian Oil and Gas Drilling and Production Regulations C.R.C., c 1517
- NEB Canadian Oil and Gas Installations Regulations SOR/96-118 (COGIR)
- Migratory Birds Convention Act and Regulations

DACC References

Available from www.energysafetycanada.com

- IRP 03: In Situ Heavy Oil Operations
- IRP 04: Well Testing and Fluid Handling
- IRP 08: Pumping Flammable Fluids
- IRP 13: Wireline Operations
- IRP 15: Snubbing Operations
- IRP 21: Coiled Tubing Operations
- IRP 28: Wellsite Waste Management

Local Jurisdictional Regulations

Alberta

Available from www.aer.ca

- Directive 036: Drilling Blowout Prevention Requirements and Procedures
- Directive 026: Setback Requirements for Oil Effluent Pipelines
- Directive 037: Service Rig Inspection Manual
- Directive 055: Storage Requirements for the Upstream Petroleum Industry
- Directive 056: Energy Development Applications and Schedules
- Directive 060: Upstream Petroleum Industry Flaring, Incinerating and Venting (Section 7.8 Flare and Incinerator Spacing Requirements)
- EnerFAQ webpage

- Interim Directive ID 91-03: Heavy Oil/Oil Sands Operations
- Manual 012: Energy Development Applications; Procedures and Schedules
- Master Schedule of Standards and Conditions
- Oil and Gas Conservation Act
- Oil and Gas Conservation Rules

Available from www.alberta.ca

- Master Schedule of Standards and Conditions
- Occupational Health and Safety Code and Explanation Guideline

Available from www.open.alberta.ca

- EAP Integrated Standards and Guidelines

British Columbia

Available from www.bcogc.ca

- BC Landslide Susceptibility Maps
- Drilling & Production Regulation
- BCOCG Flaring and Venting Reduction Guideline (Section 6.3 Flare and Incinerator Spacing Requirements)
- BCOCG Oil and Gas Activity Operations Manual (Section 8.3.5 Blowout Equipment Ancillary Equipment, Section 9.6.15 Wellsite Spacing Requirements)

Available from www.worksafebc.com

- Occupational Health and Safety Regulation

Available from www.gov.bc.ca (www.bclaws.gov.bc.ca)

- Petroleum and Natural Gas Act

Manitoba

Available from www.gov.mb.ca

- Drilling and Production Regulation
- Workplace Safety and Health Act

Saskatchewan

Available from www.saskatchewan.ca

- Directive PNG004: Surface Lease Construction Requirements
- Directive PNG036: Venting and Flaring Requirements
- Directive S-01: Saskatchewan Upstream Petroleum Industry Storage Standards
- Directive S-20: Upstream Flaring and Incineration Requirements
- Oil and Gas Conservation Act
- Oil and Gas Legislation and Regulations, 2012 – Chapter O-2 Reg 6
- Saskatchewan Activity Restriction Guidelines for Sensitive Species

Available from www.worksafesask.ca

- Occupational Health and Safety guidelines and documents