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# Horizontal Oil and Gas Well Requirements

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Directive PNG006

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January 2023

Revision 2.0

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Governing Legislation:

Act: *The Oil and Gas Conservation Act*

Regulation: *The Oil and Gas Conservation Regulations, 2012*

Order: 254/22

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**Record of Change**

<b>Revision</b>	<b>Date</b>	<b>Description</b>
0.0	September, 2015	Draft
1.0	November, 2015	Live Version, Updated Directive Number
1.1	June, 2019	Appendix 1 – Updated
2.0	January, 2023	Directive title update, inclusion of horizontal gas wells as being subject to current requirements, general clarification of requirements and addition of a new Appendix 2.

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## 1. Introduction

This Directive sets out the policies and requirements of the Saskatchewan Ministry of Energy and Resources (ER) for regulating horizontal oil and gas production wells in Saskatchewan. The requirements set forth are in relation to spacing and production associated to oil and gas wells only.

Questions concerning the requirements set out in this document should be directed to the ER Service Desk at 1-855-219-9373 or email at [ER.servicedesk@gov.sk.ca](mailto:ER.servicedesk@gov.sk.ca).

### 1.1 Governing Legislation

The requirements outlined in this Directive are authorized under and supported by:

- *The Oil and Gas Conservation Act (OGCA);*
- *The Oil and Gas Conservation Regulations, 2012 (OGCR);*
- Associated Directives and Guidelines
  - *Directive PNG003: Well Survey Requirements;*
  - *Directive PNG010: Well Logging Requirements;*
  - *Directive PNG011: Allowable Rate of Production: Gas Wells;*
  - *Directive PNG012: Allowable Rate of Production: Oil Wells;*
  - *Guideline PNG 021: Determining Drainage Units and Target Areas;*
  - *Guideline PNG024: Reclassification and Recompletion; and*
  - *Guideline: Gas Well Absolute Open Flow (AOF).*

Subsection 17(1) of the OGCA provides the minister with the authority to make orders approving plans for horizontal wells. Regulations specific to horizontal wells are contained in section 38 of the OGCR. Licensees should consult these documents in conjunction with this Directive.

It is the responsibility of all operators, as specified in the legislation, to be aware of ER requirements and to ensure compliance with all requirements for horizontal wells prior to submitting any application.

### 1.2 Definitions

**Commonly-owned lands:** these are mineral lands where the lessors and lessees between parcels are identical.

**Diversely-owned lands:** these are mineral lands where the lessor or lessees between parcels are not identical.

**Drainage area:** includes all vertical well drainage units (see definition below) within the minimum lease boundary set-back of the productive interval of the horizontal well.

**Horizontal well:** means a well that has a productive interval of at least 100 metres (m) and that is at least 80 degrees from the vertical, or is deemed by the minister to be horizontal.

**Intermediate Casing Point (ICP):** is the point at which the intermediate casing in a horizontal wellbore has landed within the stratigraphic unit or zone of interest.

**Inter-well set-back:** this is measured as the distance between productive intervals of adjacent wells producing or capable of producing from the same pool.

**Landing point:** refers to the point where the well path has reached at least 80 degrees from the vertical position within the target pool, referenced in lieu of intermediate casing point when the intermediate casing is not run.

**Lease boundary set-back:** this is measured as the distance between the productive interval of a horizontal well and the edge of the lease boundary.

**Monobore well:** refers to a horizontal well with a single string of production casing, with a uniform diameter, cemented from the total depth of the horizontal well to the surface.

**Pooling agreement:** means an agreement between multiple parties to allocate production across diversely-owned lands.

**Productive interval:** is the section of a horizontal well from the intermediate casing point (ICP)/landing point (LP) to the bottom hole, unless otherwise approved. A contact interval may not be added at a measured depth above the ICP/LP unless otherwise approved.

**Set-back:** refers to the distance from one defined entity to another defined entity.

**Tract:** refers to an area of land for production allocation purposes.

**Ultimate drainage area:** refers to an area calculated using a radius around the well productive interval that is half of the minimum inter-well set-back distance.

**Vertical drainage unit:** refers to the spacing assigned to non-horizontal wells.

## 2. Minimum Set-back Requirements

### Oil Wells

The productive interval(s) of horizontal oil wells must adhere to specific minimum inter-well and lease boundary set-backs. These set-backs are defined in pool orders, spacing area orders and in the OGCR. A brief description and table of the minimum inter-well and lease boundary set-back requirements for horizontal oil wells, as identified within the OGCR, are presented below:

Set-back Requirement	Spacing Area E	Outside Spacing Area E
Minimum Inter-well Set-back	100 m	150 m

Lease Boundary Set-back	100 m
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Proposed and 'as-drilled' survey plans must show the minimum inter-well and lease boundary set-backs (see *Directive PNG003: Well Survey Requirements* for more details).

Exceptions to the minimum set-back requirements are outlined in section 4 of this Directive.

### Gas Wells

Horizontal gas wells do not have minimum set-back requirements. One horizontal gas well is permitted per vertical drainage unit. This is applicable to both horizontal and non-horizontal gas wells. For example, if there is one vertical gas well capable of production within the drainage unit, a Spacing Modification Application and approval is required for a second gas well, prior to submitting a well licence application.

The productive interval of a gas well must be fully contained within its defined target area (see *Directive PNG007: Off Target Well Requirements* for more details) or identify the well as off-target. A productive interval of a well may not be in more than one drainage unit without approval.

Both horizontal and non-horizontal gas wells are subject to spacing and target area requirements. The following sections 2.1, 2.2 and 4 are not applicable to gas wells.

#### **2.1 Oil Well Inter-well Set-backs**

Unless defined by a pool order or spacing area order, the productive interval of a horizontal well must have a minimum 150 m inter-well set-back, as set out in section 38(b) of the OGCR. Wells drilled within the stratigraphic units and areas specified by Spacing Area E (see <http://publications.saskatchewan.ca/#/products/82401> for more information relating to Spacing Area E) must have a minimum 100 m inter-well set-back.

#### **2.2 Oil Well Lease Boundary Set-backs**

Unless defined by a pool order or spacing area order, the productive interval of a horizontal well must have a minimum 100 m set-back from the lease boundary containing the productive interval, as set out in section 38(b) of the OGCR. The road allowance is not part of the lease and therefore is not to be included in the 100 m set-back distance.

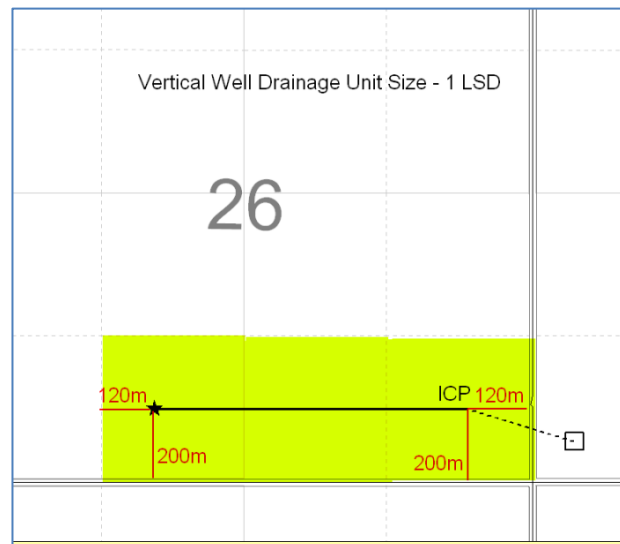
### 3. Drainage Area Determination

#### Oil Wells

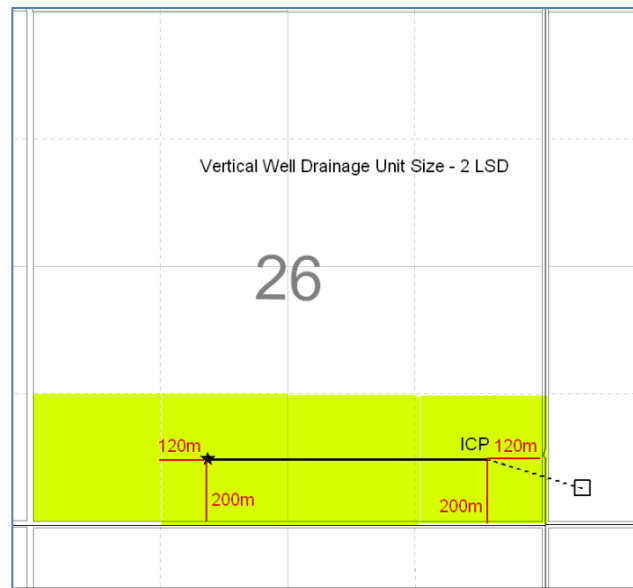
All horizontal oil wells must have their drainage area identified when an application is submitted for a horizontal well licence. A drainage area is determined based on the productive interval of the well and the size of the vertical oil well drainage unit (e.g., 1 LSD, 2 LSDs, etc.).

All vertical oil well drainage units within the lease boundary set-back of the productive interval of the horizontal oil well, as outlined in section 2, will make up the drainage area.

A company must have agreements in place with all mineral owners of lands that make up the drainage area of a horizontal well prior to submitting an application for a horizontal well licence. The following are a few examples of how to determine the drainage area of a horizontal well given different sizes of vertical well drainage units.



**Figure 1.** In this example, the size of the vertical oil well drainage unit is 1 LSD. The intermediate casing point(ICP) of the proposed horizontal well is 120 m west of the east boundary of Section 26 and 200 m north of the south boundary. In this scenario, the drainage area for a horizontal well will include LSDs 1, 2 and 3 of Section 26.



**Figure 2.** In this example, the vertical oil well drainage unit is 2 LSDs. The ICP of the proposed horizontal well is still 120 m west of the east boundary of Section 26 and 200 m north of the south boundary. For this scenario, the drainage area for a horizontal well will include LSDs 1, 2, 3 and 4 of Section 26.

### Gas Wells

The drainage area for a horizontal gas well is the vertical gas well drainage unit, unless otherwise approved.

## **4. Exceptions to the Set-Back Requirements for Oil Wells**

### **4.1 Reduced Inter-Well Set-Backs**

A reduced inter-well set-back is permitted if the last 12 months of reported production of the offset well has an average production of less than 1 m<sup>3</sup>/day. This must be a true average, calculated from natural decline and sustained production.

The application for a reduced inter-well set-back can be made by submitting a 'Well Spacing Modification Application'. Kindly refer to the Well Spacing Modification webpage on [www.Saskatchewan.ca](http://www.Saskatchewan.ca) for further details.

### **4.2 Reduced Diversely-Owned Land Boundary Set-Backs**

Reductions to the set-back for diversely-owned lands are permitted if certain conditions for approval are met. These conditions depend on the type of diversely-owned boundary:

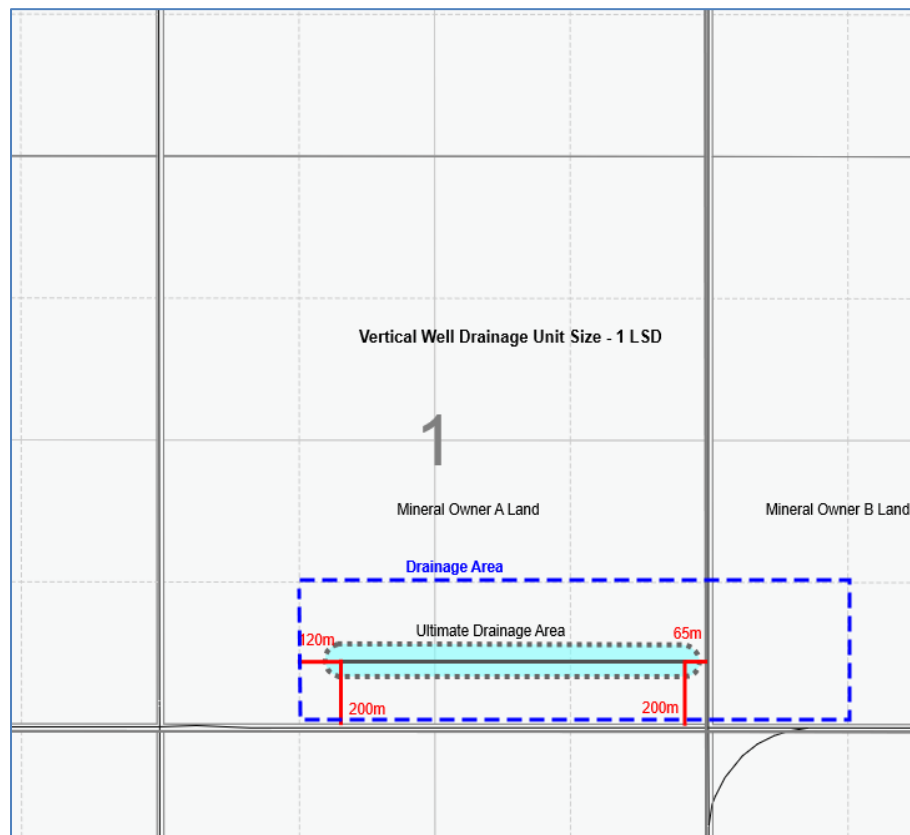
- Diverse Provincial Crown Lands - If a minimum lease boundary set-back is not met between diversely-owned disposed Provincial Crown minerals, an agreement must be in place between the disposition lessees.
- Diverse Non-Provincial-Crown Lands - If a minimum lease boundary set-back is not met



between diversely-owned Non-Provincial-Crown mineral lands, there must be a pooling agreement in place between those mineral owners.

- Provincial Crown and Non-Provincial-Crown Lands - Section 4.3 of this Directive sets out the requirements if a minimum set-back is not met between Provincial Crown and Non-Provincial-Crown land.

If a minimum set-back is not met and the offset party (Non-Provincial-Crown mineral owner or Provincial Crown lessee) has consented to a reduced lease boundary set-back, those lands would not be included in the drainage area of that horizontal oil well. The following are a few examples of how to determine the drainage area of a horizontal oil well using different scenarios of the minimum set-back not being met.



**Figure 3.** In this example, the productive interval of a well is on mineral owner A's land and is less than 100 m from the boundaries of mineral owner B's land. Mineral owner A and mineral owner B have formally agreed to a pooling of interests for the well; therefore, the drainage area of the well will include mineral owner B's affected land. Provincial Crown lands would require agreements between the Crown lessees if different (Diverse Provincial Crown Lands) and Non-Provincial-Crown lands would require agreements to be in place between the mineral owners (Diverse Non-Provincial-Crown Lands).

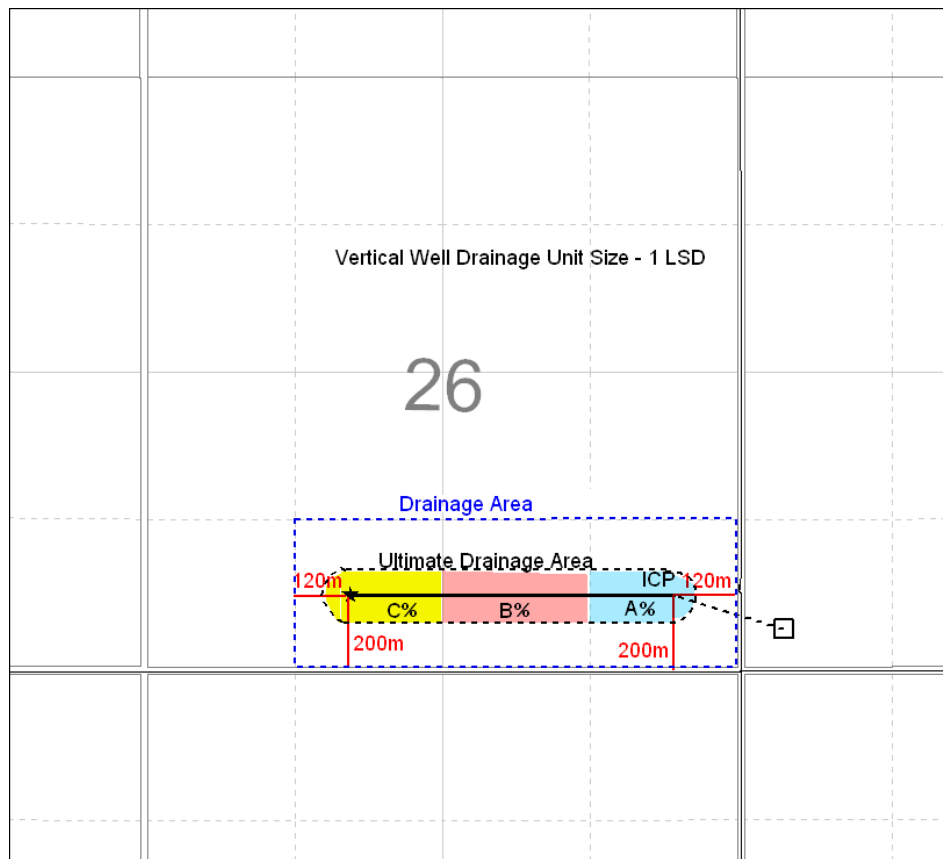


**Figure 4.** In this example, the productive interval of a well is less than 100 m from the diverse mineral owner B's land. Owner B (lessee of Provincial Crown land or Non-Provincial-Crown land owner) provides consent allowing for a set-back reduction from their lands. The drainage area of this well would not include any land associated to mineral owner B as they have consented to the well not meeting the equity boundary setback and a pooling agreement is not required.

Note: Consent will not be accepted to exclude an LSD that must be included due to sharing a vertical well drainage unit with the offset LSD. Consent is also not acceptable if a portion of the productive interval of the well is contained by the lands to be excluded.

#### 4.3 Situations Involving Provincial Crown/Non-Provincial-Crown Pooling

The following examples illustrate exceptions to the minimum diverse boundary set-back where the drainage area of a horizontal well covers both Provincial Crown and Non-Provincial-Crown lands, and the Provincial Crown disposition holder and the Non-Provincial-Crown owners have agreed to pool.



**Figure 5.** Determining the drainage area and ultimate drainage area of a horizontal oil well where the Provincial Crown/Non-Provincial-Crown pooling agreement covers a vertical drainage unit of 1 LSD.

In the example in Figure 5, the minimum inter-well set-back is 150 m, 75 m is therefore the drainage radius which is used for calculating the ultimate drainage area (UDA) of the productive interval of the well.

Each LSD within the drainage area is a tract. The tract for each LSD is based on the percentage of the UDA within that LSD. As shown in Figure 5, LSD 1 would be allocated production in accordance with A% of the UDA, LSD 2 would be allocated B%, and LSD 3 would be allocated C% of the UDA.

For example, the production would be allocated as per the below table where the total allocated production will add up to 100%. For clarity purposes, the table shows the derivation of the production allocation from UDA lands.

LSD-SEC	UDA (ha/ac/m <sup>2</sup> )	Production Allocation (%)
1-26	A	$\frac{A}{D} * 100$
2-26	B	$\frac{B}{D} * 100$
3-26	C	$\frac{C}{D} * 100$
Total	D	100%



**Figure 6.** Determining the drainage area for a horizontal oil well with a Provincial Crown/Non-Provincial-Crown pooling agreement in place, where the vertical drainage unit area covers 2 LSDs.

In the example in Figure 6, the minimum inter-well set-back distance is 150 m, 75 m is therefore the drainage radius which is used for calculating the UDA. In this example, the vertical drainage unit size is 2 LSDs; therefore LSD 4 of Section 26 is now included in the drainage area. Each LSD within the drainage area is still a tract, but the allocation of each tract is divided evenly within each vertical drainage unit.

The production would be allocated as per the table below, where the total allocated production will add up to 100%. It is assumed that the UDA allocation is derived from UDA lands.

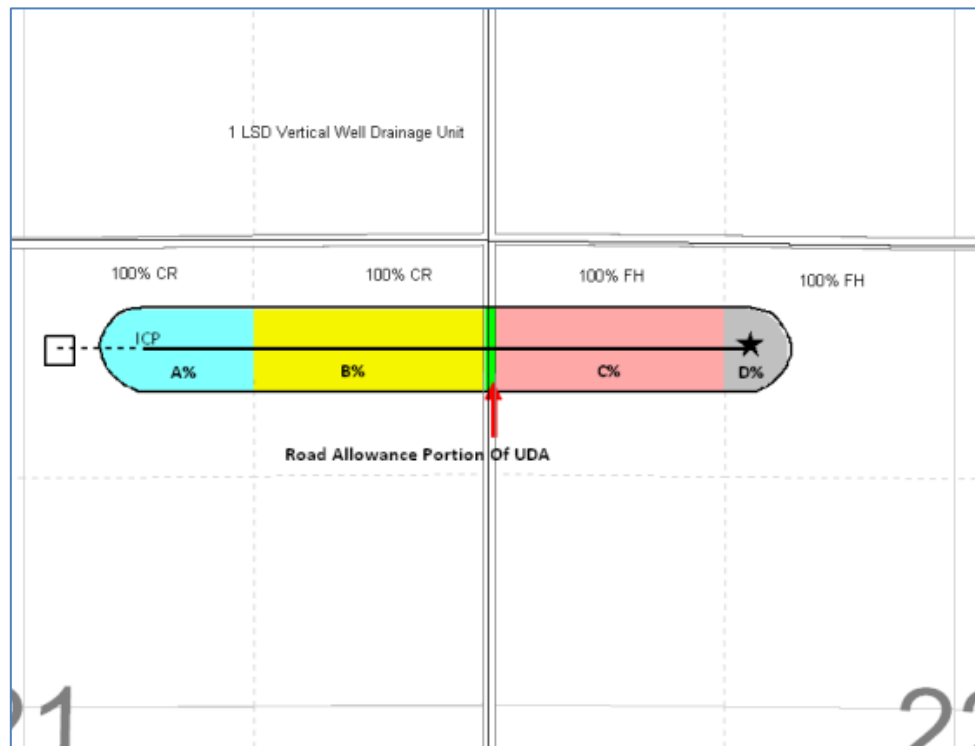
LSD-SEC	UDA Allocation (%)	Production Allocation (%)
1-26	A	$\frac{A + B}{2}$
2-26	B	$\frac{A + B}{2}$
3-26	C	$\frac{C}{2}$
4-26	0	$\frac{C}{2}$
Total	100%	100%

All mineral owners within the drainage area must be a part of the agreements in place and the pooling declaration letter (see Appendix 1) must be attached to the horizontal oil well licence application. The Provincial Crown provides approval of the proposed allocation by the issuance of the licence.

#### 4.4 Situations Involving Road Allowances

All road allowances are considered 100% Provincial Crown-owned land. However, when determining drainage areas, road allowances are only considered if the proposed well pools both Provincial Crown and Non-Provincial-Crown minerals. In these situations, the road allowance percentage is added to the UDA percentage of the nearest Crown tract within the drainage area, as shown in Figure 7.

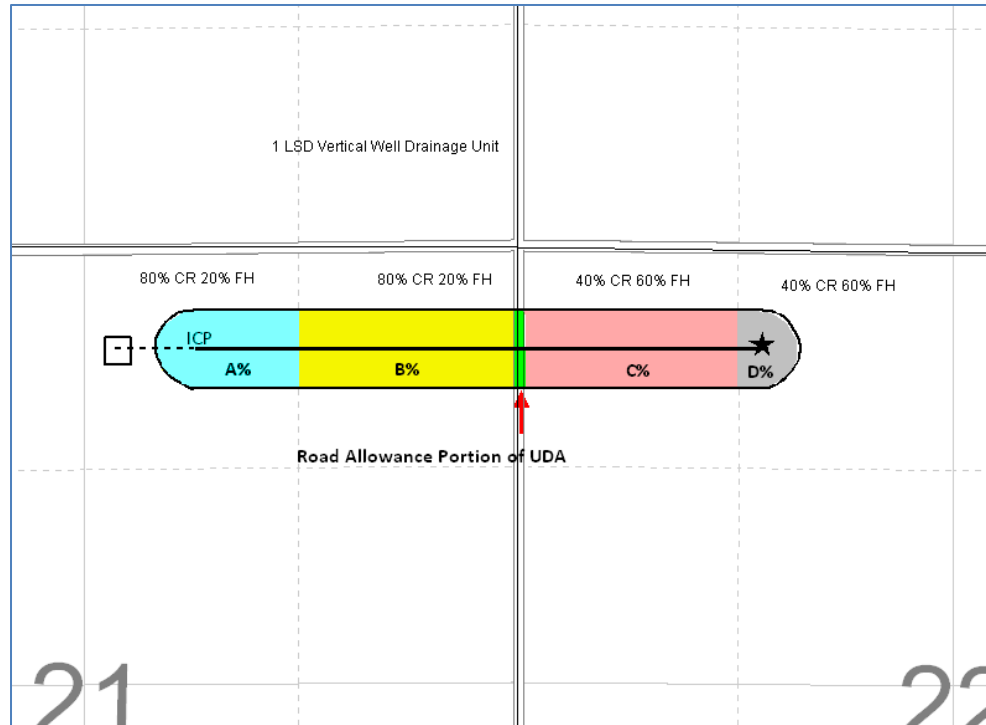
If there is a Provincial Crown/Non-Provincial-Crown split on either side of the road allowance, the road allowance is divided evenly between the tracts on either side of the road allowance, as shown in Figure 8.



**Figure 7.** Example of a road allowance allocation for a pooling agreement involving Provincial Crown and Non-Provincial-Crown tracts. In this situation, the percentage of the drainage area allocated to the road allowance portion of the UDA would be added to tract B in LSD 16 of Section 21, since this is the nearest Crown tract in the drainage area.

For example, the production would be allocated as per the table below, where the total allocated production will add up to 100%. It is assumed that the UDA allocation is derived from UDA lands.

LSD-SEC	UDA Allocation (%)	Production Allocation (%)
15-21	A	A
16-21	B	B + RA
13-22	C	C
14-22	D	D
Road Allowance	RA	N/A
Total	100	100



**Figure 8.** Example of a road allowance allocation where the Provincial Crown and Non-Provincial tracts in a pooling agreement are split between the road allowance. In this situation, the road allowance percentage of the drainage area would be divided evenly between tracts B and C. Tract B in LSD 16 of Section 21 would have 50% of the road allowance portion added, and tract C in LSD 13 of Section 22 would have 50% of the road allowance portion added.

For example, the production would be allocated as per the table below, where the total allocated production will add up to 100%. It is assumed that the UDA allocation is derived from UDA lands.

LSD-SEC	UDA Allocation (%)	Production Allocation (%)
15-21	A	A
16-21	B	$B + \frac{RA}{2}$
Road Allowance	RA	N/A
13-22	C	$C + \frac{RA}{2}$

14-22	D	D
Total	100%	100%

If the well has any tract that is 100% Crown-owned, the road allowance percentage would be added to that LSD, even if it is not directly adjacent to the road allowance.

The same rules would apply if the vertical well drainage unit size was greater than 1 LSD. The road allowance portion would be added to the UDA percentage of the entire vertical drainage unit. Then this total percentage would be divided down to the LSD level.

Amendments to the drainage area and/or the production allocation percentages can be made after the well is drilled and completed. It is the responsibility of the licensee to ensure agreements in place remain valid for any changes in production allocation.

#### 4.5 Situations Involving Unit Boundary Crossings

A horizontal production well can be proposed to be licenced with the productive interval crossing a unit boundary. The following are required on the licence application within the completion detail:

- Indicate the well is crossing a unit boundary.
- Specify the production allocation as per this section.
- A declaration must be made that the proposed well is **not** meeting equity setbacks and that agreements are in place between all parties (i.e. between units or between unit(s) and non-unit).
- An attachment must be provided that shows the impacted units and other parties that make up the drainage area of the well and confirms agreements are in place with said parties to allow for the production allocation.



**Appendix 1: Provincial Crown/Non-Provincial-Crown Pooling Declaration Letter**

DATE

ABC Company

Address

Address

**Subject: Proposed Well (1-1) 1-2-1-1 W2M**

With regards to the proposed well outlined by survey plan number XXXXXXXXX, agreements are in place to allow pooling between ABC Company and all Non-Provincial-Crown mineral owners within the Drainage Area of the subject well. The agreements in place must allow a portion of production to be allocated to the provincial Crown in accordance with the requirements outlined within *Directive PNG006*.

The agreements in place must also allow for the production allocation percentages to be adjusted based upon the as-drilled well detail and be assigned as per *Directive PNG006*.

The following shows the Non-Provincial-Crown mineral owners that are within the drainage area of the well and are therefore party to the agreements that are required to be in place:

MINERAL OWNER	ASSOCIATED LANDS
J Smith	1-2-1-1 W2M
G Beck	2-2-1-1 W2M
Federal CR Land	Portion of 3-2-1-1 W2M

It is understood the Ministry may require ABC Company to provide documentation supporting the above statement at any time. Failure to provide documentation within seven business days of request may result in an action being taken against the licence or well.

By signing below, ABC Company, is certifying the above information is accurate and complete.

Signed,

Company Representative Name

Company Title/Role, ABC Company

## Appendix 2: Unit Boundary Crossing Letter

DATE

ABC Company

Address

Address

### Subject: Proposed Well (1-1) 1-2-1-1 W2M

With regards to the proposed well outlined by survey plan number XXXXXXXXX, the well is not meeting equity setbacks, and agreements are in place between all parties (i.e between units or between unit(s) and non-unit) to allow for production allocation across the unit boundary within the Drainage Area of the subject well.

The agreements in place must also allow for the production allocation percentages to be adjusted based upon the as-drilled well detail and be assigned as per *Directive PNG006*.

The following shows the impacted units and any non-unit parties that make up the drainage area of the well and are therefore party to the agreements that are in place:

OWNERSHIP	ASSOCIATED LANDS
Unit: SK UN UXXXX Unit Operator : XXXXX	1-2-1-1 W2M
Non-Unit Lessor: XXXXX	2-2-1-1 W2M
Non-Unit Lessee: XXXXX	2-2-1-1 W2M

It is understood the Ministry may require ABC Company to provide documentation supporting the above statement at any time. Failure to provide documentation within seven business days of request may result in an action being taken against the licence or well.

By signing below, ABC Company, is certifying the above information is accurate and complete.

Signed,

Company Representative Name

Company Title/Role, ABC Company

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