

Table of Contents

I1	RURAL FIRE PROTECTION POLICY FOR MULTI-LOT SUBDIVISIONS	1
I1.1	General	1
I1.2	Intent and Professional Involvement	2
I1.3	Definitions	2
I1.4	Water Supply Requirements	3
I1.5	Facility Planning Considerations	4
I1.6	General Design Considerations	6
I1.7	In-Ground Open Storage Ponds - Design Considerations	8
I1.8	Storage Tanks/Cisterns - Design Considerations.....	10
I1.9.	Fees and Development Levies.....	11

I1 RURAL FIRE PROTECTION POLICY FOR MULTI-LOT SUBDIVISIONS

References:

1. Alberta Building Code 2006 (ABC)
2. NFPA Standard 1142, Water Supplies for Suburban and Rural Fire Fighting (NFPA 1142)
3. Fire Underwriters Survey, Water Supply for Public Fire Protection, 1996 Ed (FUS 1999)
4. Lacombe County Road and Infrastructure Standards Manual

I1.1 General

1. The purpose of this policy is to aid developers in meeting Lacombe County's rural fire protection needs through the proper construction and location of “*dry hydrant*” fire suppression facilities in rural areas and rural subdivisions not serviced by a pressurized municipal fire protection system. This policy adopts the above references as they may be amended time to time, with some variations specific to Lacombe County. The standards contained within this document are *minimums* only, and higher standards should be sought when practical. The County maintains its discretion to require higher standards where specifically required.
2. This is a summary policy document only and is not meant to be comprehensive. More specific details should be referenced directly in the reference documents.
3. The minimum water supplies required by ABC shall be established in, or transportable to, the designated area. If there are no provisions for natural or developed water sources for firefighting in the proposal, Lacombe County may require that the applicable fire department to conduct a water delivery trial to determine if sufficient water can be provided for a minimum of 30 minutes as required by FUS 1999.
4. The standards of this document are not required if:
 - a) NFPA 13, 13D, or 13R are fully met to provide an adequate sprinkler system protecting a building; or

- b) A pressurized municipal system is present which FUS 1999 considers as a piped communal system capable of 4500L/min flow for a minimum of 2 hours from fire hydrants at an adequate spacing.
5. Although a pressurized system is preferred, the County recognizes that such a system is not always practical due to high costs, low development densities, or specific land use policies. The County has therefore developed this policy to identify the level of fire protection that is to be maintained if a pressurized water system is not provided.
6. In general, this document is aimed at low-density “acreage” type country residential developments that are becoming more prevalent throughout the County. However, this policy and NFPA 1142 can also provide guidance for fire protection within commercial, institutional, and industrial developments, though more detailed and site-specific standards may have to be adopted. This document and NFPA 1142, have limitations due to their general focus. In very specialized or extremely hazardous situations, standards may be applied that exceed the standards set out in this document.

I1.2 Intent and Professional Involvement

1. These minimum requirements can be increased at the discretion of the local authority.
2. This policy document is provided for general reference only, for use by the development community, facility designers, and in the review and approval process by the County Manager of Planning Services, Manager of Operations and Lacombe Regional Fire Service (LRFS).
3. As part of the requirements of the Subdivision Conditions, Development Permit, and/or Development Agreement, a fire protection system may be required at the County’s discretion. All calculations and design drawings for such a system must be prepared and stamped by a Professional Engineer registered to practice in the Province of Alberta (the “Engineer”).

I1.3 Definitions

Minimum Water Supply (MWS) – The quantity of water required for fire control will be calculated in accordance with FUS 1999 Part II but in no case shall it be less than 2,000L/min. Pressurized water distribution systems with fire hydrants shall be installed in accordance with Section H2.4 of this manual.

Dry Hydrant – An arrangement of pipe permanently connected to a water source other than a piped, pressurized water supply system that provides a ready means of water supply for fire-fighting purposes and that utilizes the drafting (suction) capability of fire department pumpers.

I1.4 Water Supply Requirements

1. The following shall be addressed in the design of any fire protection system:
 - a) Water source(s) shall be acceptable to the County, of suitable quality and be maintained and accessible on a year-round basis
 - b) If the water is from a private source, a water use agreement acceptable to the County shall be required to ensure access to the water source. An example agreement is provided in NFPA 1142
 - c) Adequate water source indicators (signs and/or painted indicators) acceptable to the County shall be provided, and shall take into account potential for snow depth accumulation and snow plowing operations
 - d) Means of access to any required water supply or dry hydrant shall be constructed and maintained to meet the requirements of the Lacombe County Standards Manual
 - e) Locations for and the immediate area around dry hydrants shall provide for fire fighter safety
 - f) Dry hydrants shall be located to be accessible under all weather conditions
 - g) System and site accessibility criteria shall ensure the dry hydrant can be reached with no more than 6 m of hard suction hose
 - h) Dry hydrants shall have a minimum clearance of 6.1 m on each side and to be located a minimum of 30 m from any structure. Vehicle traffic shall not be impaired during the use of the dry hydrant
 - i) Dry hydrants shall be protected from damage by vehicular and other perils, including freezing and damage from ice and other objects
 - j) Dry hydrant locations shall be made visible from the main roadway during emergencies by reflective marking and signage approved by the authority having

- jurisdiction. All identification signs shall be approved by the County and/or Alberta Infrastructure and Transportation prior to installation if they are to be located on the right-of-way or are subject to local or provincial laws
- k) Vehicle access shall be designed and constructed to support the heaviest vehicle the County currently utilizes
 - l) Static lift should not exceed 3.1 m to 3.7 m. At design flow, head losses should be less than 6.1 m.
 - m) The hydrant shall be painted as needed in colors determined by the County, with reflective material to maintain visibility during emergencies.
2. The Minimum Water Supply volume shall be:
- a) Minimum of 7,600 L if there is no exposure hazard
 - b) Minimum of 11,355 L if an exposure hazard is present. The County reserves the right, at its discretion, to require a larger minimum volume to provide a higher level of fire protection for multi-lot subdivisions; or
 - c) As identified in the individual “In-Ground Open Storage Pond” and “Cistern” sections of this document.
3. If there is no developed or natural water sources contemplated in the proposal, the County may arrange a water delivery trial to determine if the fire department can deliver water to the site at the rates required by FUS 1999 for 30 minutes.

11.5 Facility Planning Considerations

In addition to the requirements of NFPA 1142 and FUS 1999, the County has developed the following criteria.

- 1. The County recognizes that there are several methods for water supply storage. The preferred facility types are constructed in-ground storage tanks (cisterns) and open storage ponds.
- 2. The County will consider applications involving locations within a natural stream, lake, or other water body, as long as adequate measures are taken to address issues of seasonal fluctuations in water level, access restrictions, and environmental concerns.

3. The County will, where typical installations are not possible, provided satisfactory measures are taken to address concerns with freezing, construction, maintenance, and supply logistics accept the following installations in unusual circumstances:
 - a) Shallow installations
 - b) Shallow or seasonal ponds
 - c) Above-ground storage tanks
 - d) Bridge installations and/or facilities that include a roadway obstruction between the water source and the dry hydrant
4. Dry hydrants, including their required lands and water storage facilities, shall be zoned as Public Utility Lots.
5. There shall be no overhead utilities on the Public Utility Lot.
6. There shall be no underground utilities permitted on the Public Utility Lot where there may be interference with the operation of the dry hydrant and/or its water supply, or where the dry hydrant and/or the water supply operation could impede the utility.
7. As outlined in NFPA 1142, the need and locations for a dry hydrant depends on a number of factors, including but not limited to:
 - a) Current and future population and building trends
 - b) Property values being protected
 - c) Potential for loss
 - d) Proximity to structures (dry hydrant to be min. 30m from structure it is protecting)
 - e) Fire history of the area protected
 - f) Current water supply systems
 - g) Potential water supply sources and reliability
 - h) Cost of project
 - i) Other factors of local concern (location of responding fire department, etc.)
8. The spacing and location of dry hydrants will remain within the discretion of the County, LRFS and the MPS, with input from engineering professionals and other agencies (i.e. Alberta Sustainable Resource Development). For any particular subdivision, many factors must be considered, such as nearest responding fire

department, proximity to existing lakes and ponds, proximity to forested areas, the nature of and value of proposed structures, setbacks, and other factors.

9. Provided an elevated fire hazard risk does not exist, and on approval by the County, dry hydrant requirements may be reduced where a proposed development is within a reasonable distance and response time from an existing hamlet or community with a pressurized municipal water system that has adequate capacity to provide fire water flow.
10. Shared dry hydrant systems may be considered by the County on a site-specific basis to reduce costs among proposed developments, or to improve fire protection in existing areas adjacent to proposed developments.

11.6 General Design Considerations

1. The design of the dry hydrant, including miscellaneous materials and liners, shall be for a minimum life span of 25 years
2. The materials of construction shall be suitable to meet fire flow needs and shall be appropriate for the installation conditions. Buried pipe should be rated for suction conditions. Should rubber gasket PVC pipe be proposed, it shall meet AWWA C900 or C905 with a minimum Class 150 (DR18) rating and wall thickness. Should HDPE pipe be proposed, it shall be rated for a minimum 150 psi (DR11). Should steel pipe be considered, it shall be a minimum of Schedule 40, with corrosion protection and sacrificial anodes considered. Minimum size of suction and buried piping is 250 mm (10 inch) diameter. Above ground metal pipe shall be primed and painted
3. The dry hydrant shall be designed and constructed to provide a minimum flow of 3,800 L/min at draft.
4. The fire department connection shall consist of a 100 mm Storz type quick connect fitting steamer port. The protective cap on the connection shall be acceptable to the County and meet the requirements of NFPA 1963 *Standard for Fire Hose Connections*.
5. All pipe shall be adequately bedded and all trenches and excavations fully compacted to 98% SPD minimum. Pipe cover should consider the potential for frost penetration of at least 2.7 m.
6. The dry hydrant riser shall be primed and painted above ground in Chromium Yellow. Riser shall be protected from vehicular damage by a minimum of four bollards placed in square configuration at a distance of 1.2 to 2.0 m from the riser. Bollards shall be constructed of concrete-filled 100 mm diameter steel pipe also primed and painted Chromium Yellow.

7. Signage shall be provided at the dry hydrant location as follows:
 - a) Minimum size 300 mm x 600 mm
 - b) Mounted with standard Telespar post system
 - c) Signage to read as follows, 65 mm red letters against a bright yellow background:

FIRE DEPARTMENT USE ONLY

8. System strainers and associated components shall be stainless steel. Manufactured PVC strainers may be considered on a site-specific basis.
9. A graveled approach shall be constructed with adequate gravel base (minimum 150 mm depth of 25 mm crush gravel on 300 mm compacted native material), culvert (minimum 400 mm diameter), and of sufficient length and width to allow the responding fire truck to pull fully out of traffic with a minimum 1.5 m clearance on all sides to allow for safety during filling operations.
10. Access to a dry hydrant location shall be designed as right-in/right-out, however, access to or from the opposite traffic direction shall not be inhibited by any type of barrier.
11. A reliable water source for filling and topping up the dry hydrant must be identified and approved by the County prior to approval of the development permit. The dry hydrant assembly, as well as the method of topping, up shall be approved by the County and any other provincial and/or federal approving agencies as required. Filling can be achieved by a dedicated well, stream access, or in the case of buried tank storage only, trucked in. For open ponds, topping up by *trucking in* is not acceptable due to the larger volumes typically stored within ponds, and the potential for larger losses due to seepage and evaporation when compared to buried tanks. Open ponds filled by storm water flows may be acceptable, provided adequate sedimentation traps are provided upstream of the fill location, and emergency overflow provisions are made. Storm water routes that flow adjacent to the facility, allowing off-stream filling, are preferred rather than routes that directly flow through the facility, which can have higher maintenance and potential for damage due to flood events.
12. The area within a distance of 3.0 m around the hydrant assembly shall be surfaced with gravel or similarly inert material to minimize growth of grass, brush, or other vegetation.
13. The County reserves the right to request, at its discretion, materials and geotechnical information relating to the design of roads, approaches, backfill,

bedding, foundations, material tests (i.e. concrete, liner materials, etc.) as required. All such information shall be provided by and stamped by a Professional Engineering firm registered in Alberta.

11.7 In-Ground Open Storage Ponds - Design Considerations

1. When calculating the Minimum Water Supply volume, consideration shall be given to the practicality of constructing an open storage pond. Based upon the criteria outlined below, assuming a square pond with a 3 m x 3 m bottom, the minimum active Water Supply Volume (below the ice allowance and above the suction line intake) that can be provided by a constructed open pond is 182 m³ (48,100 US gal/40,100 l).

The following design criteria should be considered:

- a) Minimum 3H:1V sides slopes inside and outside
- b) Minimum horizontal bottom dimension of 3.0 m
- c) Minimum driving bank of 4.0 m width around pond
- d) Fencing typically 2.0 m beyond driving bank.
- e) Minimum depths are indicated in the following table:

	Depth	Volume
Minimum freeboard above ice	0.3 m	151,400 L (152 m ³)
Minimum ice depth allowance	1.0 m	371,687 L (372 m ³)
Minimum active storage depth	1.05 m	182,058 L (182 m ³)
Dead storage	1.15 m	52,422 L (53 m ³)
Minimum Total Pond Depth	3.5 m	758,324 L (758 m ³)

Note: 1 m³ = 1,000 L

2. The above design criteria accommodate the minimum desired frost cover of 2.7 m above pipes. Vertical risers that may contain water within the frost zone and are thereby subject to freezing may require special treatment (i.e. heat trace, insulation, etc.) to prevent a frost plug from forming. See NFPA 1142 for examples. Satisfactory operation of the riser must be demonstrated over a period of two winters before final acceptance by the County, including necessary field proof tests witnessed by the County.
3. The minimum site area required is 30 m x 30 m, or approximately 0.09 ha based upon a square pond and the above criteria not including any allowance for an approach. Given this, plus the additional area required for an approach and other geometries, the minimum total site area required for an open pond dry hydrant

would be in the order of 0.2 ha. Larger areas may be required depending on site conditions.

4. Ponds shall only be considered in areas where water sources for topping up by means other than trucking in are readily available (i.e. wells, storm water routes, stream access).
5. The ponds must hold and maintain water on a continuous basis
 - a) Where groundwater conditions merit it, the pond may be unlined to allow for replenishment by natural infiltration. If unlined, deepening of all or a portion of the pond should be considered to allow for anticipated fluctuations in water level.
 - b) In all other situations, lining is required. Lining can be *in situ* native clay materials or synthetic liners. Both must be properly designed by a qualified geotechnical Engineer. Synthetic liners can include plastic (HDPE or PVC) and clay (bentonite) materials, or variations thereof. Generally plastic liners should be a minimum of 40 to 60 mil thickness (1.0 to 1.5 mm), with the HDPE on the thicker end of the range. Joints should be fused or similarly sealed. HDPE liners are generally more resistant to ultraviolet radiation from sunlight than PVC and can remain exposed on the surface. PVC and bentonite liners typically require a compacted clay or gravel armor cover. Gravel armor is also necessary to hold down a liner in areas subject to high water table. The minimum acceptable thickness for a compacted clay liner is 0.6 m. The minimum requirement for cover by a gravel armor is a 0.3 m thick layer containing at least 25% by weight material with a size range of 100 mm to 200 mm.
6. Should an exposed PVC or HDPE plastic liner be used, the side slopes can be slippery to maintenance personnel and animals, especially if wet. For safety, consideration should be given to roughening the liner surface to provide adequate traction, covering the exposed liner with clay or gravel to allow footing, and/or decreasing the side slopes. These measures should be applied to all sides of the liner. If the liner is left exposed, the pond must be fenced.
7. At ponds equipped with an exposed plastic liner, a 2.0 m high chain link fence complete with a top 3-wire barbed security attachment shall be provided around the exterior of the open storage pond and driving bank. The fence shall be located 2.0 m outside of the outside shoulder of the driving bank to allow adequate vehicular access around the entire perimeter of the pond. A sliding gate shall be provided so as to not block the entrance or gravel driving surface when open.

Preference should be given to locating the fire department connection outside of the gate.

8. Warning signage at open ponds shall meet the following requirements:
 - a) Minimum of four signs, one on each corner of the pond, installed diagonally
 - b) Minimum size 600 mm x 900 mm
 - c) Mounted with a standard Telespar post system
 - d) Signage to read as follows, against a bright yellow background:

CAUTION (75 mm Red Letters)

THIN ICE (65 mm Black Letters)

DROWNING HAZARD (65 mm Black Letters)

9. At the County's discretion, consideration shall be given to allowing two trucks to fill simultaneously from the open pond dry hydrant.
10. A compacted gravel driving bank of similar construction to the approach in Section 6.0 shall be provided.
11. The pond shall be provided with a means to monitor water level, such as by staff gauge. The developer shall supply tables indicating storage volumes at various water levels.

I1.8 Storage Tanks/Cisterns - Design Considerations

1. Cisterns and buried underground tanks are acceptable storage facilities for dry hydrants. They are often preferred in rural subdivisions where open surface water sources are not readily available, where available land and/or top-up capabilities for open ponds are severely limited, where development densities and property values are high, or where a number of other factors and considerations make them more feasible. Cisterns and tanks should be sized based upon NFPA Minimum Water Supply calculations. Sizing shall be such that the Minimum Water Supply volume is provided as active storage, meaning the volume of water available to be pumped out of the tank or cistern, not including water below the suction pipe intake (i.e. dead storage).
2. Tanks shall be provided with an adequate dry hydrant head assembly, vent assembly, and fill assembly. Examples are provided in NFPA 1142.

3. For larger more intensive developments, large concrete cisterns illustrated in NFPA 1142 may be required by the County.

Some specifics of the cisterns are as follows:

- a) Cisterns located no more than 671 m truck travel distance from the nearest lot line of the furthest lot
- b) Minimum capacity of 113,560 L
- c) Concrete construction (fiberglass is an alternative)
- d) Suction system capable of 3,800 L/min for 75% of the cistern capacity
- e) Design includes suction connection, Siamese fill pipe, vent, and manhole access complete with ladder
- f) Access approach complete with protective bollards

I1.9. Fees and Development Levies

1. The County reserves the right to develop levies and fees for equitable distribution of costs for provision of rural fire protection facilities. Where warranted, the County will develop Endeavour to assist policies.