
PEREGRINE FIRE

Consulting, Engineering, Advocacy



SITE FIRE PROTECTION / NFPA 1142 REPORT

TO: Kevin Kofford, PE - Kimley Horn
FROM: Sean S Donohue, PE - Peregrine Fire
SUBJECT: Kristin Estates, Parcel No. 3412000026
DATE: September 23, 2025

I. INTRODUCTION & PROJECT DESCRIPTION

Kristin Estates is a 60-acre proposed residential development located north of CO Hwy 94 at N. Log Road. The property is located within the Ellicott Fire Protection District (EFPD). The development includes 11 subdivided parcels measuring approximately 5 acres each.

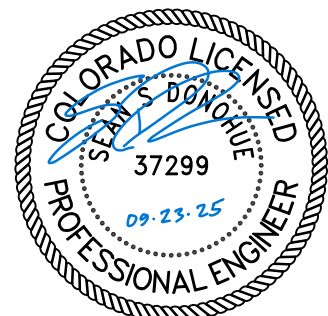
Since the property falls outside the city limits, it does not have access to Colorado Springs Utilities including water for domestic and fire protection use. When municipal fire protection water is not available, the International Fire Code (IFC) Section B103.3 permits the use of NFPA 1142, *Standard on Water Supplies for Suburban and Rural Firefighting*.

Peregrine Fire has been retained to provide this report detailing the fire protection water storage and delivery requirements as detailed in NFPA 1142 and the El Paso County Land Development Code as well as fire department access requirements.

II. EXECUTIVE SUMMARY

This report lays out the following fire protection specifications with code references and supporting calculations for the project:

Fire Water Source:	2 cisterns, evenly spaced 1,000 ft max from lot lines
Fire Water Capacity:	30,000 gallons per cistern; 60,000 gallons total
Dry Hydrant:	6 inch minimum, capable of 1,000 gpm flow
Access:	Single access road, new development road 1,450 ft Total length from Hwy 94 - 3,400 ft
Road material:	Gravel on a compacted base (see Civil drawings)
Minimum load:	75,000 lbs
Road width:	32 ft
Dead end:	96 ft bulb turnaround
Average grade:	< 2 percent



PEREGRINE FIRE
6745 Rangewood Dr, Suite 210
Colorado Springs, CO 80918
www.peregrinefire.com
(719) 355-5290

III. EL PASO COUNTY LAND DEVELOPMENT CODE REQUIREMENTS

The El Paso County Land Development Code (LDC) Section 6.3.3, Fire Protection and Wildfire Mitigation, provides the following guidance with regards to fire protection water:

- ┌ A Water Supply provided by either a municipal hydrant system, or where hydrants are not provided, a system conforming to NFPA 1142, *Standard on Water Supplies for Suburban and Rural Fire Fighting*.
- ┌ Automatic fire protection as required for buildings in accordance with the building code adopted by the Pikes Peak Regional Building Department.
- ┌ For areas without a central water system, "fire cisterns shall be provided in planned building areas which are not served by hydrants, unless the Fire Authority has recommended, and the approval authority has approved an alternate fire protection water supply system."
- ┌ "Cisterns shall be designed for the largest building allowed by zoning in the worst-case hazard and construction class."
- ┌ Cisterns shall have a total capacity equal to:
 - 300 gallons per acre within the subdivision, plus
 - 3,000 gallons per dwelling unit, or
 - NFPA 1142 calculated volume, whichever is greater
- ┌ Cisterns shall have access via dedicated turnarounds located no more than 50 ft from the cistern and access to a "standpipe" within 8 ft. By standpipe, this is understood to mean a hose connection with specified hose thread as required by the servicing fire district or department.
- ┌ Dry hydrants, when used, must be accessible under all weather conditions, have a clearance of 20 ft on each side, located a minimum of 100 ft from any structure, be protected from vehicular damage, and be visible from the roadway with reflective markings. Additional installation and performance as per NFPA 1142.

Minimum Water Required

The development measures 60 acres with 11 planned single-family homes. The largest home is estimated at 10,000 GSF. The three calculations methods prescribed by the LDC are:

- ┌ 300 gallons per acre within the subdivision (18,000 gallons) plus
- ┌ 3,000 gallons per dwelling unit (33,000 gallons); or
- ┌ As per NFPA 1142, which is based on the single largest building within the area of consideration.

IV. LDC & NFPA 1142 CALCULATIONS

NFPA 1142 provides a methodology for calculating the required volume of stored water for use in rural firefighting. At its core, the approach is based on the following formula:

$$WS_{min} = \frac{VS_{tot}}{OHC} (CC) \times 1.5$$

Where:

WS_{min} = minimum water supply in gallons

VS_{tot} = total volume of structure in cubic feet (ft³)

OHC = occupancy hazard classification number

CC = construction classification number

The 1.5 multiplier is based on proximity and exposure to adjacent structures of 50 ft or less. When structures are located over 50 ft apart, this multiplier can be disregarded. Although homes will almost certainly be located more than 50 ft from each other given 5 acre lots, future adjacent structures such as garages, barns, sheds or other structures should be taken into account; therefore, the 1.5x multiplier will be maintained. Type of construction is assumed to be the most restrictive (Type V); and no automatic sprinkler protection is assumed. Average roof height is assumed to be 12 ft.

- ┌ Structures may be located within 50 ft, therefore the additional 1.5 multiplier is used
- ┌ Type of construction is assumed to be Type V as this is proposed as a metal building, providing a CC = 1.5.
- ┌ Residences are specifically listed in NFPA 1142 as giving an OHC of 7.

Rounding to the nearest 100, this yields the following minimum required volume of water:

$$WS_{min} = \frac{1,200,000 \times 1.5}{7} (1.5) = 38,600 \text{ gallons}$$

Based on a volume requirement of over 30,000 gallons, the minimum water delivery rate per NFPA 1142 Table 4.6.1 is 1,000 gpm.

The two methods of assessing minimum water volume result in the following:

V. Table 1: Water Storage Required based on Method of Evaluation

Inputs → Method ↓	Acres	Homes	Estimated Home Volume	Resulting Water Storage Volume Required (Gallons)
LDC method	60	11		51,000
NFPA 1142			120,000 ft ³	38,600

The above shows that the LDC clearly requires more volume than NFPA 1142; therefore, the development will be provided with cisterns to accommodate the required volume.

VI. ELLICOTT FIRE PROTECTION DISTRICT REQUIREMENTS

EFPD has adopted the 2015 edition of the International Fire Code (IFC) and has adopted and modified Appendix B to read:

B103.3 Areas without water supply systems. For information regarding water supplies for fire-fighting purposes in rural and suburban areas in which adequate and reliable water supply systems do not exist, the fire code official is authorized to utilize NFPA 1142 or ~~the International Wildland Urban Interface Code~~ per Chapter 6 of the El Paso County Land Development Code.

IFC Section 507.2.2 permits water tanks complying with NFPA 22 to be placed in service for fire protection provided they are capable of providing the required fire flow. Chapter 11 of NFPA 22 provides for the specification of reinforced fiberglass tanks, which are the most appropriate material for buried installations and the most common tank material used in other portions of El Paso County.

Per conversations with El Paso County Fire Safety and Wildfire Mitigation Program Manager, EFPD has stipulated a maximum distance from cistern to lot line of 1,000 ft with a minimum of two evenly spaced cistern locations. Therefore, cisterns will be sized to meet the volume demands listed above with 30,000 gallons of cistern capacity at each cistern location. We understand this request is based on Insurance Services Office (ISO) requirements to maintain the current district ISO rating.

A single dry hydrant with a minimum suction line size of 6-inch will be provided to accommodate up to 1,000 gpm flows at each cistern. The tanks will be designed to meet NFPA 22, *Standard for Water Tanks for Private Fire Protection*.

Cistern turnarounds or pull offs shall be provided per the LDC and NFPA 1142 to allow fire department access to the dry hydrant. Cisterns will be sited such that accompanying dry hydrants are no more than 1,000 ft to the furthest lot line within the filing. See Sheet I of the attached Fire Exhibit.

The following requirements apply to the pull off to access the dry hydrant:

1. A hydrant pull off will need to be created which allows firefighting apparatus to draft from the hydrant while traffic on the through access road (unnamed) is maintained. The pull off must be at least 12 ft wide to allow firefighters room to access the driver's side of the apparatus (NFPA 1142 Section 7.5) and 40 ft long with the hydrant centered to provide a clearance of 20 ft to either side, as per LDC 6.3.3(C)(1)(d)(ii). The pull-off must also be capable of carrying the maximum expected vehicle weight.
2. The hydrant shall be located a maximum of 6 ft from the edge of the pull off as per LDC 6.3.3(C)(1)(c)(vii) to accommodate at 10ft section of hard suction piping.
3. Bollards are recommended to be placed in front of the hydrant in accordance with IFC Section 312 to provide vehicle damage protection.

VII. FIRE DEPARTMENT SITE ACCESS

The development will be provided with a single dead end gravel road constructed down the middle of the development with a fire department vehicle turnaround at the end. The access road measures approximately 1,450 ft in total length; however the total length measured from CO Hwy 94 is approximately 3,400 ft. Dead ends exceeding this length already exist in this portion of the district.

The El Paso County Engineering Criteria Manual (ECM) Section 2.3.8 permits dead ends of up to 1,600 ft for rural conditions. NFPA 1140 Table 11.1.4.1(a) permits a single access point to a residential area of less than 100 households. IFC Appendix D Table D103.4 requires special approval if a dead end is over 750 ft. It is our understanding that EFPD is willing to grant a single access road given the two cistern locations and 32 ft wide road, discussed below.

Given the western grassland fuel loading, average road grade below 2%, and low density of proposed housing, we judge the risk of a single access road being compromised by wildfire to be low and agree with a single entry access road for this development.

Given a dead end over 300 ft, two-way traffic shall be accommodated and a minimum 28 ft wide road is required per the ECM Table 2.5 for local roads. In preliminary discussions with EFPD, a 32 ft wide road was requested and has been provided. Per the LDC Section 6.3.3(2)(a), emergency vehicle access roads may be constructed to the County's gravel road standard if open to the public, which this road is. Per Appendix D of the IFC, Section D102, the road shall be designed to accommodate a minimum vehicle load of 75,000 lbs.

The cul-de-sac or turnaround shall be in accordance with the ECM and Appendix D of the IFC, which requires a minimum bulb diameter of 96 ft with a minimum entry radius of 28 ft.

VIII. CONCLUSIONS

This report provides an evaluation of the required fire protection water and emergency vehicle access for the project. Construction drawings and specifications will be developed based on these specifications and calculations.