

5.16 LIGHT EMISSIONS AND VISUAL IMPACTS

Airports have high-intensity lights to illuminate runways and taxiways, and to supply visual approach navigational aids, which are critical to the safe operation of an airport. This section presents the analysis of the impact of airport-related light emissions and the overall visual impact upon the areas surrounding Gness Field Airport (DVO or Airport) resulting from the project alternatives under consideration in this Environmental Impact Statement (EIS).

5.16.1 REGULATORY SETTING

Only in unusual circumstances (e.g., when high-intensity strobe lights would shine directly into people's homes) would the impact of light emissions be considered sufficient to warrant special study and a more detailed examination of alternatives in an EIS. As directed by Federal Aviation Administration (FAA) Order 1050.1E, Change 1, *Environmental Impacts: Policies and Procedures*, light emissions are assessed to the "...extent to which any lighting associated with an action will create an annoyance among people in the vicinity or interfere with their normal activities." Airport facilities at DVO are illuminated by various types of lighting emanating from any of the following sources:

- Airfield lighting on runways, runway thresholds, taxiways, and ramps (runway lighting);
- Visual approach aids;
- Obstruction lights;
- Hangar and other Airport facilities lighting; and
- Roadway and parking lot lighting.

Generally, lights located at the runway thresholds and in the approach area pose the greatest concern for potential impact due to their intensity and direction the lights are focused. Therefore, the Visual Glideslope Indicator lighting systems were evaluated. The following information is provided in the assessment for each lighting system:

- Location of existing and future runway threshold lights and approach light systems;
- Descriptions of each airfield lighting system as to its purpose, intensity, color, flashing sequence (as appropriate), and beam angle; and
- Assessment of the extent of annoyance caused by the DVO airfield lighting systems.

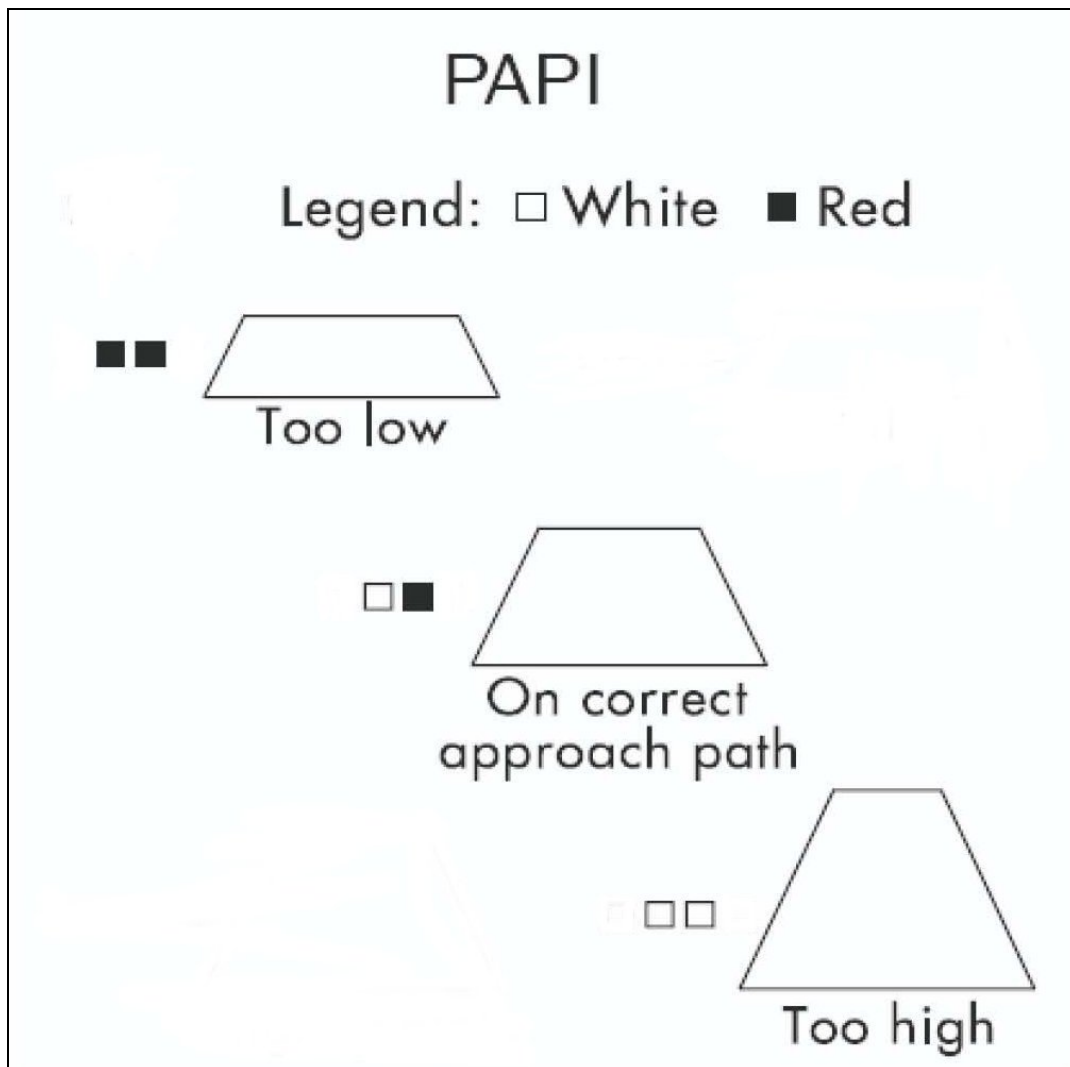
5.16.2 EXISTING CONDITIONS

The following paragraphs discuss the existing lighting systems in use at DVO.

VISUAL GLIDESLOPE INDICATOR

The Visual Glideslope Indicator is a system of lights arranged to provide visual descent guidance information to pilots during the aircraft landing approach.¹ One such system that is in use at DVO, a Precision Approach Path Indicator (PAPI), provides a specific light pattern when the aircraft is on the desired descent path to the touchdown point. A diagram of a PAPI lighting system is shown in **Figure 5.16-A, PAPI Lighting System**.

**Figure 5.16A
PAPI LIGHTING SYSTEM
Gross Field Airport**



¹ FAA AC 150/5345-52, *Generic Visual Glideslope Indicators (GVGI)*, 9/5/2007.

A PAPI system includes sets of two or four red-to-white lighting units installed at the approach end of a runway in a single horizontal row.² The system is located perpendicular to the runway centerline, at a distance from the threshold that provides the proper threshold crossing height and obstacle clearance.

Each lighting unit projects a split beam of light; the upper segment is white, and the lower segment is red. The transition from white to red, or vice versa, occurs within a vertical angle of five minutes of arc at the beam center and results in a well-defined corridor of light consisting of white (top) and red (bottom) beams. These systems have an effective visual range of about five miles during the day and up to 20 miles at night. The PAPI lights are high-intensity lights that are red and white and are not sequenced flashing lights. The lights are installed on poles and the light beam is positioned to project 20 feet above the most critical obstruction in the area.

When using a PAPI, pilots operating on the correct glidepath would see one red light and one white light as they complete the approach to landing. Pilots operating above the glidepath would see two white lights, while pilots operating below the glidepath would see two red lights as they complete their approach to landing; appropriate correction would then be applied in order to join the correct glidepath for the landing approach.

Runway 13 has a two-light PAPI located on the right side of the runway as the pilot approaches from the north. This PAPI provides guidance for a 3.5 degree glide path, which clears any obstacles and the terrain north of the Airport. Runway 31 has a two-light PAPI located on the left side of the runway as the pilot approaches from the south. This PAPI provides guidance for a 4.0 degree glide path, which clears any obstacles, including the elevated terrain approximately one mile south of the Airport.

The nearest residential area to the PAPI lighting system at the approach end of Runway 13 (north of the Airport) is located in the City of Petaluma, approximately 5.5 miles away. Given the distance from the Airport and the angle of the PAPI lights, it is unlikely that residents living in that area would be able to see the PAPI even at night. The nearest residential area to the PAPI lighting system at the approach end of Runway 31 (south of the Airport) is located 1.1 miles away in the City of Novato. The angle of the PAPI on the south side of the Airport is set at 4.0 degrees, which is a steeper angle than the typical 3.0 degree approach. The reason for this increased angle is to provide an additional margin of safety for pilots approaching over the elevated areas south of the Airport. Therefore, the PAPI lights are directed above the residential areas located on the elevated terrain. It is possible that residents at the highest points of this residential area may be able to see the PAPI lights, but given the angle and the distance, these lights would not be intrusive.

² Federal Aviation Administration, *Aeronautical Information Manual*, Change 3, August 27, 2009. On-line at: http://www.faa.gov/air_traffic/publications/ATpubs/AIM/, accessed October 18, 2011.

OTHER AIRPORT LIGHTING

A rotating beacon identifies the location of the Airport at night and is identified by projecting a green and white beam of light 180 degrees apart.

Obstructions in the vicinity of the Airport are also marked or lighted to warn pilots of their presence. These obstructions may be identified by a steady-red, flashing-red, or white strobe light. These obstructions are identified for pilots on approach and sectional Visual Flight Rules (VFR) charts and on the official Airport Obstruction Chart, published by the National Oceanic and Atmospheric Administration (NOAA).

Other lighting exists along the taxiways and ramps for low visibility purposes and to assist aircraft movement on the airfield, such as hold position lights, stop bar lights, and runway and taxiway signage. Each of these additional light systems is located within the Airport complex and represents no impact upon neighboring communities.

5.16.3 FUTURE CONDITIONS: 2018

The following section describes the conditions that would result from the lighting required by each of the proposed runway alternatives during the first full year in which the proposed runway extension is anticipated to be operational. While the same types of lighting systems described for the existing conditions are expected to be used for each of the proposed runway alternatives, the location of lighting equipment in relation to homes would change due to the proposed relocation of the runway approach ends.

Alternative A: No Action

Under this Alternative, Runway 13/31 would remain in its current location and therefore no changes to the existing lighting equipment or locations would occur.

Alternative B: Extend Runway to the Northwest by 1,100 Feet (Sponsor's Proposed Project)

Alternative B (Sponsor's Proposed Project) includes the extension of Runway 13/31 1,100 feet to the northwest. Under Alternative B, the approach end of Runway 13 would move 1,100 feet to the northwest, along with the existing runway's current PAPI lighting system. With the existing PAPI location, the nearest residential area to the PAPI lighting system at the approach end of Runway 13 is located in the City of Petaluma, approximately 5.5 miles away. Under Alternative B, the PAPI would now be located approximately 5.3 miles away from the closest residential area, located in the City of Petaluma. As with the existing condition, it is extremely unlikely that residents of this area would be able to see the PAPI lighting system due to the distance and angle of the lights. Taxiway and runway lights would also

be added to the Airport, but these lights are directed in a way to illuminate specific areas of pavement. These lights would likely be visible by the residential areas to the south that has a view of the Airport, but due to their intensity and distance from the residential areas, they would not significantly increase the overall light emissions created by the Airport. Therefore, Alternative B would not result in significant light impacts.

Alternative D:

Extend Runway to the Southeast by 240 Feet and to the Northwest by 860 Feet

Alternative D includes the extension of Runway 13/31 860 feet to the northwest and 240 feet to the southeast. Under Alternative D, the approach end of Runway 13 would move 860 feet to the northwest and the approach end of Runway 31 would move 240 feet to the southeast, along with each runway's current PAPI lighting system.

With the existing PAPI locations, the nearest residential area to the PAPI lighting system at the approach end of Runway 13 is located in the City of Petaluma, approximately 5.5 miles away; while the nearest residential area to the PAPI lighting system at the approach end of Runway 31 is located 1.1 miles away in the City of Novato. Under Alternative D, the PAPI at the approach end of Runway 13 would now be located approximately 5.4 miles away from the closest residential area, located in the City of Petaluma. As with the existing condition, it is extremely unlikely that residents of this area would be able to see the PAPI lighting system due to the distance and angle of the lights.

The PAPI at the approach end of Runway 31 would now be located approximately 1.04 miles away from the closest residential area, located in the City of Novato. Due to the elevation of the terrain south of the Airport, it is likely that the angle of the PAPI would increase to 4.25 or 4.5 degrees to provide the necessary guidance to pilots approaching from the south of the Airport. As a result, the PAPI lighting system may still be visible to residential areas, but would not create a significantly different lighting situation that exists today. Taxiway and runway lights would also be added to the Airport to provide lighting for the taxiway and runway extensions. The area to the south of the Airport where the southern extension would be located would have additional taxiway and runway lights. These lights are directed in a way to illuminate specific areas of pavement; however they would likely be visible by the residential areas to the south that has a view of the Airport. However, the overall view of an Airport setting would be similar to the existing condition. The intensity and distance of the lights from the residential areas would make it unlikely that light emissions would adversely affect the area, but residents may notice the lights being somewhat closer than under the existing layout. Given these conditions potential light impacts are deemed less than significant.

5.16.4 VISUAL IMPACTS

According to FAA Order 1050.1E, Change 1, "Visual or aesthetic impacts are inherently more difficult to define because of the subjectivity involved." Analysis of visual impacts refers to "...the extent that the development contrasts with the existing environment..."³ The current visual setting of the area is one that can best be described as an airport setting. Existing views of the site from residential areas to the south, the park areas to the northwest, or from motorists on Highway 101 are of an airport surrounded primarily by vacant land. Because the proposed development would occur entirely on Airport property and not include any new vertical structures such as buildings, the resulting visual character of the site would remain an airport surrounded primarily by vacant land. As such, no adverse visual or aesthetic impacts would occur under Alternative A, B, or D. As discussed under light emissions above, residents located south of the Airport that have a view of the Airport may notice a change in the layout of the runway and taxiway, but the modified view would be consistent with the existing view of an airport and the increase in lights would be consistent with the existing lights at the Airport.

³ FAA Order 1050.1E: *Environmental Impacts: Policies and Procedures*, Appendix A, paragraph 12.2b.