



**noble energy
mediterranean ltd.**
a subsidiary of noble energy, inc.

Leviathan Production Platform

Lighting Intensity Measurement Plan

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REV	DATE	OWNER	DESCRIPTION	CHECKER	APPROVER
			Noble Energy Mediterranean Ltd.		
			LPP Lighting Intensity Measurement Plan		
			LPP-OP-NEM-EHS-PLN-0001		

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1. BACKGROUND

The Leviathan Production Platform (LPP) is located approximately 10 km offshore Dor, Israel, and is operated by Noble Energy Mediterranean Ltd. (Noble Energy). The LPP utilizes nighttime lighting throughout the facility for the sake of preventing any operational, safety, security and navigational hazards. There are no operational or support vessels regularly present near the LPP at night. In general, all operational and support vessels activities, at or near the LPP, [מידע סודי]

General platform lighting was designed to conform to the requirements of the International Commission and vendor/industry recommendations. The installation of luminaires throughout the platform was designed in accordance with IEC-61892 table 6 (Mobile and Fixed Offshore Units) and all applicable offshore and industry standards. Navigational lighting for the Leviathan platform was designed as specified in United States Federal Regulation Title 33 Part 67 Aids to Navigation on Artificial Islands and Fixed Structures.

Many marine ecosystems around the world are exposed to artificial nighttime lighting with varying characteristics such as colors, cycles and intensities of nighttime lighting around these ecosystems. Environmental impact of light pollution is difficult to pinpoint empirically. The main challenge of studies on this subject is isolating the impact of light generated from various spots. Temporary and permanent nighttime lighting may affect a wide range of organisms and ecosystems in the marine environment. The subject has been addressed within the NOP that governs the LPP installation (TAMA 37/H) and within the approved offshore EMMP that refers to the LPP. In order to assess the potential impact of LPP lighting on the marine environment, Noble Energy intends to conduct a survey around the LPP to measure the overall intensity resulting from the nighttime lighting sources on the platform. As a general background, the radiance over the area prior to the LPP operation commencement is shown in Figure 1 below.

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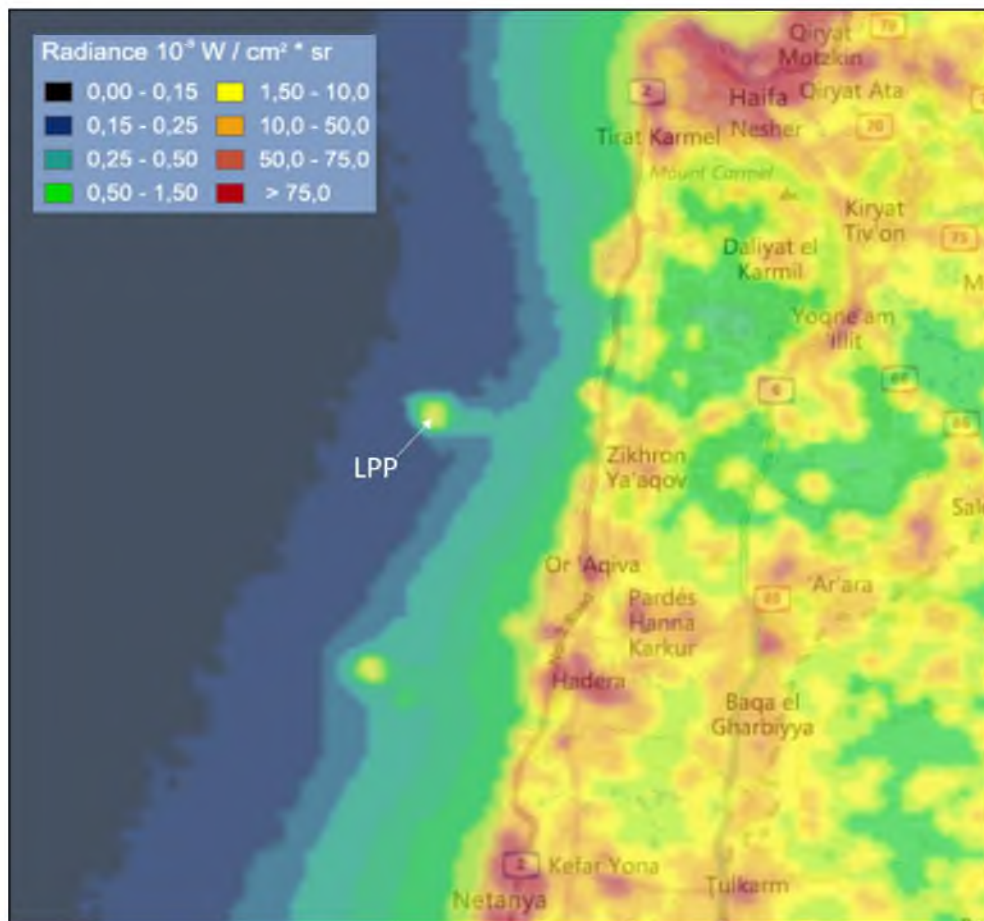


Figure 1 – 2019 annual average radiance composite image produced by NOAA / NCEI using nighttime data from the Visible Infrared Imaging Radiometer Suite (VIIRS) Day/Night Band (DNB).

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2. FIELD METHODS

2.1. Monitoring Vessel

The monitoring vessel will be in operation, provided safe sea state, and will supply appropriate safe working deck for the monitoring team. The proposed vessel is the [ציד], subjected to availability at time of requirements.

2.2. Measuring Instrument

Measuring the light intensity in the vicinity of the LPP will be done using the testo 545 Lux-meter (figure 2), operated by an experienced lighting consultant onboard the monitoring vessel. The instrument measuring unit is Lux – a unit used to define illumination, where 1 lux is equal to 1 lumen falling on an area of 1 square meter.



Figure 2 – testo 545 light lux-meter.

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2.3. Survey Design

2.3.1. General Timing

The survey is planned to take place at night during a new-moon phase, or near it, in order to minimize, as far as possible, the influence of the moonlight natural illumination on the readings. Additionally, the survey will take place during quiet sea-state conditions to assure the safety of all personnel onboard the vessel, and also to enable conducting the readings at the same height above sea level, as the readings may differ at different elevations. Quiet sea-state conditions are also preferable to eliminate any potential obstruction by waves.

2.3.2. Measurement Stations

Since the intensity of the LPP Lighting dwindles with growing distance from the platform, the measurement distances are set to start closer to the platform and gradually move away from the platform. The selected measurement distances are [מיקום האסדה] (see Figure 3).

At each selected distance, [מידע סודי] will be conducted around the platform at [מידע סודי] to measure the impact of the lighting sources of the platform in all directions, and to eliminate any external effects, such as coastal lighting sources. If deemed necessary, and providing that coastal effects are not causing interference, measurements may continue at [מידע סודי] until the lighting intensity measurement will match that of the natural nighttime lighting intensity of a full moon (0.27 Lux).

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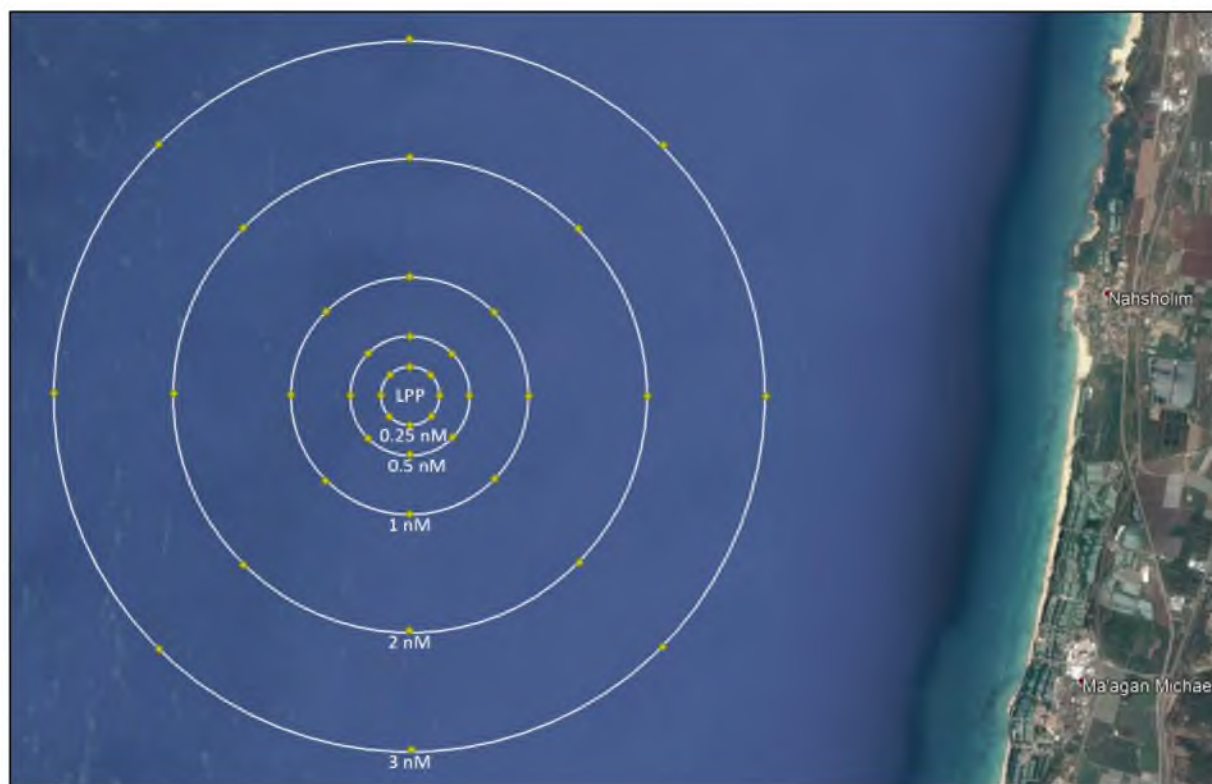


Figure 3 – Map of the measurement distances (white circles) and stations (yellow dots) planned for the survey.

The table below shows the coordinates of the planned measurement stations at each distance, numbered [מידע סודי] intervals between measurement points. The measurement stations at distances of [מידע סודי] will take place only in case the natural nighttime lighting of a full moon (0.27 Lux) has not been reached at closer distances and providing that coastal effects are not causing interference.

[מידע סודי]

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2.3.3. Readings Method

In each station the lighting surveyor will perform two types of readings, vertical and horizontal. Vertical light level measures the illumination on a vertical plane, and readings are taken with the light meter in the vertical position. The horizontal light level measures the illumination on a horizontal plane, and readings are taken with the light meter in the horizontal position (i.e. sea surface).

Each reading will be measured at the same elevation above sea level to prevent inconsistencies. The measurement height above sea level, both in horizontal and vertical readings, will be determined by the height of the side of the monitoring vessel.

3. REPORTING

The lighting surveyor will provide a field survey report to Noble Energy with the survey details and the average results at each measured distance from the platform.

Based on the field report, Noble Energy will prepare a report to be submitted to the Ministry of Environmental Protection with the assessments of the impact of the lighting on the environment. This report will be submitted within 3 months of field survey completion.