UNOSAT satellite imagery-based analysis of disturbed earth near Tarhuna, in Marqub District, Tripolitania Region, Libya on behalf of the Independent Fact-Finding Mission on Libya

15 September 2021 **Geneva, Switzerland**

UNOSAT was requested by the Independent Fact-Finding Mission on Libya (Libya – FFM) to corroborate the location of mass graves at seven locations near Tarhuna, in Marqub District, Tripolitania Region, Libya. UNOSAT was also asked to acquire and analyze satellite images that could identify areas of disturbed consistent with mass graves within these parameters:

Location: near Tarhuna, in Marqub District, Tripolitania Region, Libya

- **Site 1 and 2**: 5Km Agricultural Project (مشروع الزراعي 5 كيلومتر)
- **Site 3**: Central Support Prison (سجن الدعم المركزي)
- **Site 4**: Al-Rabt Agricultural Project (مشروع الربط)
- **Site 5**: Prison of the Boxes (مقر المختبرات الزراعيه سجون البوكسات)
- **Site 6**: Judicial Prison (سجن القضائية)
- **Site 7**: Al Naaji Factory (مصنع النعاجي)

Incident dates: Between 2019 and 2020

Request description: Corroborate and identifying, via satellite imagery-based analysis, any potential burial sites/mass graves that may appear at any of the seven aforementioned locations.

UNOSAT location verification and disturbed earth assessment near Tarhuna, in Marqub District, Tripolitania Region, Libya

UNOSAT conducted an open-source and satellite imagery-based analysis to determine the presence of mass graves or burial related activity at:

- Site 1 and 2: 5Km Agricultural Project (مشروع الزراعي 5 كيلومتر) at 32.42296, 13.57296 and 32.423844, 13.571922 respectively,
- Site 3: Central Support Prison (سجن الدعم المركزي) at 32.375342, 13.657444
- Site 4: Al-Rabt Agricultural Project (مشروع الربط) at 32.393853, 13.642419
- Site 5: Prison of the Boxes (مقر المختبرات الزراعيه سجون البوكسات) at 32.352222, 13.637111
- Site 6: Judicial Prison (سجن القضائية) at 32.391533, 13.641464
- Site 7: Al Naaji Factory (مصنع النعاجي) at 32.421806, 13.646444

To conduct the disturbed earth analysis UNOSAT acquired satellite imagery collected between 2019 and 2021. The satellite images used in the analysis were selected using three-tier selection criteria: best high-resolution cloud-free images, and in equal intervals, when possible. The selection process was conducted to optimize the change detection analysis which is explained in the next paragraphs.

UNOSAT used a satellite imagery-based change detection analysis to identify, and quantify differences between images of the same scene at different times and detect areas of disturbed earth. Change detection is a common activity in satellite imagery analysis and includes a broad range of methods and software tools to identify and quantify differences between satellites images collected at different points in time.

UNOSAT used manual techniques to identify possible areas of disturbed earth that could potentially have been used as mass grave sites in the immediate vicinity of the aforementioned sites. First, UNOSAT acquired satellite images from 2019 to 2021 at the aforementioned locations to capture how the landscape changed over time.

A summary map of the locations is shown in figure 1 below.

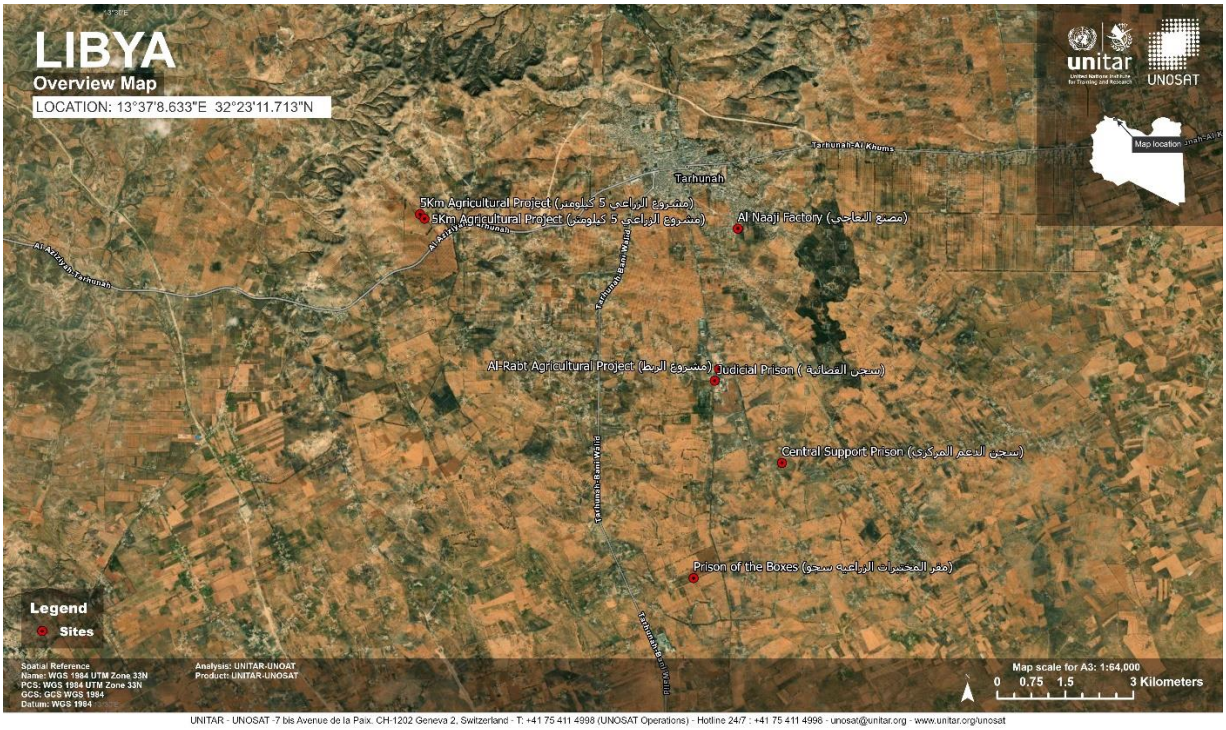

Figure 1: overview map

UNOSAT Findings

UNOSAT analysis is based on high-resolution imagery collected at different intervals, and it is limited by meteorological conditions and image availability. The summary of the results of the analysis is included in the following paragraphs and overview maps summarizing the findings are located on pages 3 to 6. The UNOSAT satellite imagery-based analysis was conducted using a collection of suitable images collected from 2019 to 2021.

Site 1 and 2: 5Km Agricultural Project (مشروع الزراعي 5 كيلومتر)

UNOSAT's change detection analysis has identified one location with soil disturbances (site 1) and vehicle-related activity near site 2. The soil disturbance near site 1 could be indicative of mass burial activity between 1 October and 19 December 2019 (see figure 2).

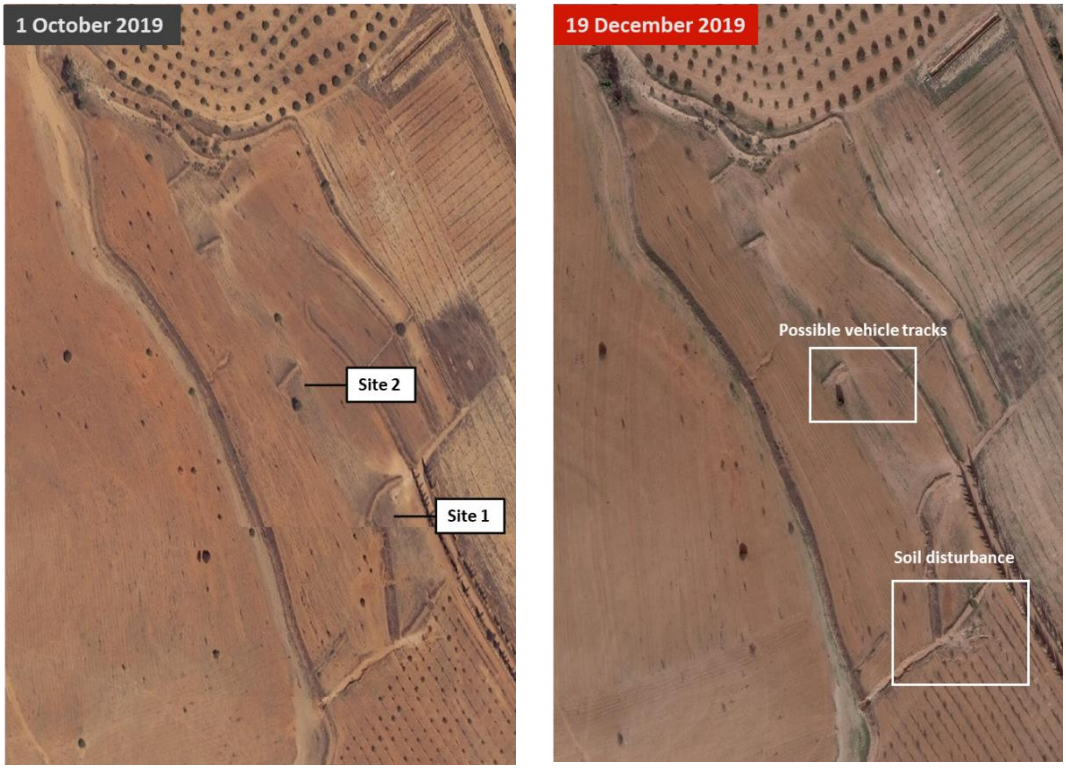

Figure 2: 5Km Agricultural Project (مشروع الزراعي 5 كيلومتر)
1 October 2019 WorldView-2 and 19 December 2019 WorldView-3 DigitalGlobe Inc. images
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UNOSAT's change detection analysis also identified possible excavations by 16 April 2021 at site 1 and site 2 (see figure 3). More than a dozen ditches are seen on both sites on imagery collected on 16 April 2021.

Figure 3: 5Km Agricultural Project (مشروع الزراعي 5 كيلومتر)
16 April 2021 GeoEye-1 DigitalGlobe Inc. image
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Site 3: Central Support Prison (سجن الدعم المركزي)

UNOSAT's change detection analysis has identified a site with possible soil disturbances detected on imagery collected on 20 September 2019. The soil disturbance was observed near a vehicle with a walled compound (see figure 4).

Figure 4: Central Support Prison (سجن الدعم المركزي)
15 and 20 September 2019 WorldView-2 DigitalGlobe Inc. images
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Site 4: Al-Rabt Agricultural Project (مشروع الربط)

UNOSAT's change detection analysis has identified a site with possible soil disturbances detected on imagery collected on 19 June 2020. The estensive soil disturbance was observed in close proximity to an agricultural field but seems to be not directly related to agricultural-activity. (see figure 5).

Figure 5: Al-Rabt Agricultural Project (مشروع الربط)
19 December 2019 WorldView-3 and 19 June 2020 GeoEye-1 DigitalGlobe Inc. images
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Site 5: Prison of the Boxes (مقر المختبرات الزراعيه سجون البوكسات)

UNOSAT's change detection analysis has identified a site with possible soil disturbances detected on imagery collected on 24 March 2020. Additional soil disturbance was observed on an image collected on 7 May 2020. The extensive soil disturbance was observed within the walled compound as well as a construction of a berm (see figure 6).

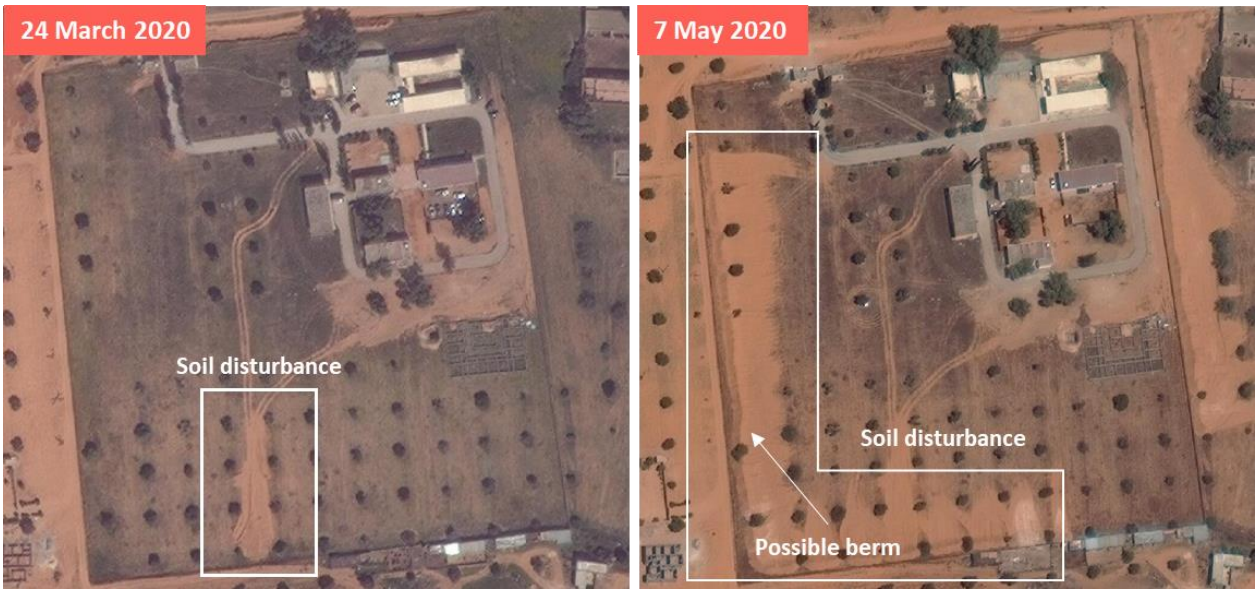

Figure 6: Prison of the Boxes (مقر المختبرات الزراعيه سجون البوكسات)
24 March 2020 GeoEye-1 and 7 May 2020 GeoEye-3 DigitalGlobe Inc. images
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Site 6: Judicial Prison (سجن القضائية)

UNOSAT's change detection analysis has identified two sites with possible soil disturbances detected on imagery collected on 1 August 2020 within the secured walled prison facility (see figure 7).

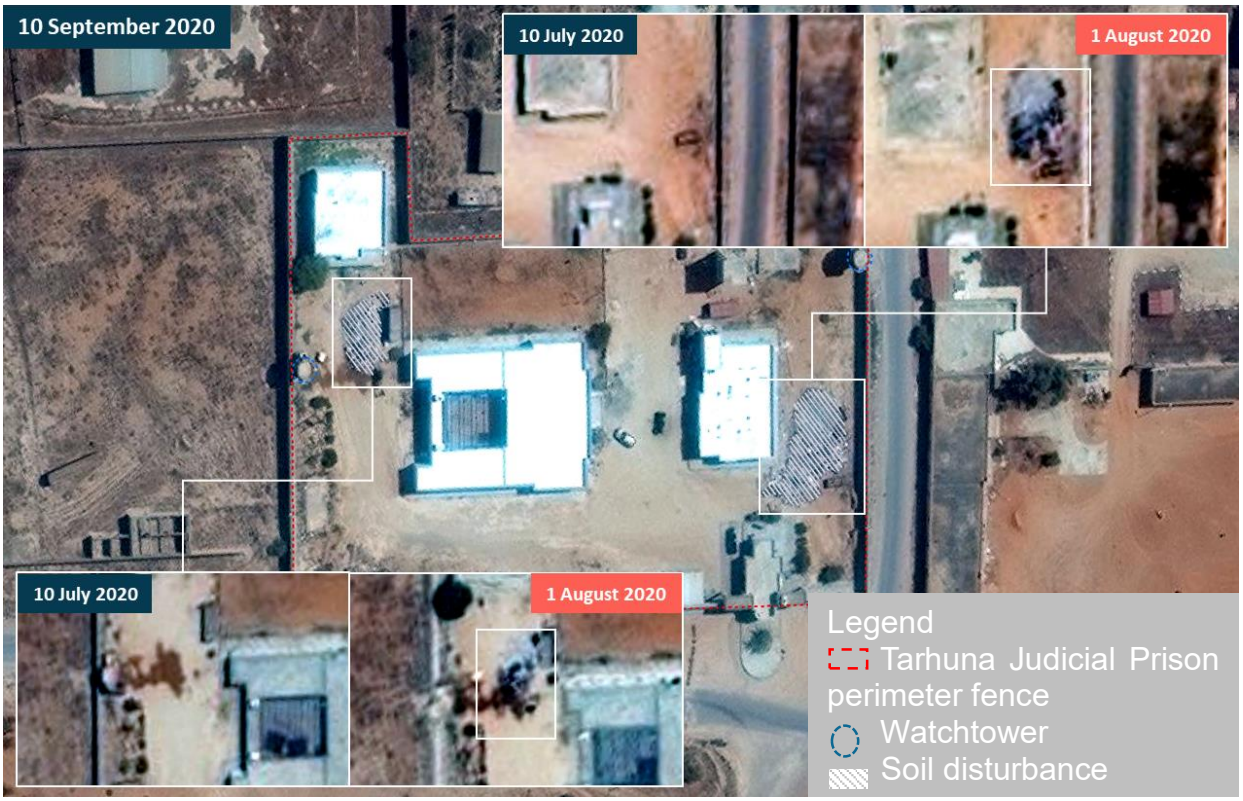

Figure 7: Judicial Prison (سجن القضائية)

10 September WorldView-3, 10 July WorldView-2, and 1 August 2020 WorldView-2 DigitalGlobe Inc. images
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Site 7: Al Naaji Factory (مصنع النعاجي)

UNOSAT's change detection analysis has identified a site with possible soil disturbances detected on imagery collected on 19 June 2020 at the Al Naaji Factory site (see figure 8).

Figure 8: Al Naaji Factory (مصنع النعاجي)
26 May 2020 WorldView-2 and 19 June 2020 WorldView-2 DigitalGlobe Inc. images
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