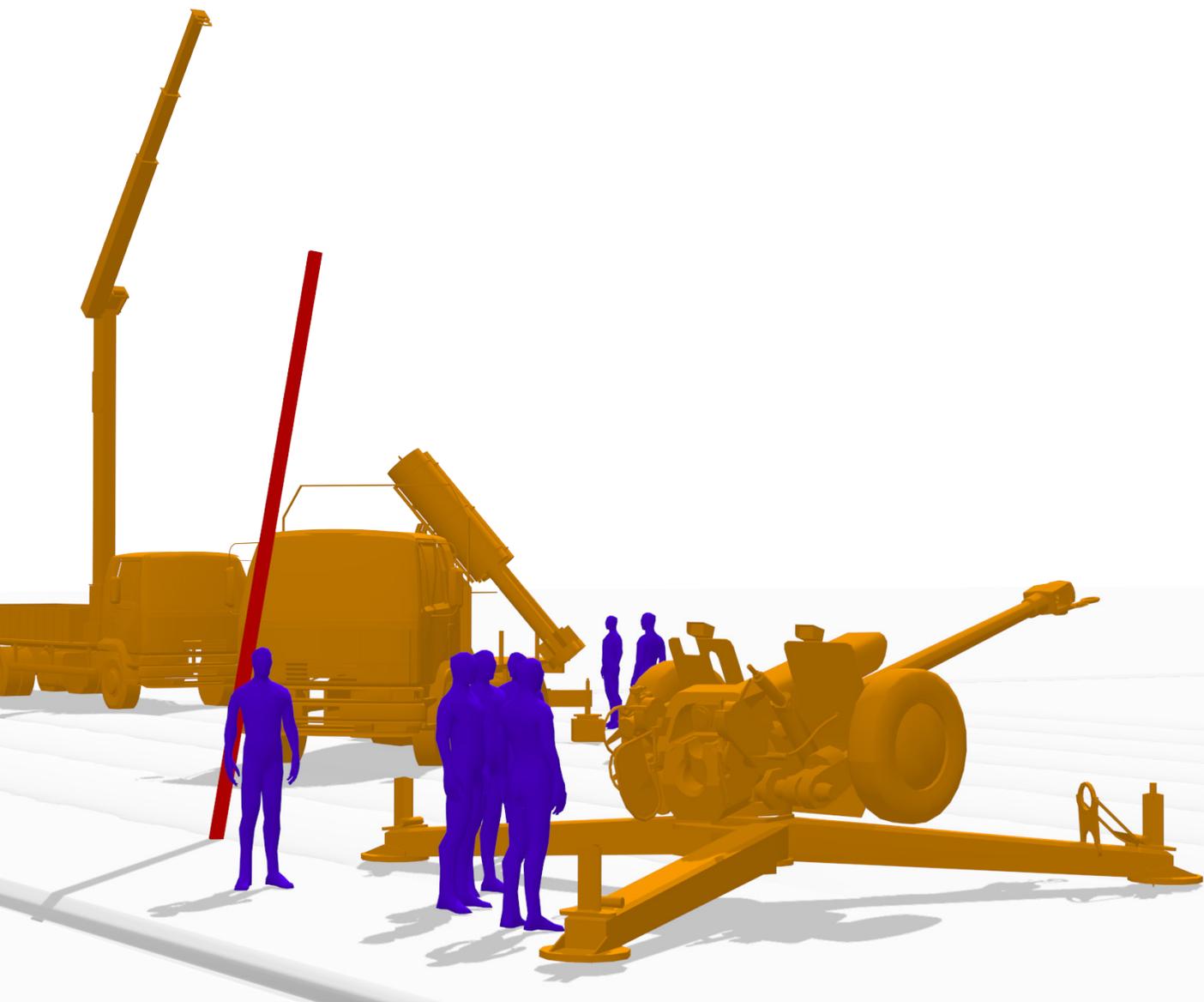


GHOUTA SARIN ATTACK

Review of Open-Source Evidence

Michael Kobs, Chris Kabusk, Adam Larson and many helpful citizen investigators.



SUMMARY

This document summarizes the main findings of months of citizen investigation into the 2013 sarin attack east of Damascus, which is estimated to have killed over 1000 innocent civilians.

By analyzing multiple videos published at the time, the event was accurately recreated, uncovering many new details, and pointing to an undeniable conclusion: The perpetrators are opposition fighters, and not the Syrian government.

This conclusion goes against the position confidently claimed by virtually every Western intelligence agency, human rights organization, and research institute that has studied the issue.

The conclusion was reached in the following process:

1. Videos of seven rocket impact sites were analyzed. Each was matched to a specific location using satellite imagery, and impact signs like rocket remains, craters and broken walls, were used to calculate the trajectory of each rocket.
2. The seven trajectories were shown to all intersect at one opposition-controlled location, which happens to be 2 km away from the impact sites - the exact range of the Volcano rockets used in the attack.
3. Within that area is a small field, and satellite imagery of that field shows several features that perfectly match a video leaked a month after the attack. In that video fighters wearing gas masks and identifying as the opposition faction Liwa Al Islam, launch multiple Volcano rockets on the night of the attack.

Part 1: Locations and Trajectories

In the days following the attack dozens of videos were uploaded showing impact sites with remains of “Volcano” rockets – cheap short-range rockets manufactured locally. There are hundreds of videos showing government forces launching these rockets, but always with a conventional explosive warhead. The version found in the impact site had a different warhead, capable of dispersing large amounts of chemicals. Samples taken by the UN indicate these rockets likely carried sarin.

We will now examine each of the impact sites and try to determine its location and a rocket trajectory.

Location: Wall 1

Coordinates: 33.520415°, 36.356117°

Source: <https://www.youtube.com/watch?v=MmP6wPdTIUM>

In this location a Volcano rocket seems to have lodged directly into the ground, maintaining its original trajectory.

The UNSC report A/67/997-S/2013/553 states:

Considerations on the likely trajectory of the rockets

Of the five impact sites investigated by the mission, three do not present physical characteristics allowing a successful study of the trajectories followed by the rockets involved, due to the configuration of the impact places. However, Impact site number 1 (Moadamiyah) and Impact site number 4 (Ein Tarma) provide sufficient evidence to determine, with a sufficient degree of accuracy, the likely trajectory of the projectiles.

Impact Site Number 4

The munition related to this impact site by observed and measured characteristics indicatively matches a 330 mm caliber, artillery rocket. The projectile, in the last stage of its trajectory, hit the surface in an area of earthy, relatively soft, ground where the shaft/engine of the projectile remained dug in, undisturbed until investigated.

The said shaft/engine, presenting no form of lateral bending, pointed precisely in a bearing of 285 degrees that, again, represent a reverse azimuth to the trajectory followed by the rocket during its flight. It can be, thus, concluded that the original azimuth of the rocket trajectory had an azimuth of 105 degrees, in an East/Southeast trajectory.

This location was already identified days after the attack, shown below.





UN report on the site. Source: <https://www.un.org/zh/focus/northafrica/cwinvestigation.pdf>



If the angle measured by the UN mission is true then the rocket and the wall would confine an angle of only 8°. The line of sight along the rocket's trajectory would then show a higher building (magenta) in the east of the impact in the background - which is obviously not the case. This wrong angle was originally used by [Human Rights Watch](#) and [New York Times](#) ([archived version](#)) to point to a Syrian military base as the launch source. The question of why the UN team reported a false azimuth is left to another investigation.



To identify the true angle, we follow the line of sight along the rocket trajectory, which points to where the northern facades in the shadow meet the western facades in the sun (red rectangle).

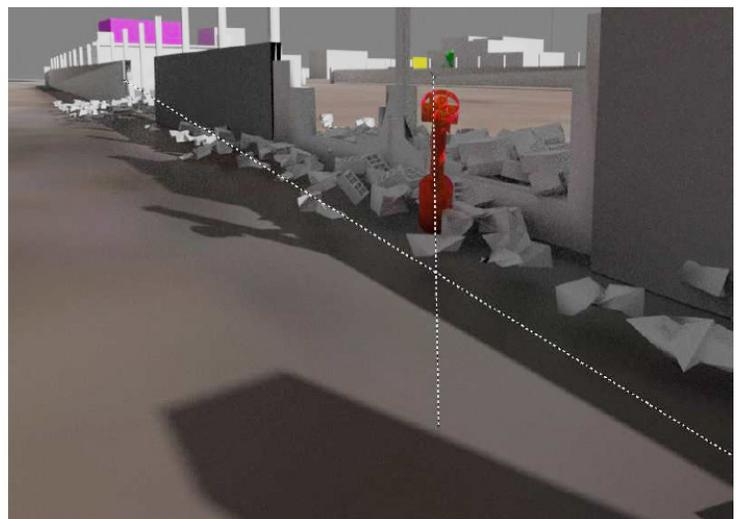
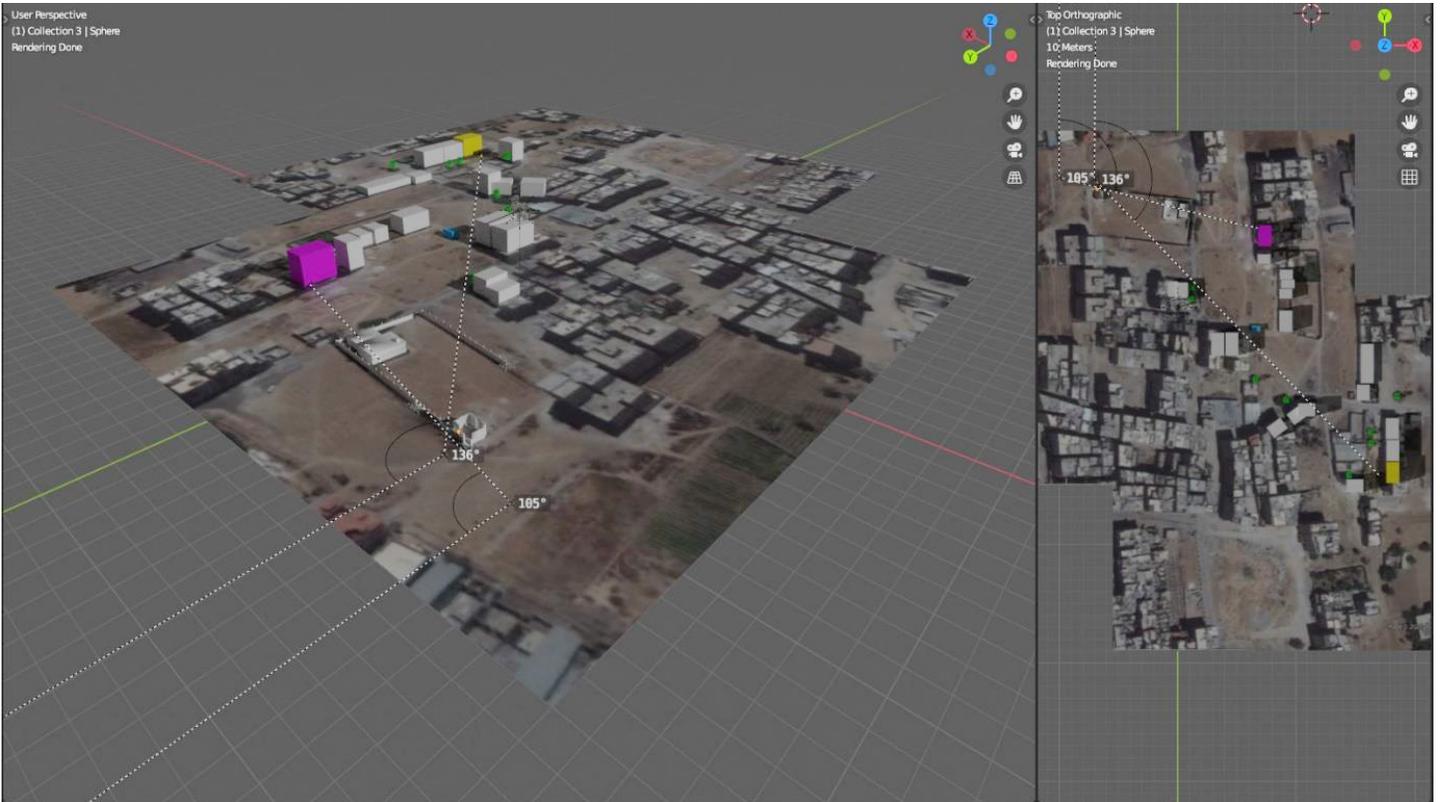
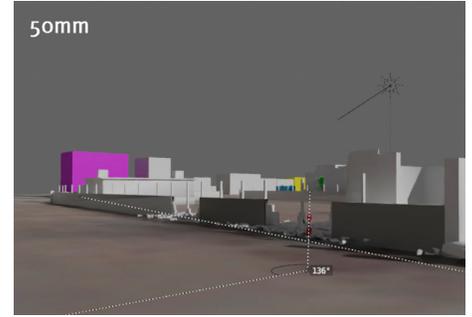
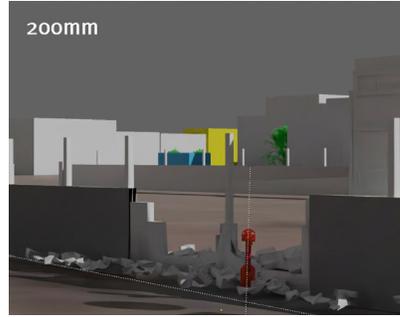


This can be seen clearly when the camera in the [videos](#) show the rocket from almost directly behind, with a tree in the background:



The shot ends before the camera is directly behind the rocket, but the next shot shows it slightly from the other side, with the lighted facades behind it.

The line of sight from the rocket to the tree has an azimuth of 138° . The line of sight from the rocket to the lighted facade has an azimuth of 134° . We therefore estimate the azimuth for this rocket as 136° .



Left: According to the false rocket bearing in the UN report, the motor should point to the house in the background (magenta)

Right: the rocket bearing of 136° we determined

The red area in the following image represents the probable launch area for an assumed angle of 136° , with a margin of error * of $\pm 2^\circ$ and a rocket range of 2km:



* Note: This considers only the error of our reading between the tree and the illuminated facades. If the UN's assessment that the rocket points directly at the source is incorrect, then the actual location may be slightly outside this triangle.

Location: Sheep

Coordinates: 33.524265°, 36.359485°

Source: https://www.youtube.com/watch?v=tB2d_ujkkqQ

https://www.youtube.com/watch?v=lb2RkVVK_Aw

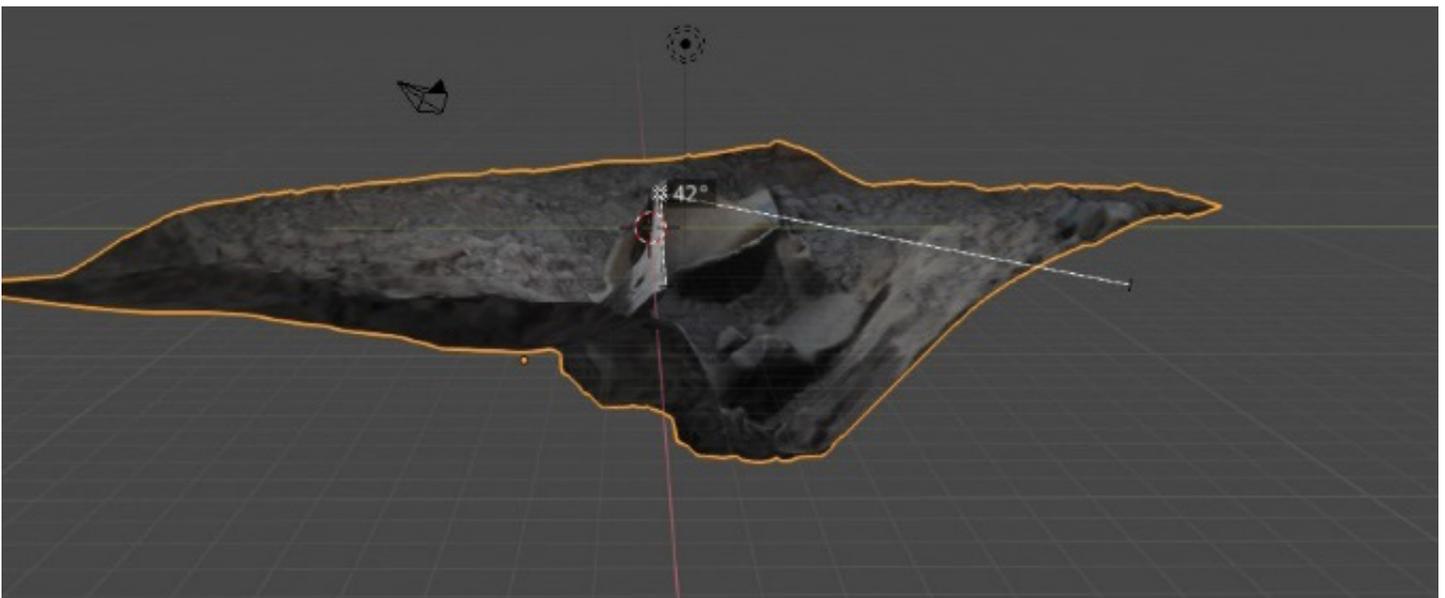
In this location the rocket left an elongated crater with a piece of metal lodged in it. To the right of the crater is a long metal cylinder pointing towards the camera.



The long part of the metal piece is parallel to the direction of the crater, which is the likely direction of impact.



A re-creation of the crater as a 3D model using Autodesk point-cloud technology reveals the angle between the two pieces to be 42°.





Note that the blue line [the cylinder pointing at the camera] points to the center of the protruding part of the building's wall.

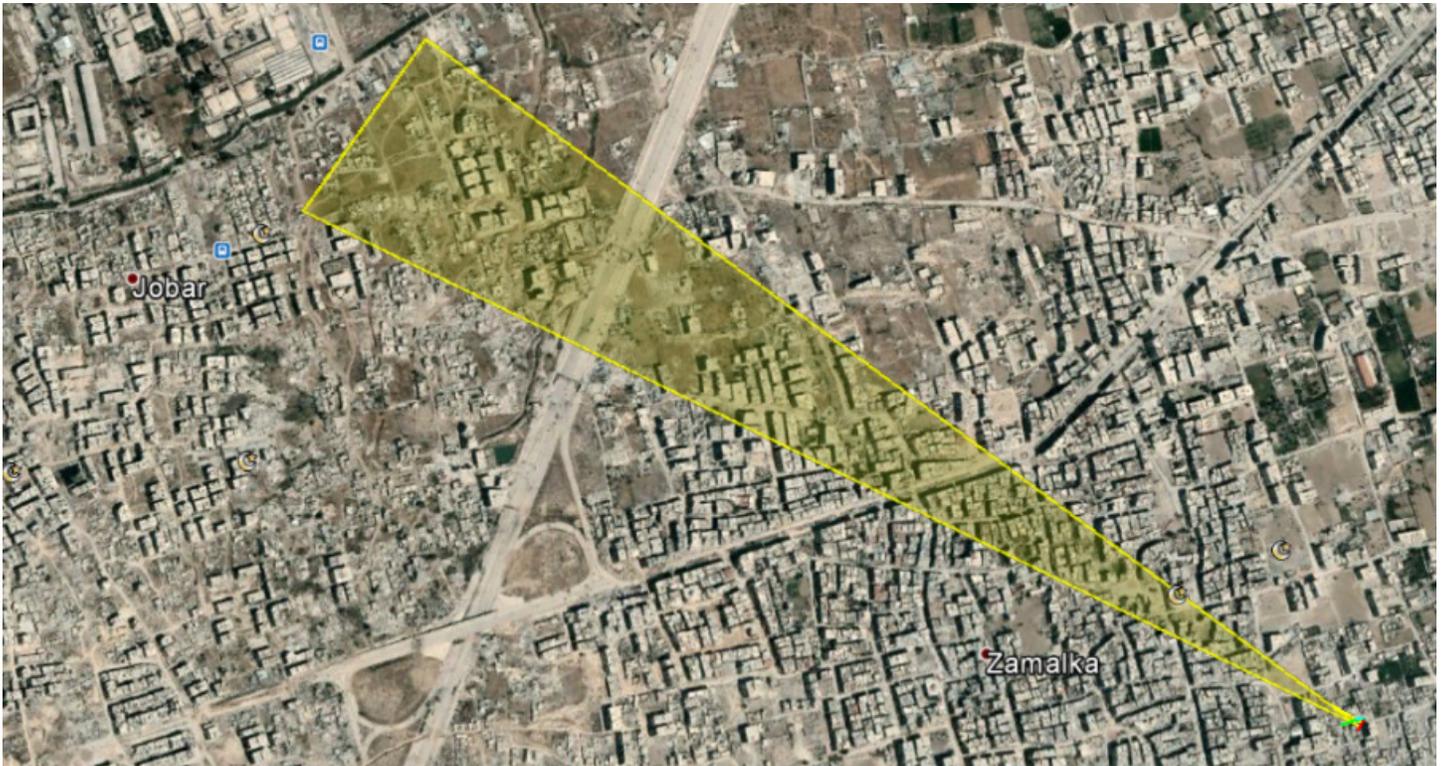


Also note the debris along the building's wall (in the above image) and the damaged roof edge in the following image:

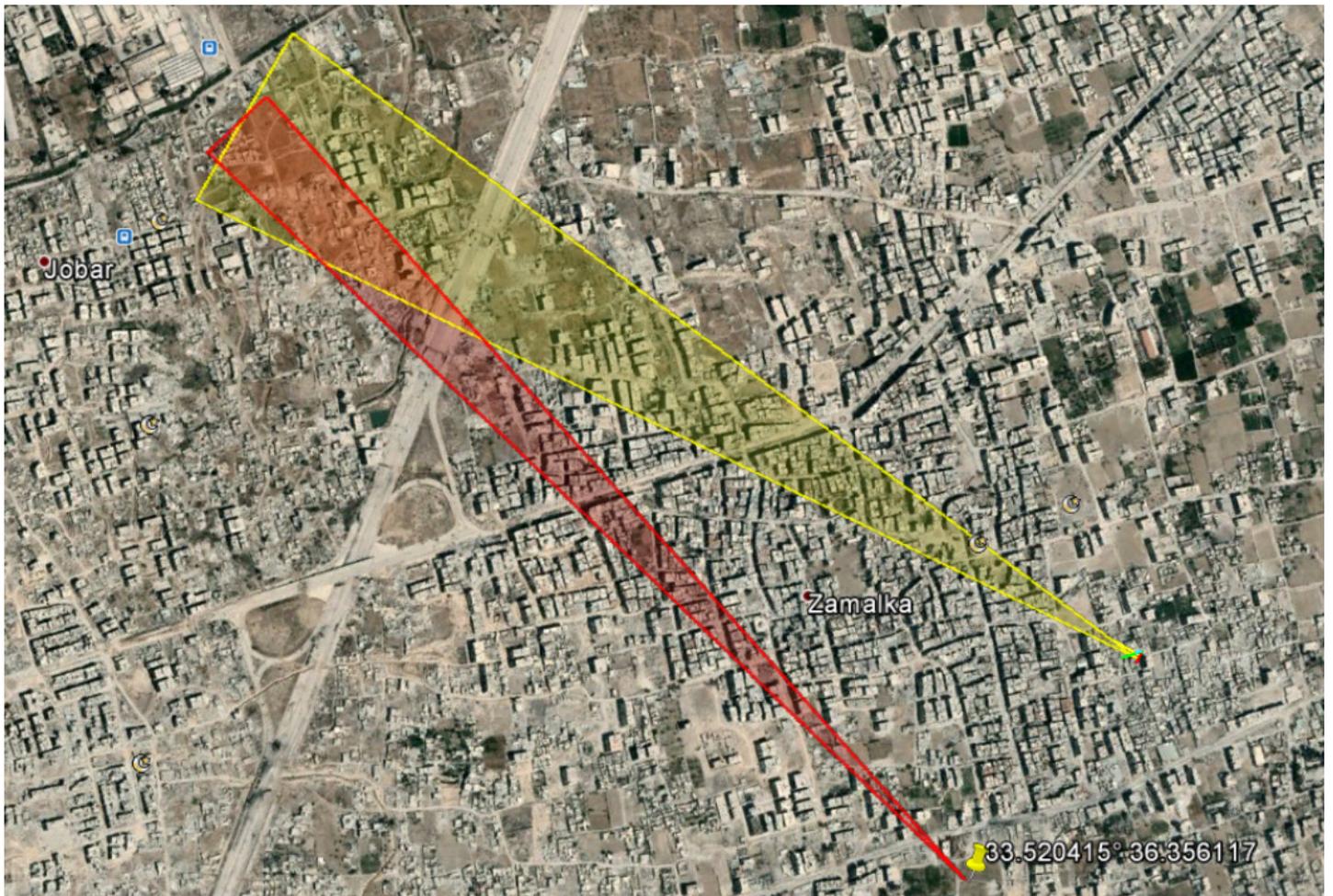


When matching these features to the satellite image, the azimuth of the crater can be estimated at 121° (or 301° when measured in the opposite direction). We estimate an error of 5° in each direction, due to errors in the camera angle, projection, or crater shape.

The yellow area is the probable launch area assuming a range of 2km and an azimuth of $301^{\circ} \pm 5^{\circ}$:



Combined areas:



Location: Roof

Coordinates: 33.519130° , 36.354841°

Source: https://www.youtube.com/watch?v=SNT_qrgv-ME
<https://www.youtube.com/watch?v=xrmPdJhbxcA>

This rocket penetrated a wall on a roof.



With the help of the photo below, we were able to locate the roof.

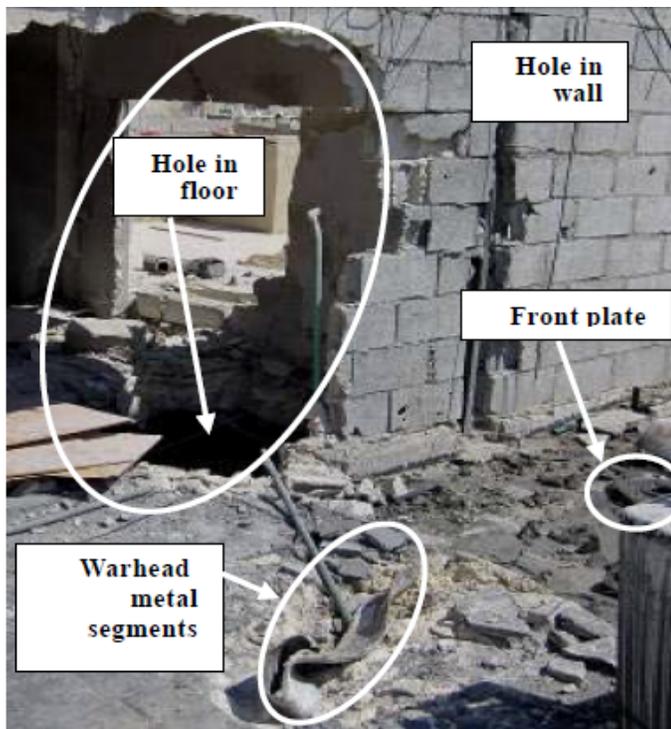




Source: <https://www.arabnews.com/node/1084201/middle-east>

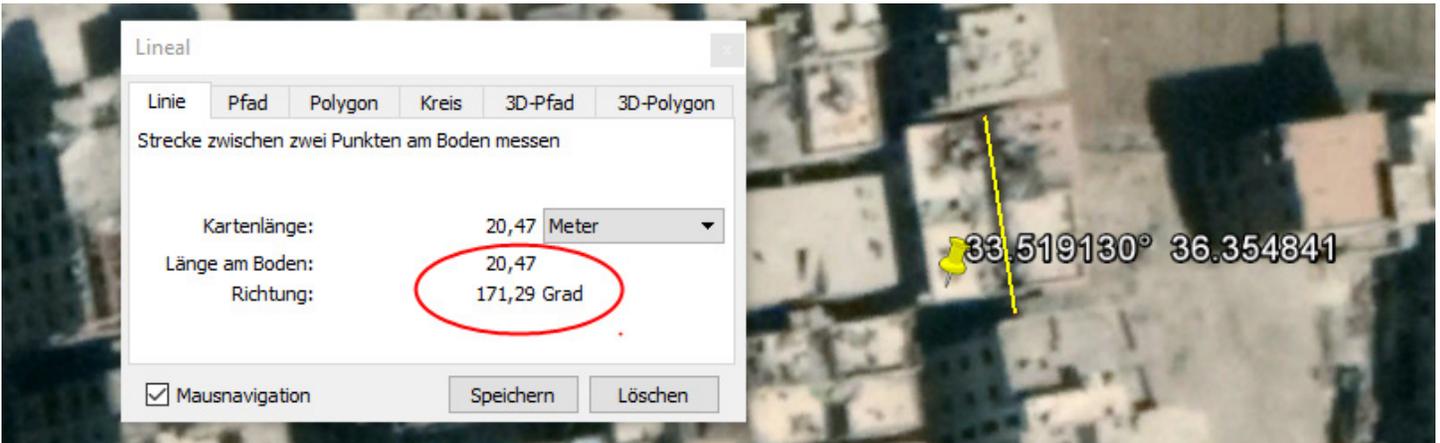
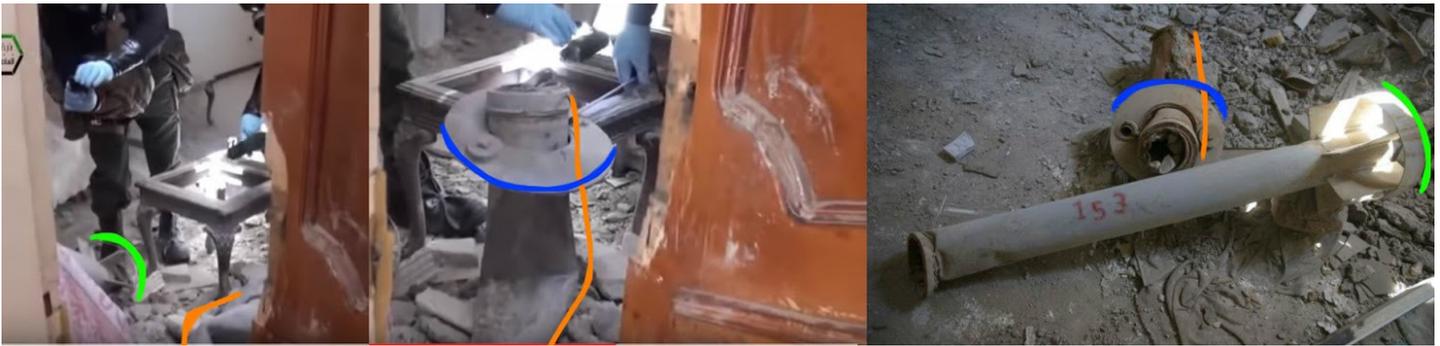


As seen in this video, and reported by the UN, the rocket penetrated the western outer wall (far wall in the photo below) and continued into the floor below. The impact force and debris likely caused the southern wall (the near wall below) to break apart.



1. The rocket found by the sub-team on the roof penetrated a cinderblock wall and a rebar containing concrete floor before coming to rest in a room below. The suspected front plate of the warhead and other parts suspected of being the warhead casing were found in front of the first wall and not in the lower room. Additionally, they did not exhibit signs of significant deformation or damage due to kinetic impact. Based on the found evidence; there is an indication that the rocket warhead appeared to function prior to impacting on the roof, releasing its contents and depositing the discovered fragments before travelling through the structure to its terminal location. Apart from the rocket motor and the front central tube with the base plate, no other munition fragments were found in the lower room.

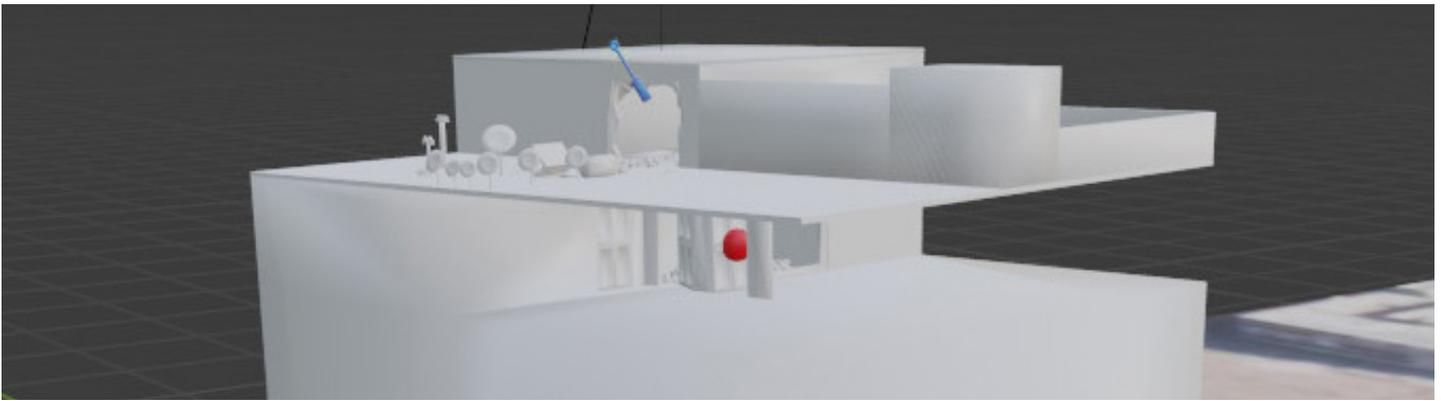
UN report on the site. Source: <https://digitallibrary.un.org/record/756814>



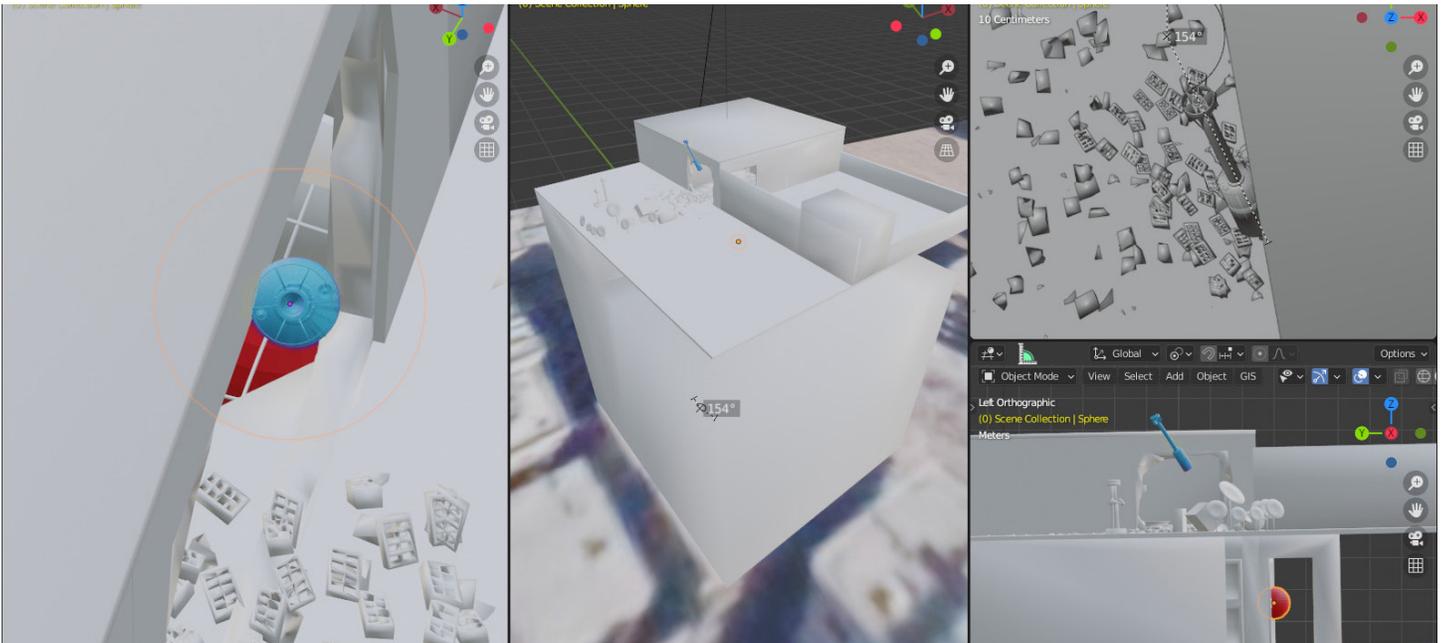
The penetrated western wall has an azimuth of about 171° . To be able to penetrate this wall without going through the northern wall, and continuing to the floor below, the trajectory azimuth can not exceed 154° . Since the western wall impact may have diverted the rocket from its flight path, smaller azimuths are also considered possible.



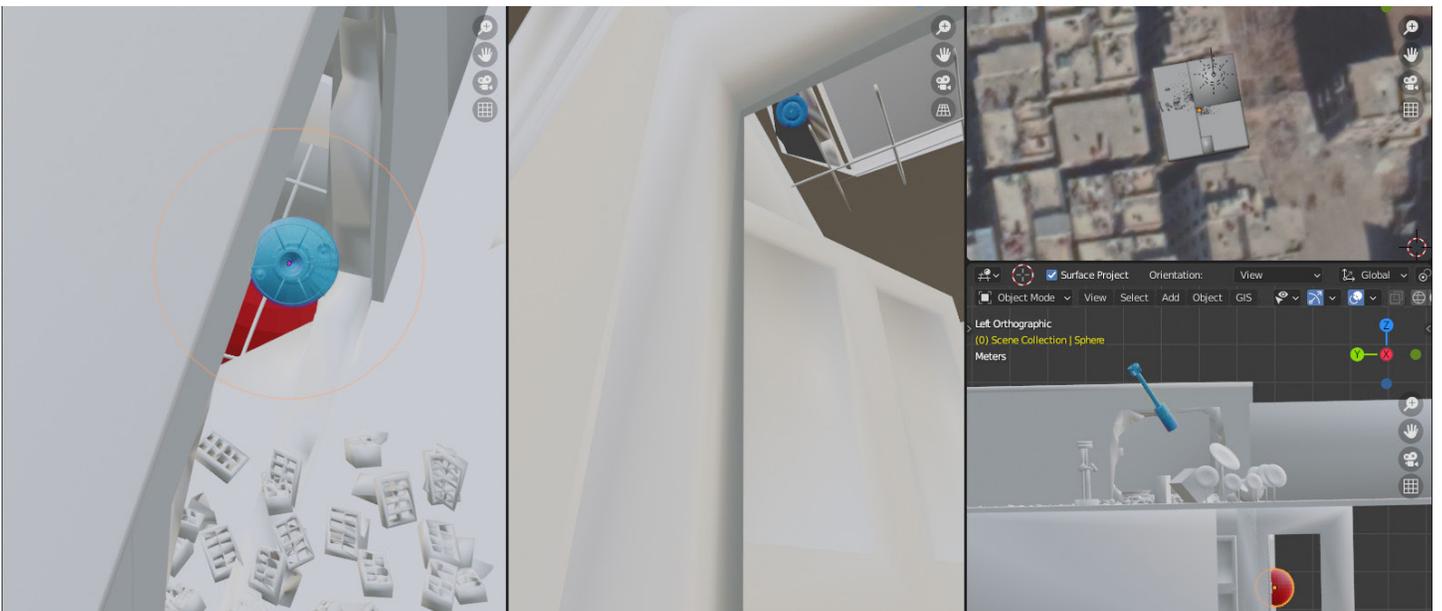
As further verification of a maximum azimuth of 154° we prepared a detailed 3D model of the impact site.



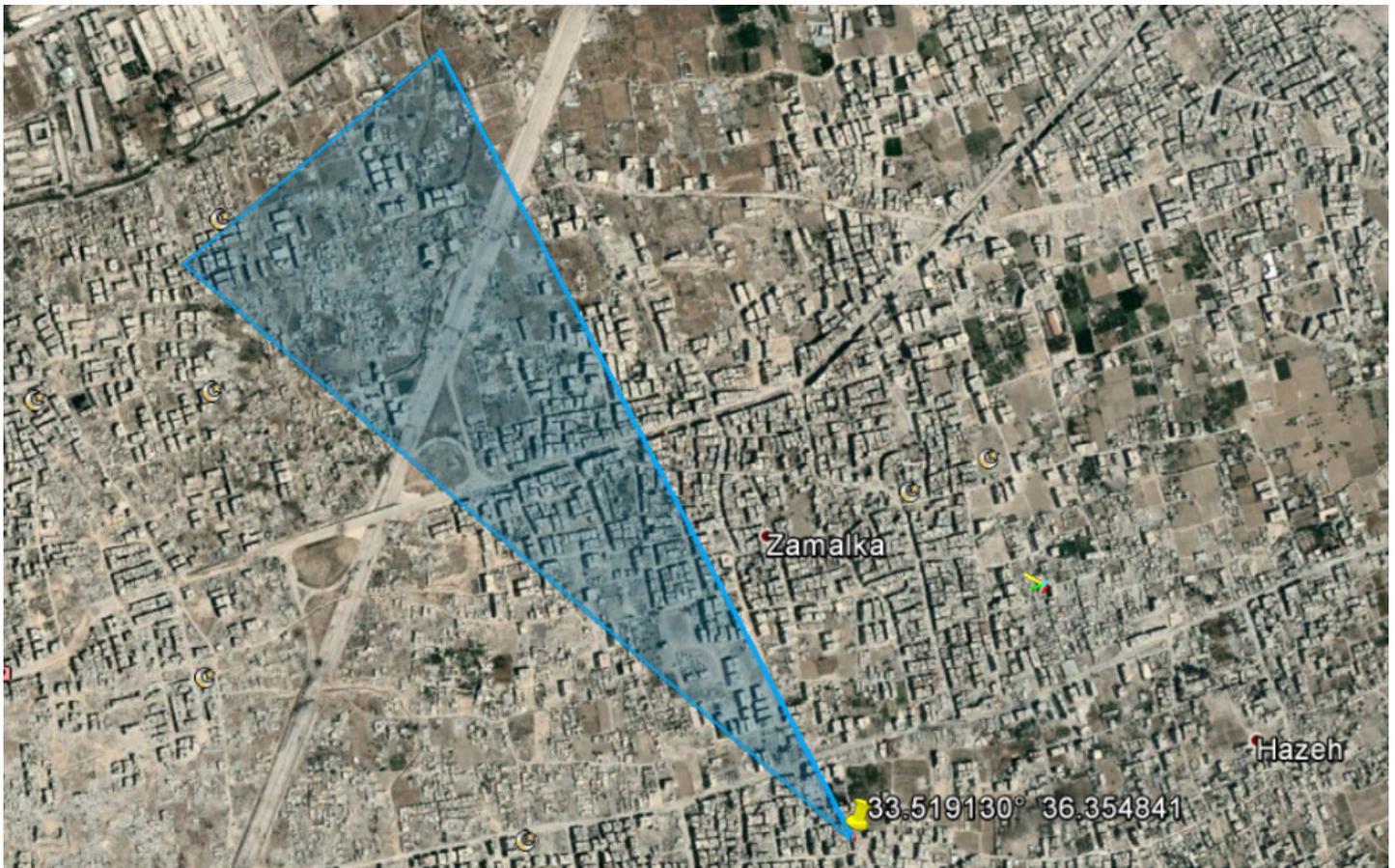
As one can see in the orthogonal plot (left), an azimuth of 154° seems a bit too high, since there is no straight path through which the rocket could have passed without additional damage. It is therefore safe to exclude launch locations east of a 154° azimuth from this location.



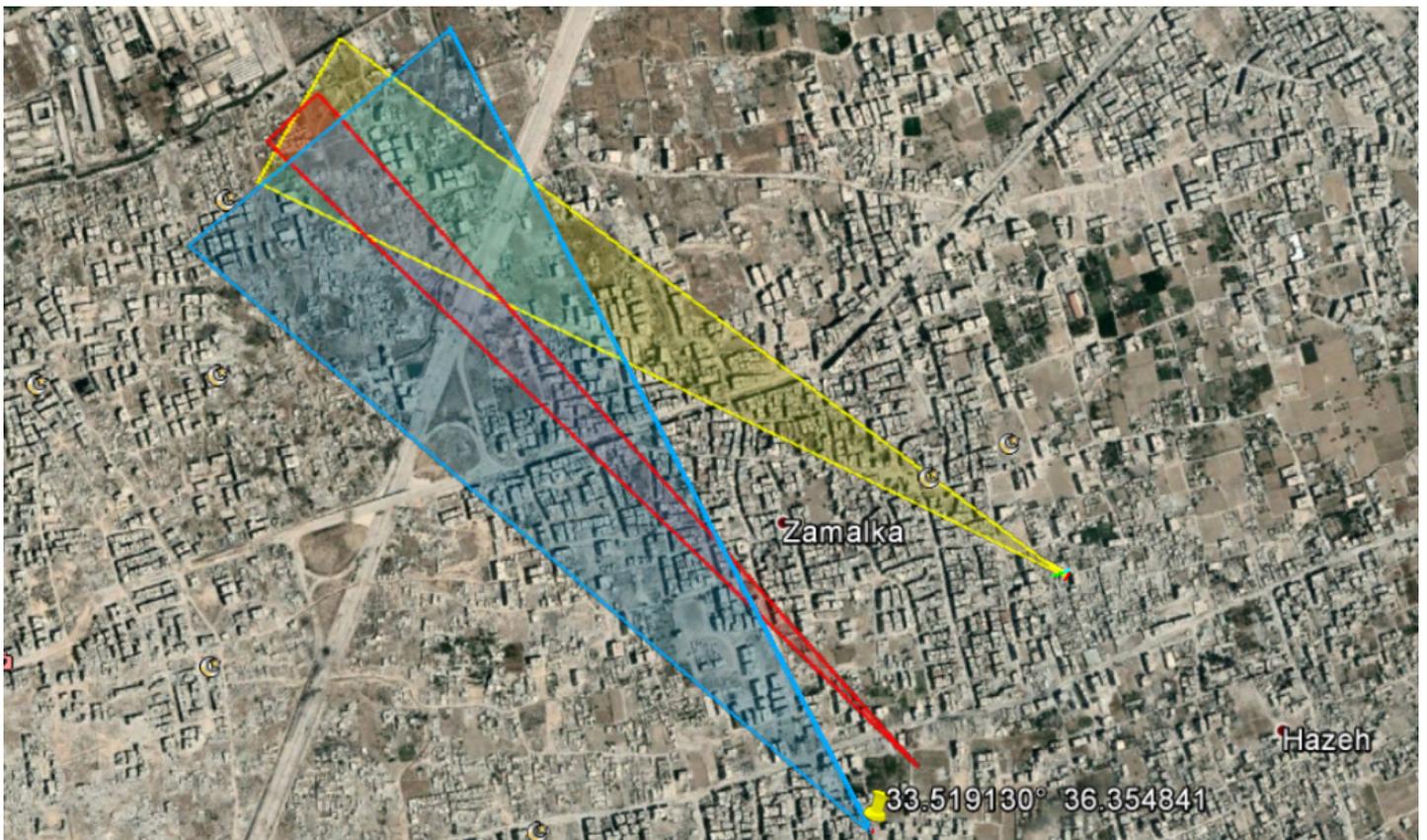
This can also be seen when placing the viewpoint (center of the red sphere) on a 154° flight path - towards the rocket in the room below.



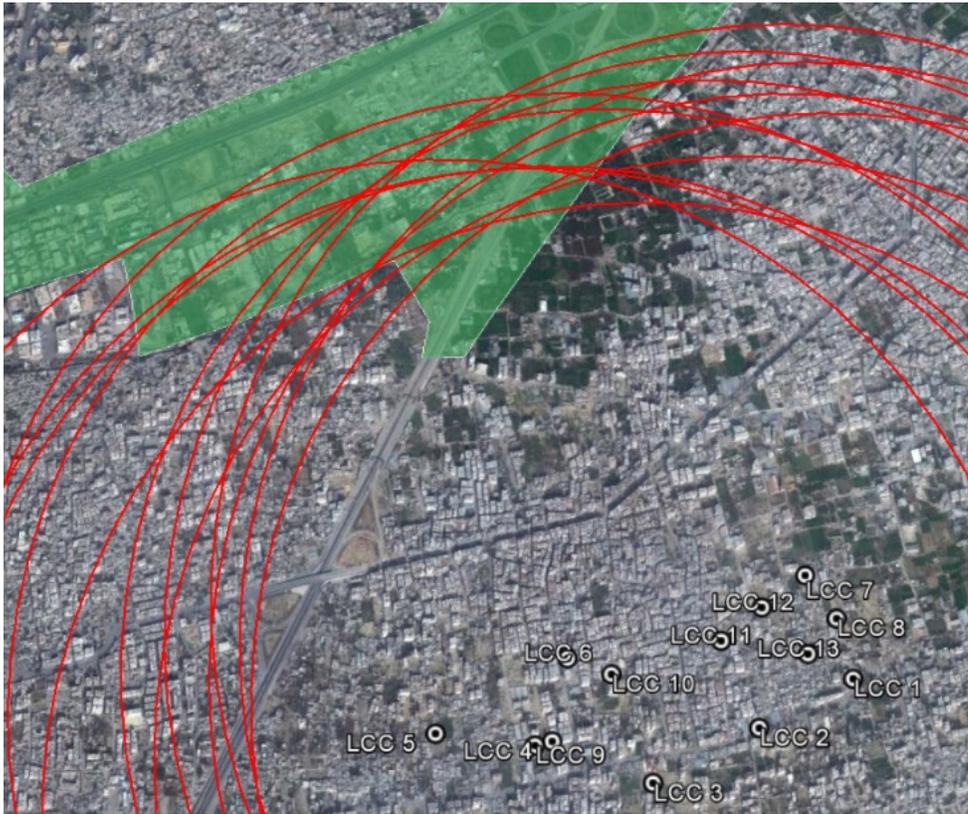
The blue area is the probable launch area assuming a range of 2 km and an azimuth of up to 20° lower than 154°. The 20° being our estimate for the maximum deflection the rocket may experience from hitting the southern wall, and still retain enough energy to penetrate the floor.



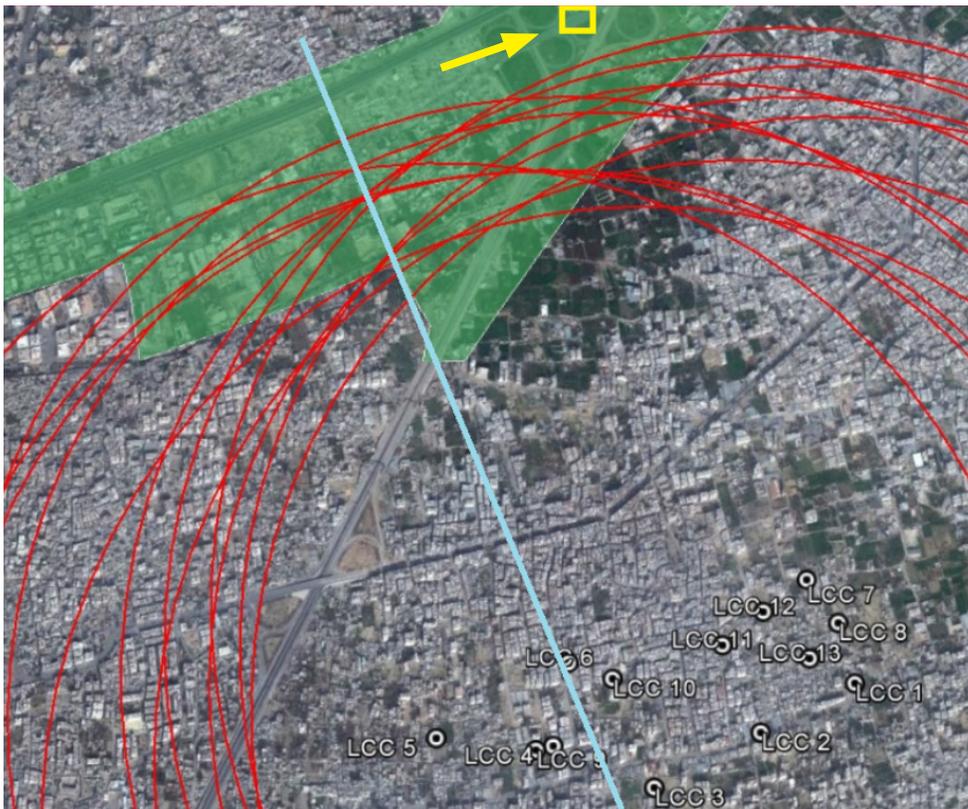
Combined areas:



Side note: This location is especially interesting as it singlehandedly invalidates the current hypothesis for government involvement in the attack. When the rockets were discovered to have a short range of 2 km, claims of the attack being launched from a Syrian Army base had to be retracted, as no such bases were in range. Eliot Higgins of Bellingcat then [offered](#) a new hypothesis, suggesting the area south of the Air Force Intelligence branch as the source.



In his diagram (left), the green area is government-controlled area, and red circles are 2 km from the various impact sites.



However, given that the “Roof” location shows penetration of the western wall, we can definitively exclude locations east of the green-blue line below (Azimuth 154°), including this new hypothesized source (Air Force Branch is the yellow rectangle).

So even without the evidence below, which points to the actual perpetrators of the attack, this site alone makes a launch source within government territory unrealistic.

Location: Field

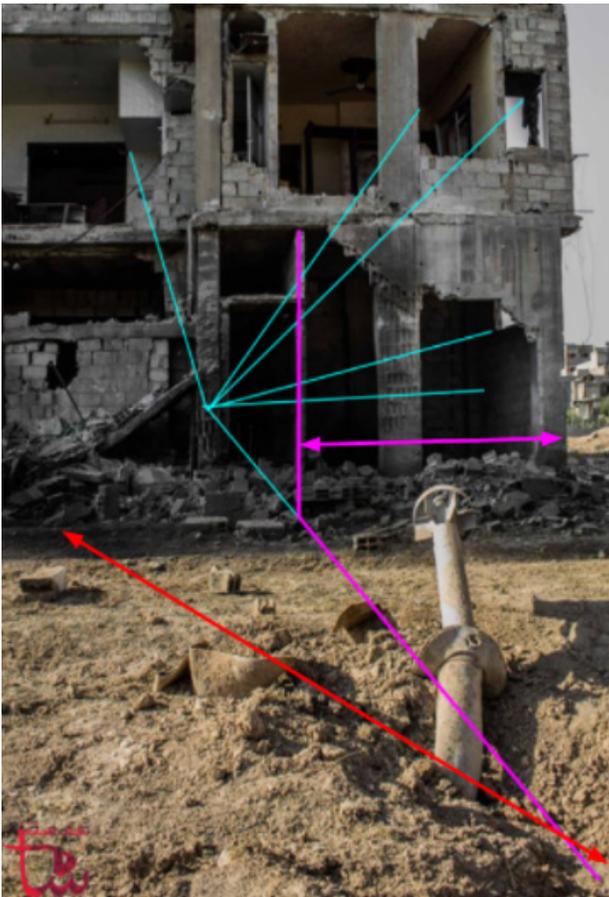
Coordinates: 33.520730° , 36.357350°

Source: <https://www.youtube.com/watch?v=kllhsgFrgNQ>
<https://www.youtube.com/watch?v=7waMvbhELso>
<https://www.youtube.com/watch?v=PSMCpBe2cmE>

In this impact site, the rocket created an elongated crater along its path. It then bent forward due to its momentum and landed a bit to the right. The crater is located between the third and fourth plow lines opposite the protruding part of the building (purple), about 3/4 of the width of this part of the building from the west side to the east.



Camera turns on the spot



The crater points (red line) approximately to the far part of the next section of the building (green). In this way the azimuth can be roughly estimated at 137°.

The green area is the probable launch area assuming a range of 2km and an angle of $137^{\circ} \pm 10^{\circ}$. The high uncertainty of 10° is due to the low reliability of the crater's shape.



Combined areas:



Location: Wall 2

Coordinates: 33.525361° , 36.362167°

Source: <https://www.youtube.com/watch?v=KOHcmPX6FSQ>
<https://www.youtube.com/watch?v=pZA4Tknw1Zk>
<https://www.youtube.com/watch?v=GBd7aclRLMg>



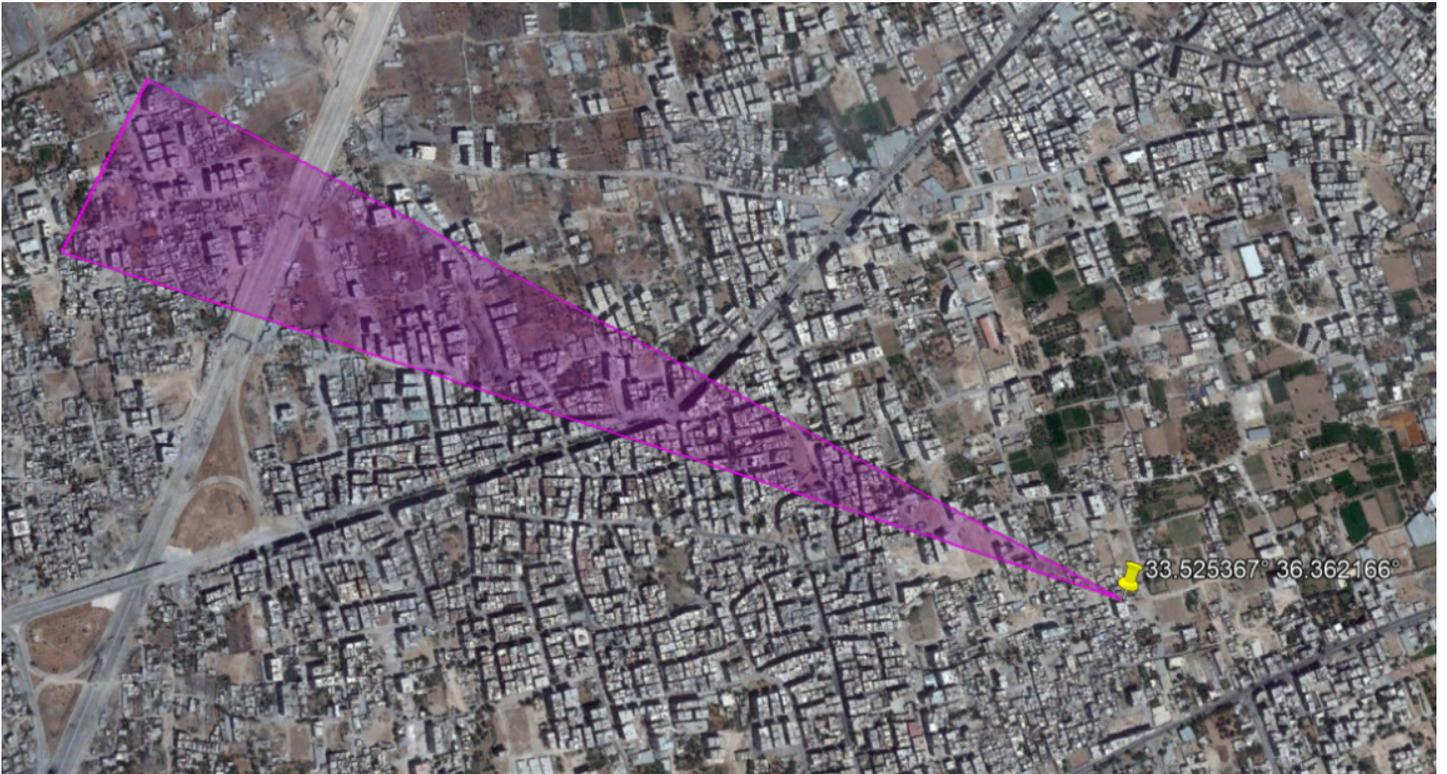


We estimate this azimuth using brick lengths. The distance from the crater to the wall is 1.8 bricks, and the rocket has landed three brick lengths laterally offset to the right of the center of the hole.



This results in an angle from the wall equal to: $\text{Arctan}(1.8/3) = 31^\circ$. Since the wall has an azimuth of 82° (or 262°), the trajectory azimuth is around 293° .

The pink area is the probable launch area assuming a range of 2km and an angle of $293^{\circ} \pm 5^{\circ}$.



Combined areas



Location: Pool

Coordinates: 33.522261° , 36.358931°

Source: <https://youtu.be/DxqpQ362DRU?t=344>

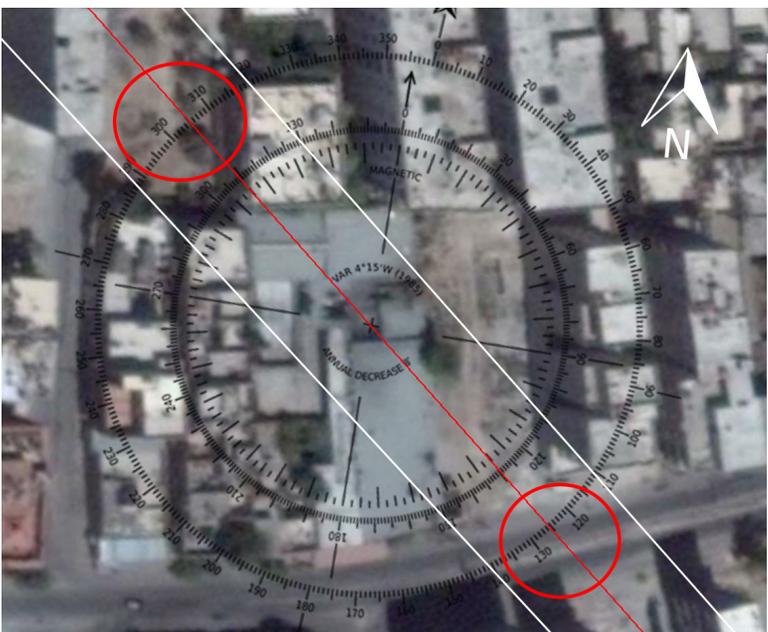
A [report by Al Jazeera](#) shows the impact site of another Volcano rocket and men surveying the site.

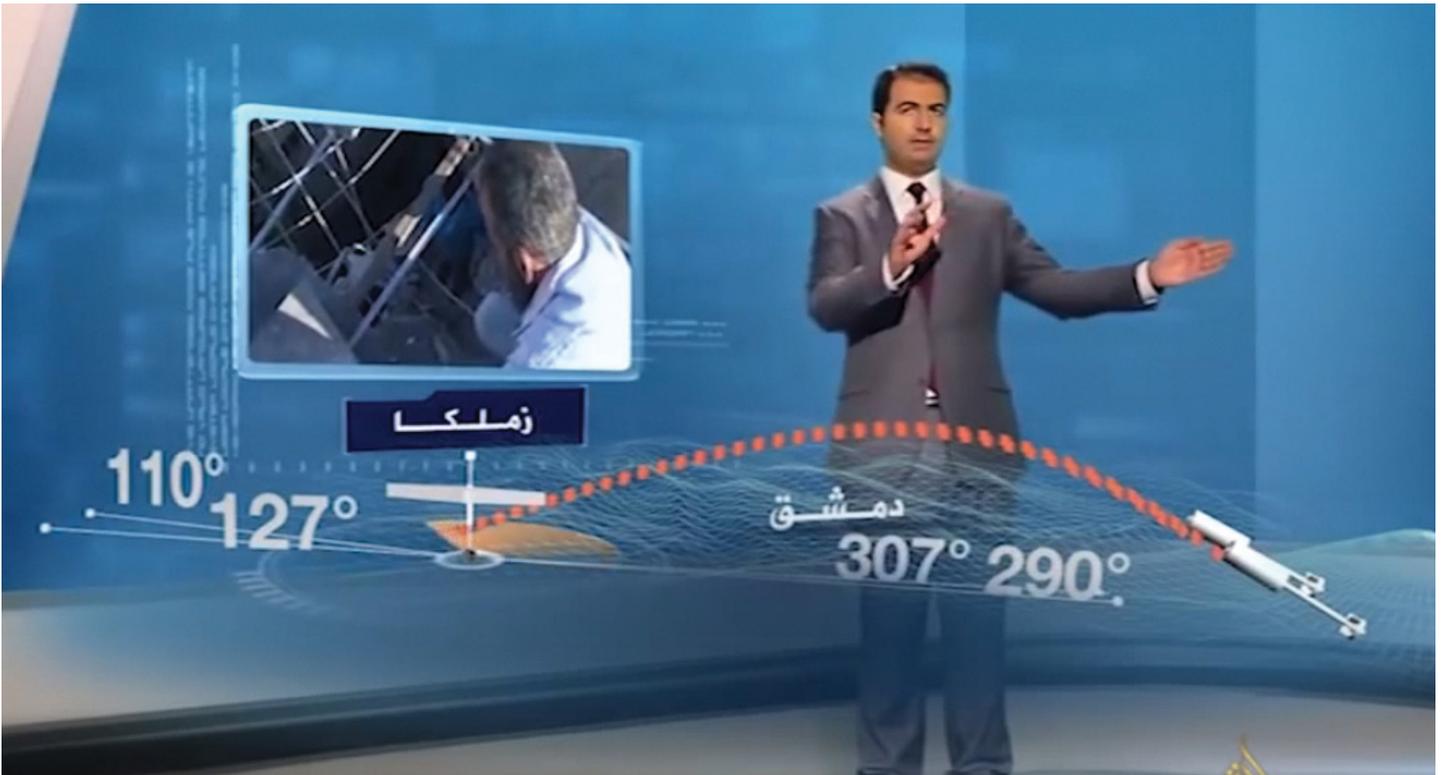


We were able to identify this impact site perfectly at the coordinates above.



The TV report shows a compass reading of 127° at this location (The other azimuth of 110° is discussed below).



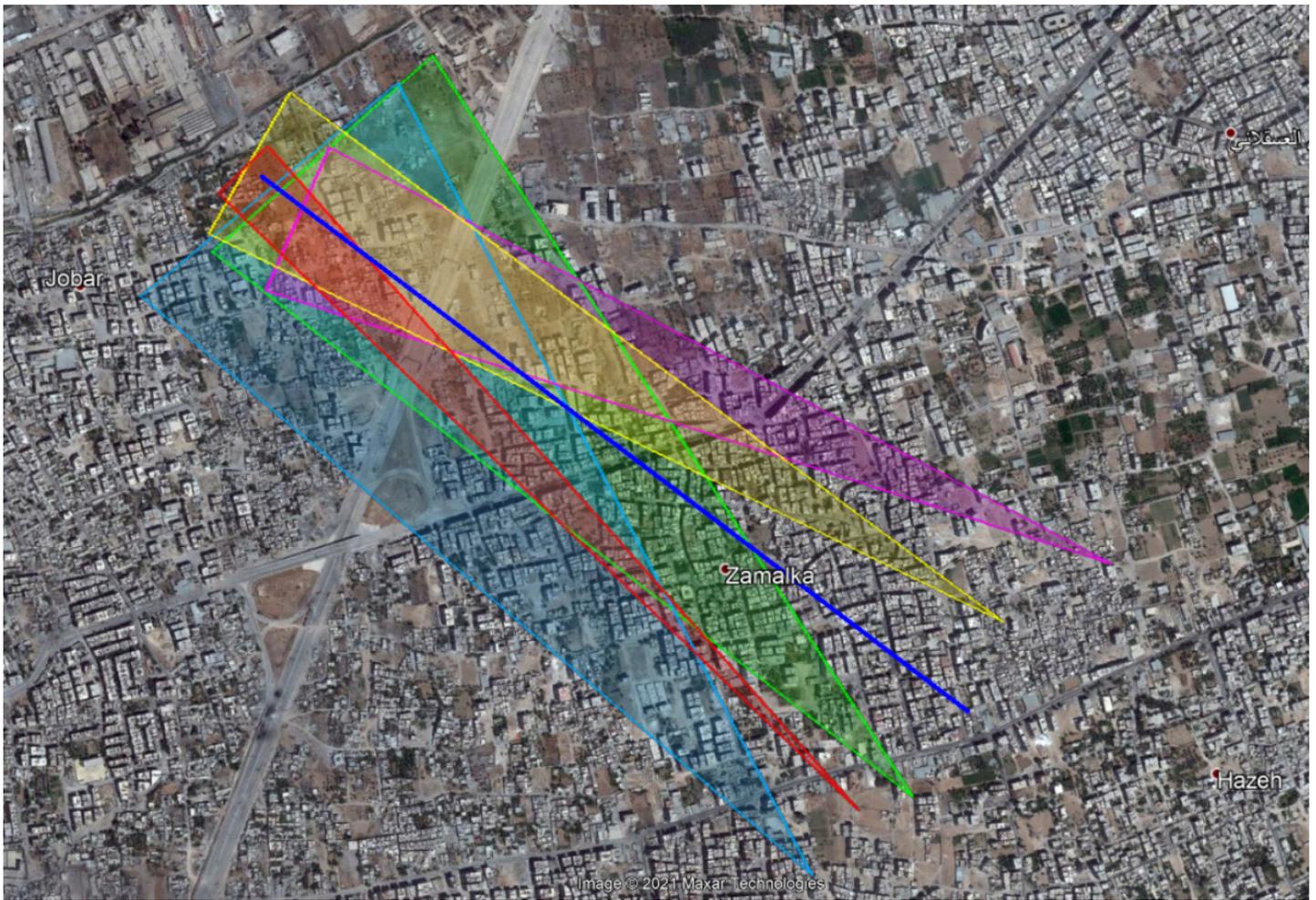


In the show, they use a wrong rocket range of over 5 km to associate these trajectories with Syrian Army positions on Mt. Qasioun (forcing them to claim two different launch sources), but the azimuth compass readings can still be helpful to us.

We added a 127° line (dark blue) from the impact point at the pool at a 2km range.



Combined areas and compass readings:



Location: Syrian Archive / Al Jazeera / HRW

Coordinates: 33.526095° , 36.362502° / azimuth: 110°

Coordinates: 33.526867° , 36.360932° / azimuth: 110°

Source: <https://www.youtube.com/watch?v=NTfbbIOf0i8&t=158s>
<https://youtu.be/DxqpQ362DRU?t=865>

Under the title “[Syria: Government Likely Culprit in Chemical Attack](#)”, Human Rights Watch published a map with impact sites reported by locals.



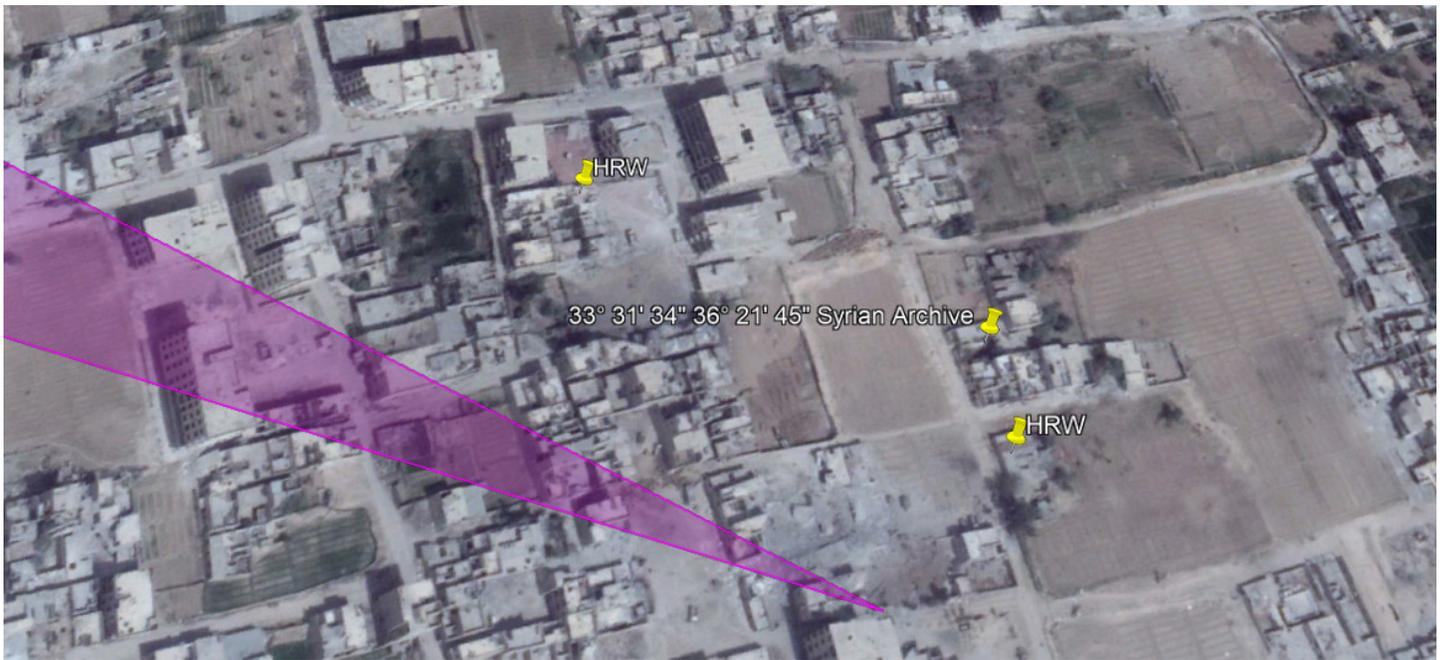
Al Jazeera shows in the documentary “[Al-Ghouta, the orchestrated attack](#)” by Mahmoud AlKen an impact site where the Syrian investigators measure an impact angle of 110°, the smallest known azimuth.



The Syrian Archive published in their video “[Press release: First Criminal Complaint on behalf of Sarin Attack Victims](#)” (33.526095° , 36.362502°) the coordinates of an impact site, but without any corresponding footage.

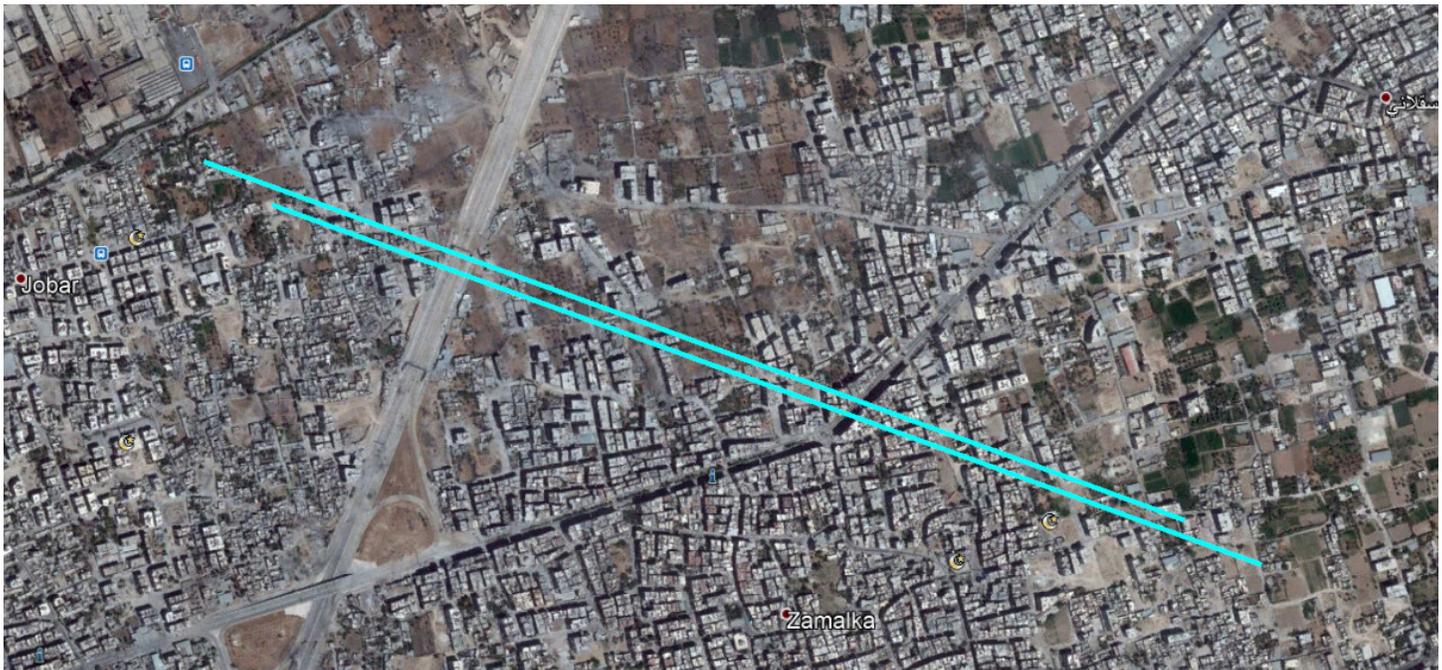


The Syrian Archive's coordinates are fairly close to one of the impact sites in the HRW map.

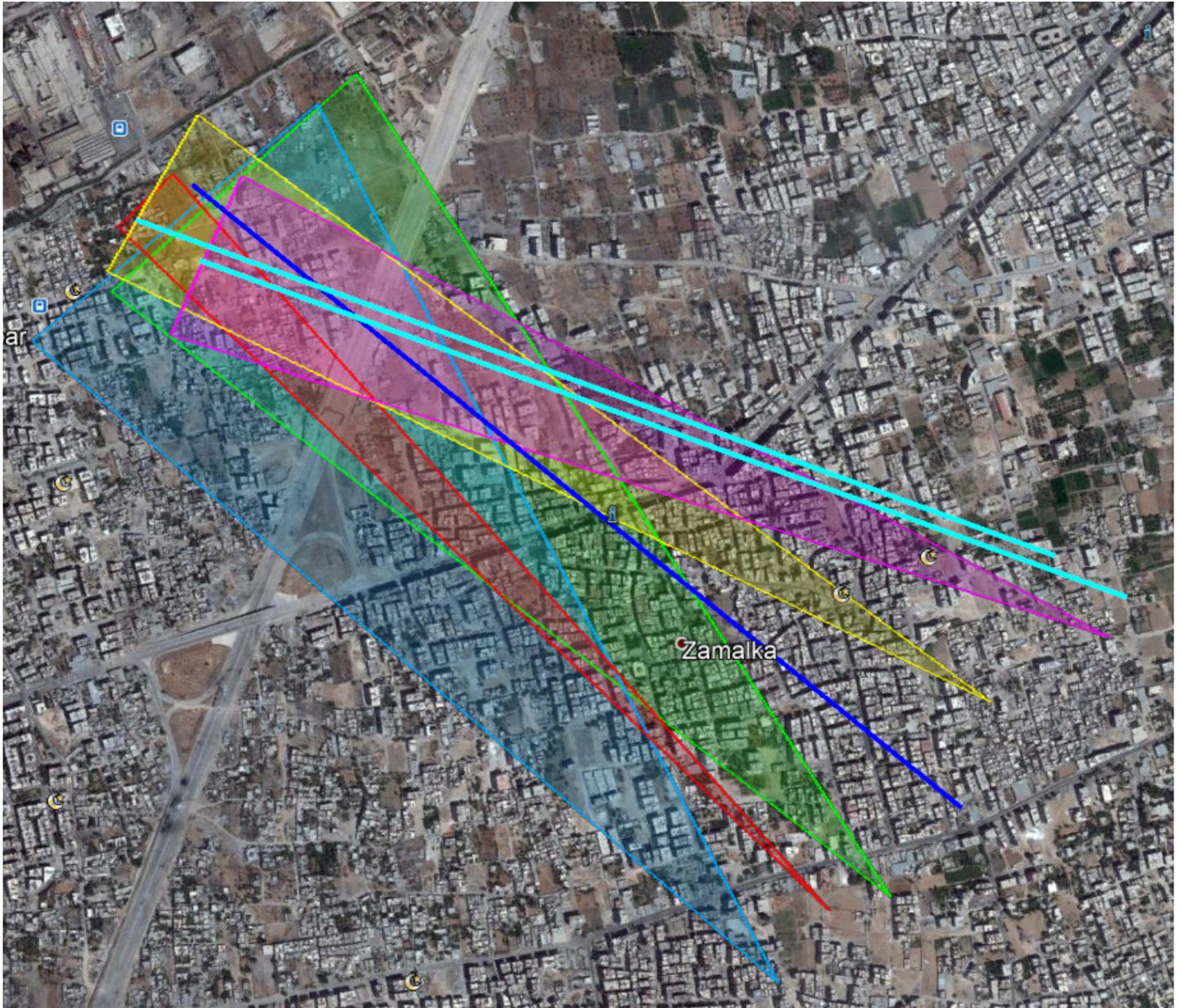


Since we could not confidently locate this second impact site shown in the documentary, we decided to combine the known data of the northeasternmost coordinates (HRW / Syrian Archive) and the smallest known azimuth (Al Jazeera, 110°) to establish a reasonable northeast boundary for a possible launcher location.

We added two 110° lines (bright blue) from the most north-eastern impact points for a 2km range. Because the 110° compass reading can be subject to error, and especially because the HRW map is not very accurate with respect to coordinates, the two blue-green lines represent a northeastern boundary beyond which a launch location becomes increasingly unlikely. There are no known impact locations that support a launcher north or east of this boundary.



Final combined areas and compass readings are shown below. Note the agreement not only in trajectories, but also in range. The impact sites are all at a similar distance from the intersecting area.



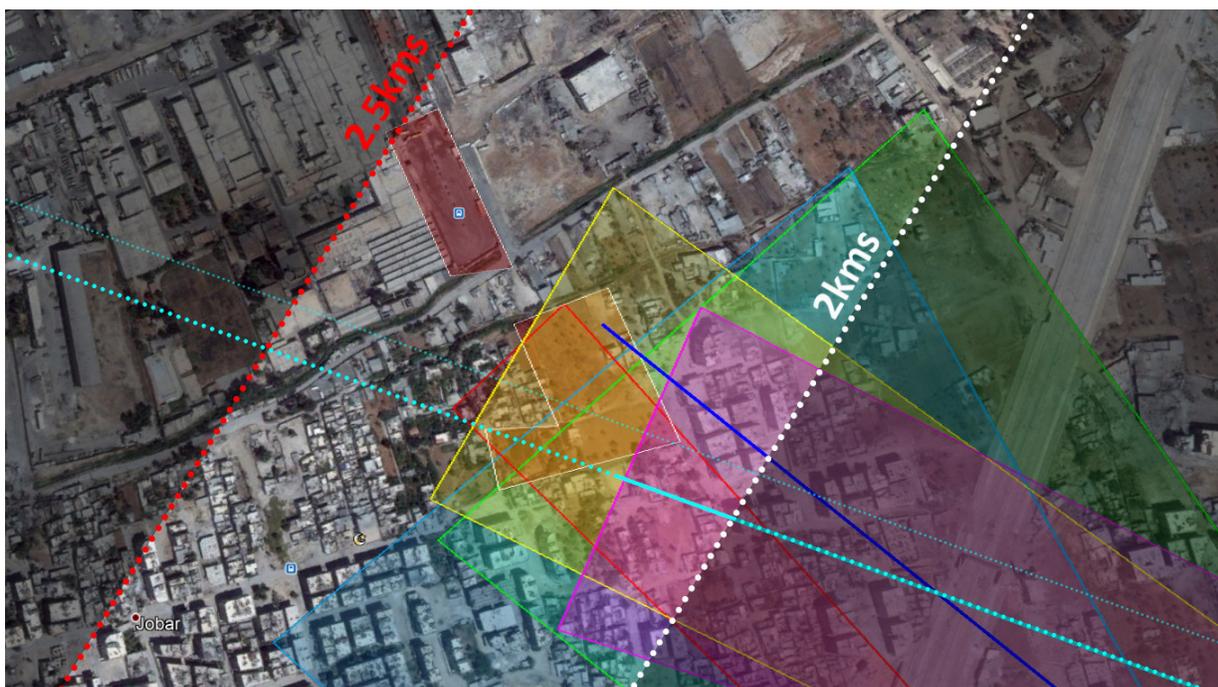
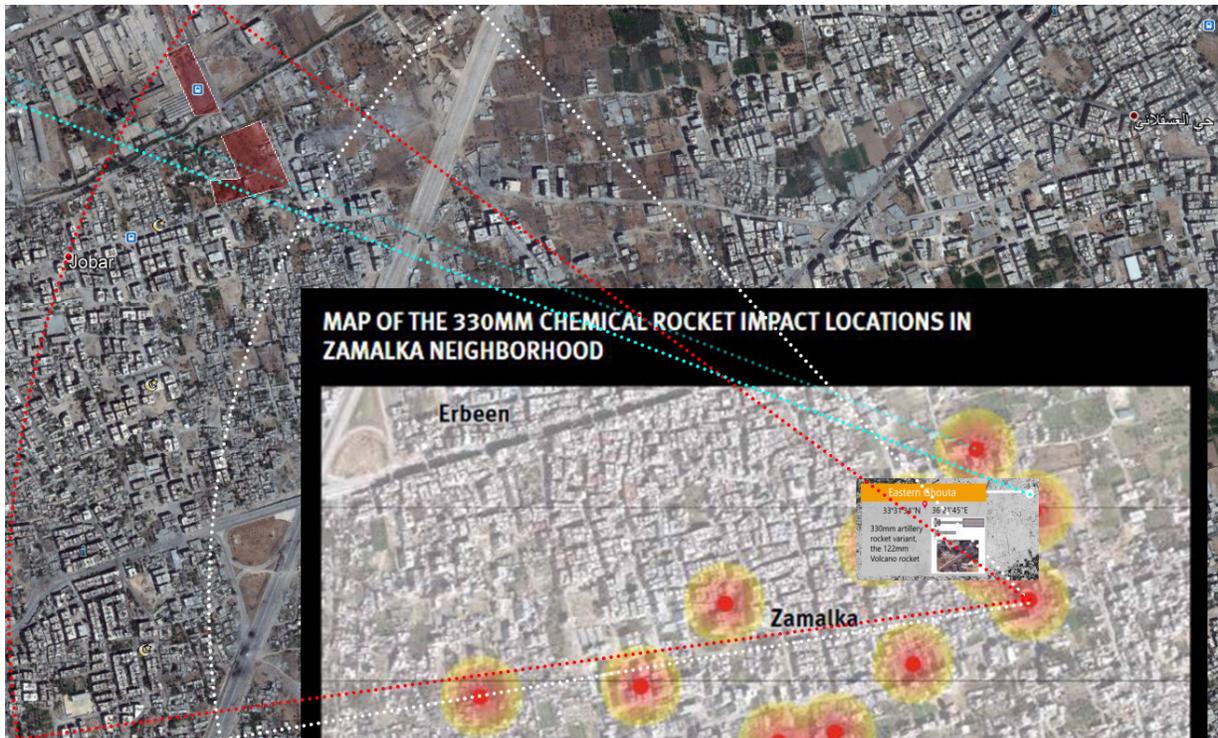
Part 2: Launch Site

Probable launch area

The range of 2 km calculated by weapons experts [Richard Lloyd and Ted Postol](#), along with the analysis above significantly narrows down the probable area from which the rockets could have been launched.

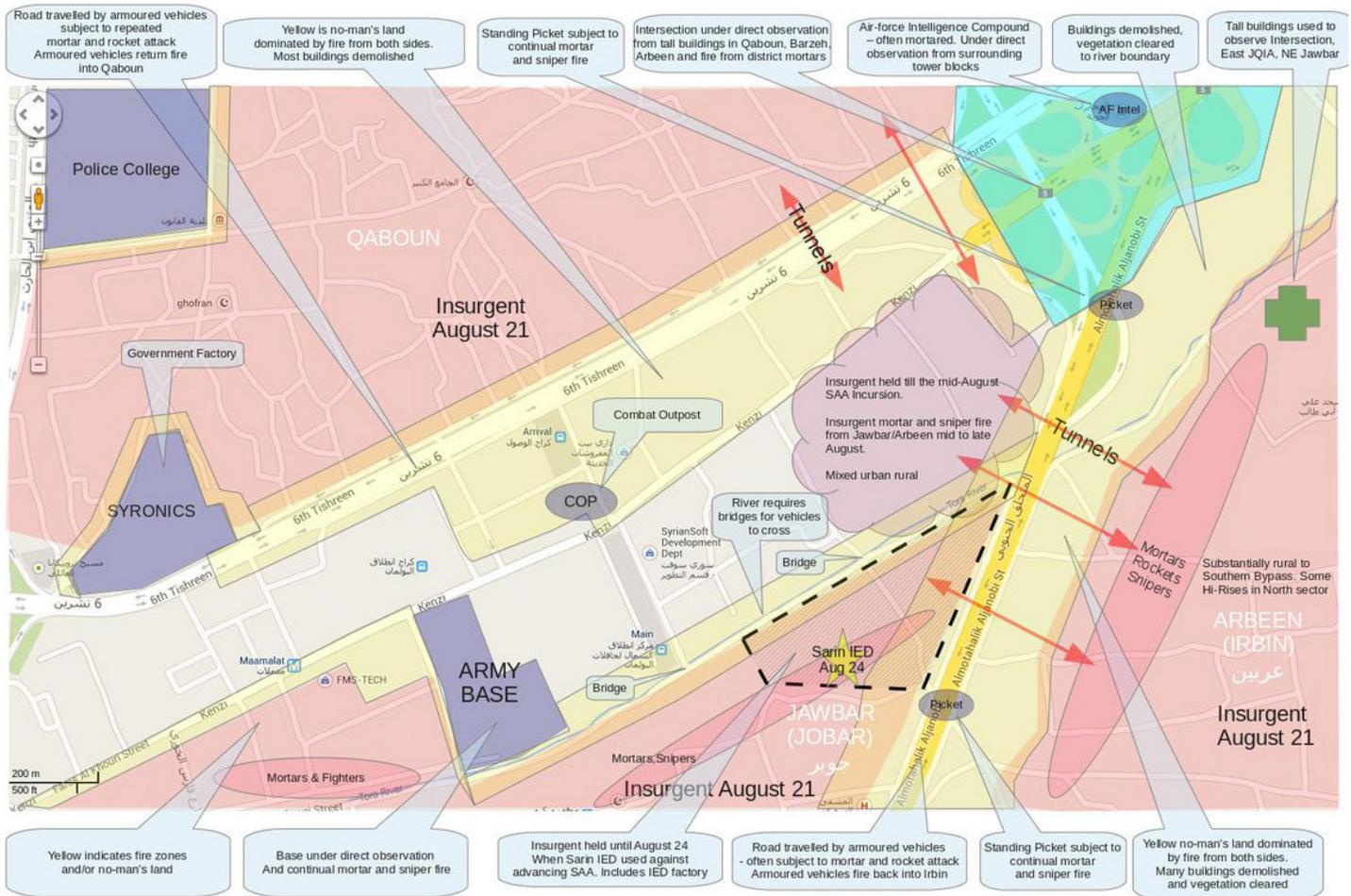
This area, shown in the satellite images below, is where all the calculated trajectories intersect (colored triangles), further limited to the range of between 2km (white dotted arc) and 2.5km (a generous estimate of the maximal range; red dotted arc), from the farthest impact site on the HRW map.

This gives an area of about 500 by 250 meters where the launch site is most likely to be located. Since multiple Volcano launches require at least two trucks (a launcher and a crane for reloading), we can also exclude rooftops and areas behind tall buildings. This leaves two areas (red) for possible Volcano launches.



North of the small river, which effectively divides the area into spheres of influence between the Syrian army and Islamist militants, is the bus station parking lot (red I shape). From what we know so far, this parking lot is the only suitable place within range for a Volcano attack by the Syrian army. Note, however, that this parking lot is entirely northeast of the 110° boundary. To consider this site we must assume an error of 4.5° in Al Jazeera's compass reading. Such an error is unlikely, as this measurement was done by accurately measuring and connecting two distant impact points (a thin roof and a wall).

South of the river is a grassy area (red, inverted L-shape) that would provide enough space for launching rockets from the opposition's side.



Map of control territories situation on August 21, by Charles Wood

To summarize the impact sites analysis: The seven sites are in perfect agreement as to the launch source, pointing to a small area within opposition controlled Qaboun. This alone makes government attack scenarios highly unlikely, but under generous assumptions, some may still be considered possible.

Liwa Al-Islam Leaked Videos

Almost a month after the attack, three videos were anonymously leaked online. Two of these videos show Jihadist fighters in gas masks launching Volcano rockets, with their commander identifying them as Liwa Al-Islam (the dominant opposition faction in the area) and announcing the date as August 21st (the day of the attack).

<https://www.youtube.com/watch?v=VlcbBTjh2EU> - Firing a D-30 Howitzer artillery

<https://www.youtube.com/watch?v=F2QbEuRhgY4> - Launch of two Volcano rockets

<https://www.youtube.com/watch?v=r9Ztl0bm7u8> - Launch of a Volcano rocket

According to the description, these videos were found on the cell phones of “three Syrian terrorists” shot near the Turkish border.

While under normal circumstances such videos would be considered a smoking gun, they were quickly dismissed as a desperate fabrication by the Syrian government. Those claims relied on an alleged exaggerated display of Liwa al-Islam’s insignia, an unusual use of a commanding “takbir,” poor image quality, anonymous origin, and a denial by Liwa al-Islam’s leadership.

Nevertheless, we decided to revisit these videos. A careful frame-by-frame examination revealed new and highly valuable information.

Group of trees: The launcher and a Mercedes truck with a crane are in front of a group of trees with a small tree in the middle.



Row of small trees: The rocket’s ignition additionally reveals a row of small trees that bounds the field on the side opposite the camera.



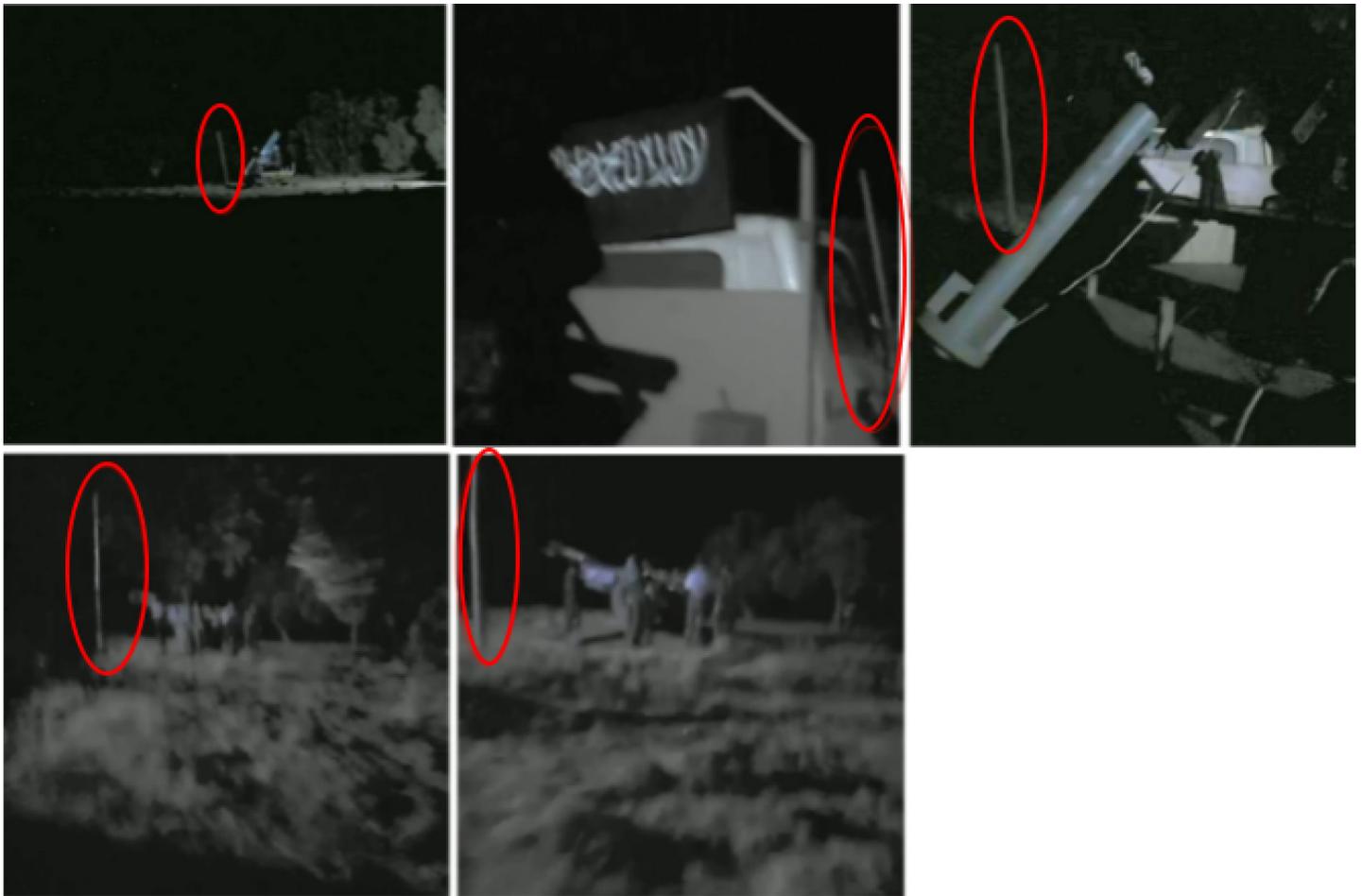
Paved area: Once the rocket reaches a few meters in elevation, the glow illuminates a wider area, revealing the cameraman is on a paved platform, and the area is covered in low vegetation.



Vegetation: The vegetation is seen in several shots taken from near the launcher and the D-30 Howitzer. When the team walks away from the launcher in preparation for launch, they are seen (and heard) stepping in the vegetation. The images below were enhanced from a very dark shot, so colors are hardly noticeable.



Pole: A tall pole that is stuck in the ground at a slight angle can be seen in all three videos. Even though the video showing a D-30 howitzer seems to be at a different location at first glance, the pole suggests the same location in all videos.



Source of light: The light source is a spotlight mounted on or near the crane truck. When reloading the launcher, the movement of the crane slightly changes the lighting. In one launcher video you can see a streak of light on the group of trees and the pole slightly in front of the launcher, while in the other launcher video the group of trees and the pole disappear in darkness. However, the general direction of the light remains the same.



Distance: The camera observes the launcher at an oblique angle from the paved platform. From the launcher to this area, the cameraman walked 42-44 steps, which corresponds to about 33 meters.

Ditch: Near the D-30 is a small ditch or edge.



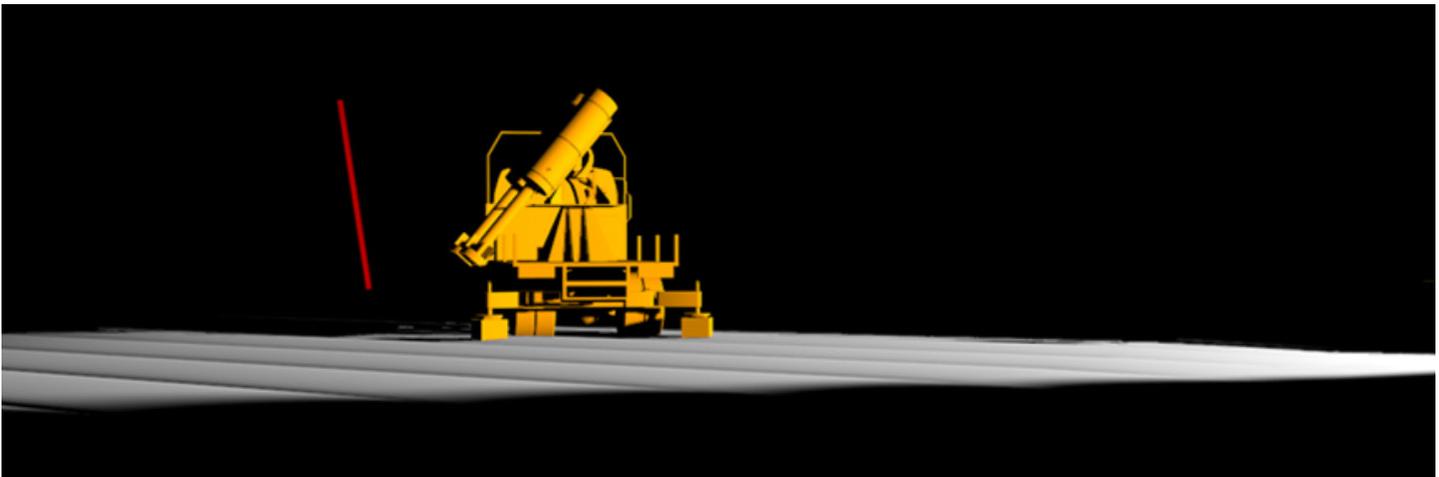
A pole close to the ditch and close to the rocket launcher

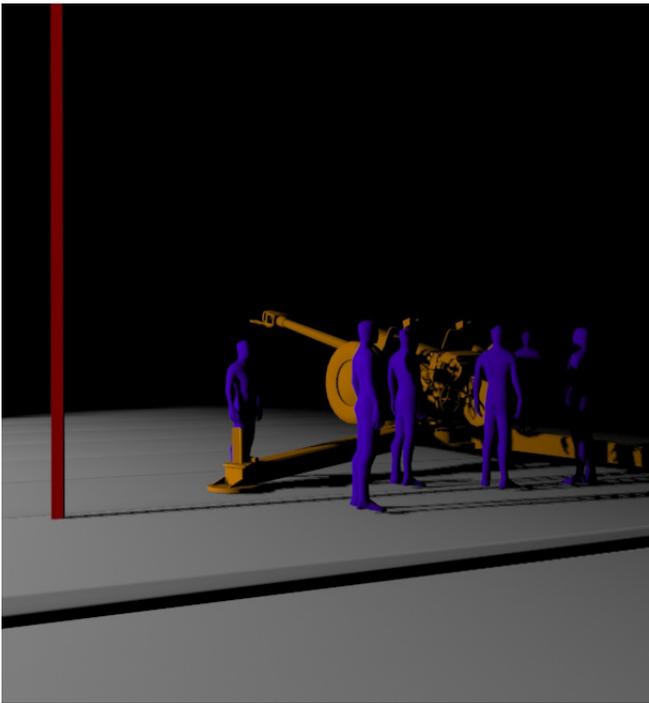
Space for a second truck: Furthermore, the launch spot needs enough space to place the crane truck to the right of the camera.

Loop: Lastly, we observed a loop of rope or cable in the upper right corner of some frames. This loop is either hanging down from the crane or indicates some structure out of camera view.

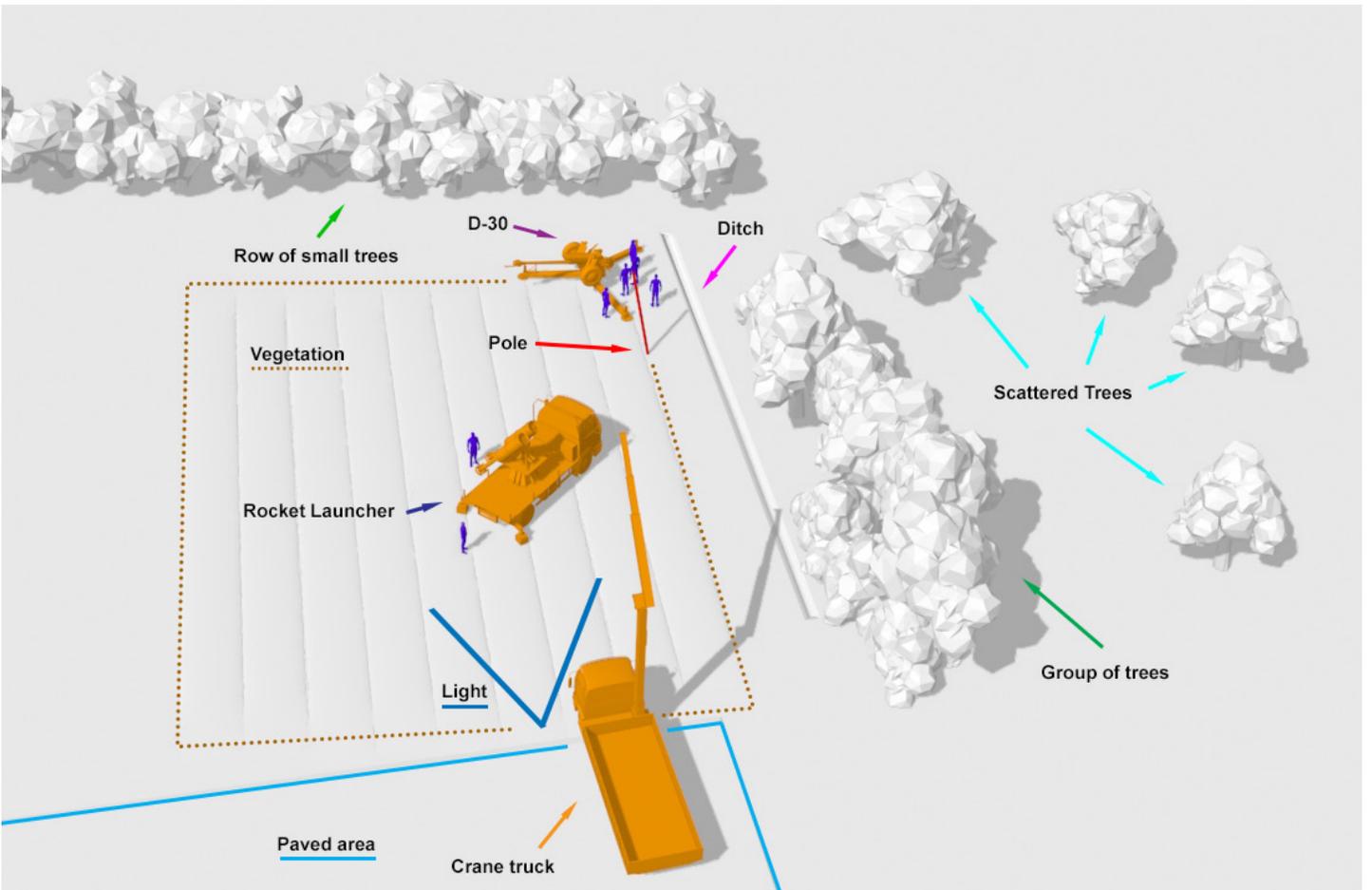


To merge all the features into one coherent view, we recreated key shots from the video using 3D modeling software.



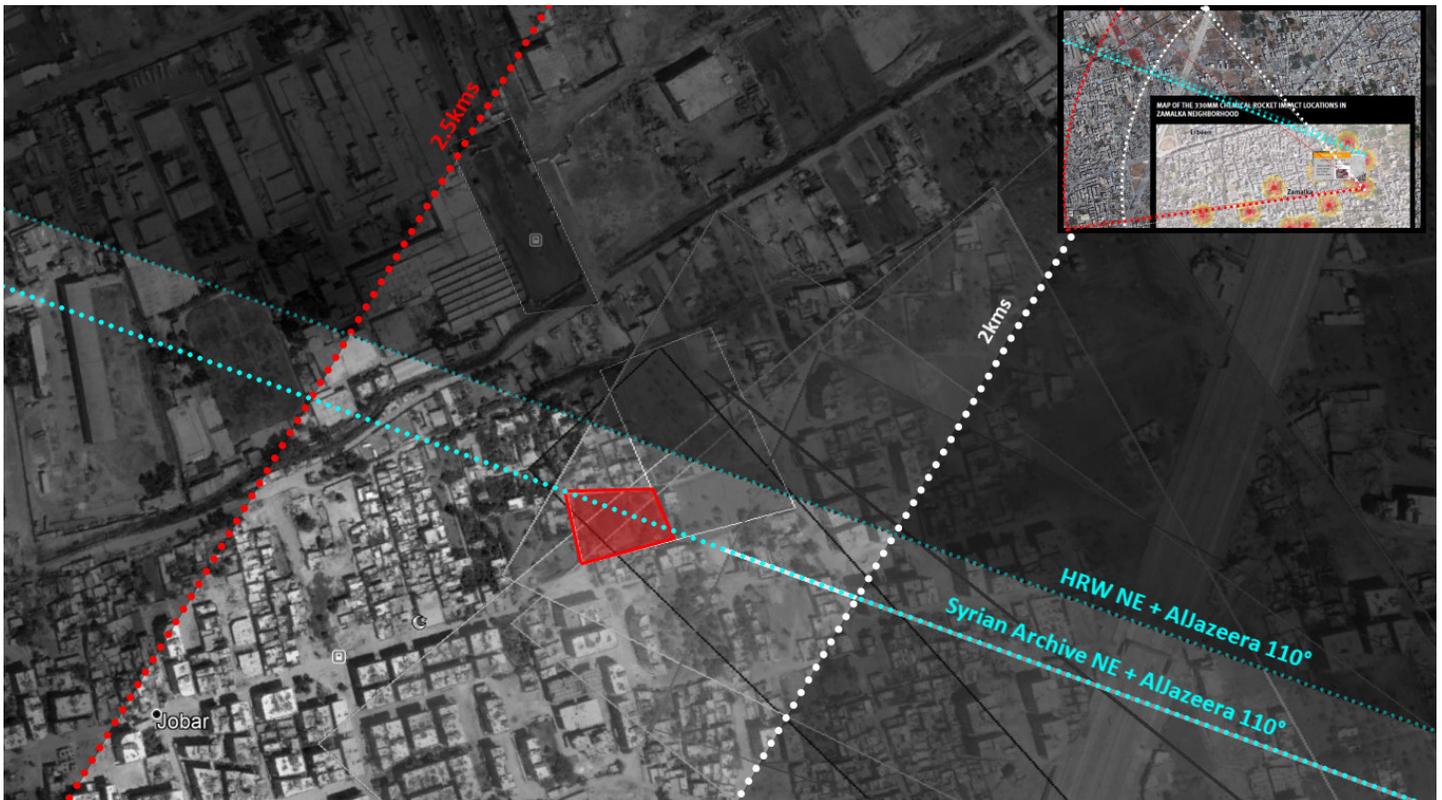


Here is the entire recreated scene from above:

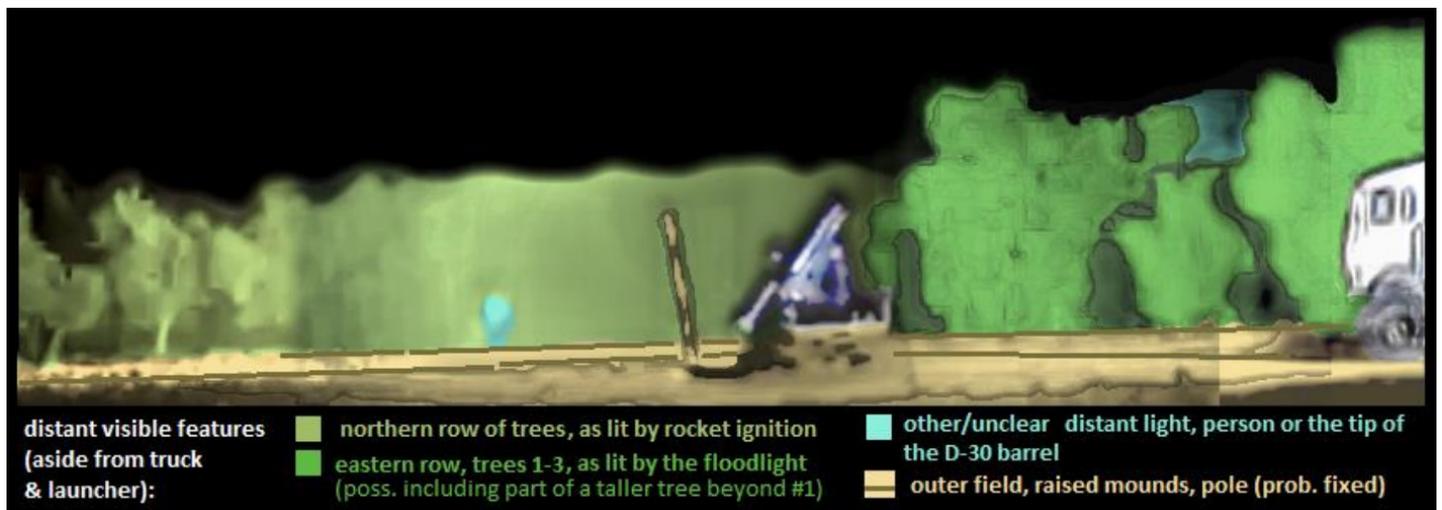


Matching the characteristics

This model is a perfect match to a small field that lies within the most likely area identified above – It is at the intersection of all trajectories, and is 1.9 to 2.2 kms from all impact sites. There are likely very few, if any, areas in Syria that match the videos as well as this spot does. The fact that such a spot happens to be within this previously identified small area is remarkable.



This field is about 43 x 33 meters framed by trees and to the south by buildings. In the southeast corner there is some structure that was removed about a year later.

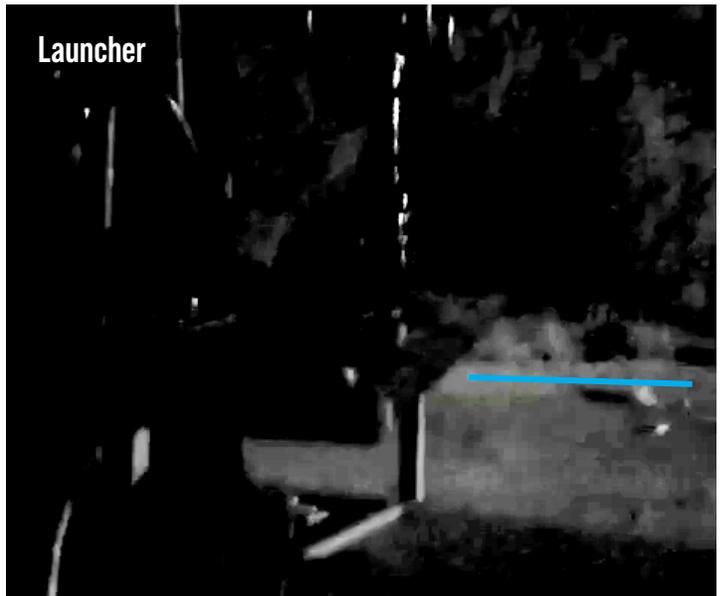


Note the burned appearance of the southeast corner of the field (blue) in a satellite image from three days after the attack.



In the area west of the D-30 we can see a patch of clear land, after which the vegetation starts. This is clearly seen in the satellite photo.

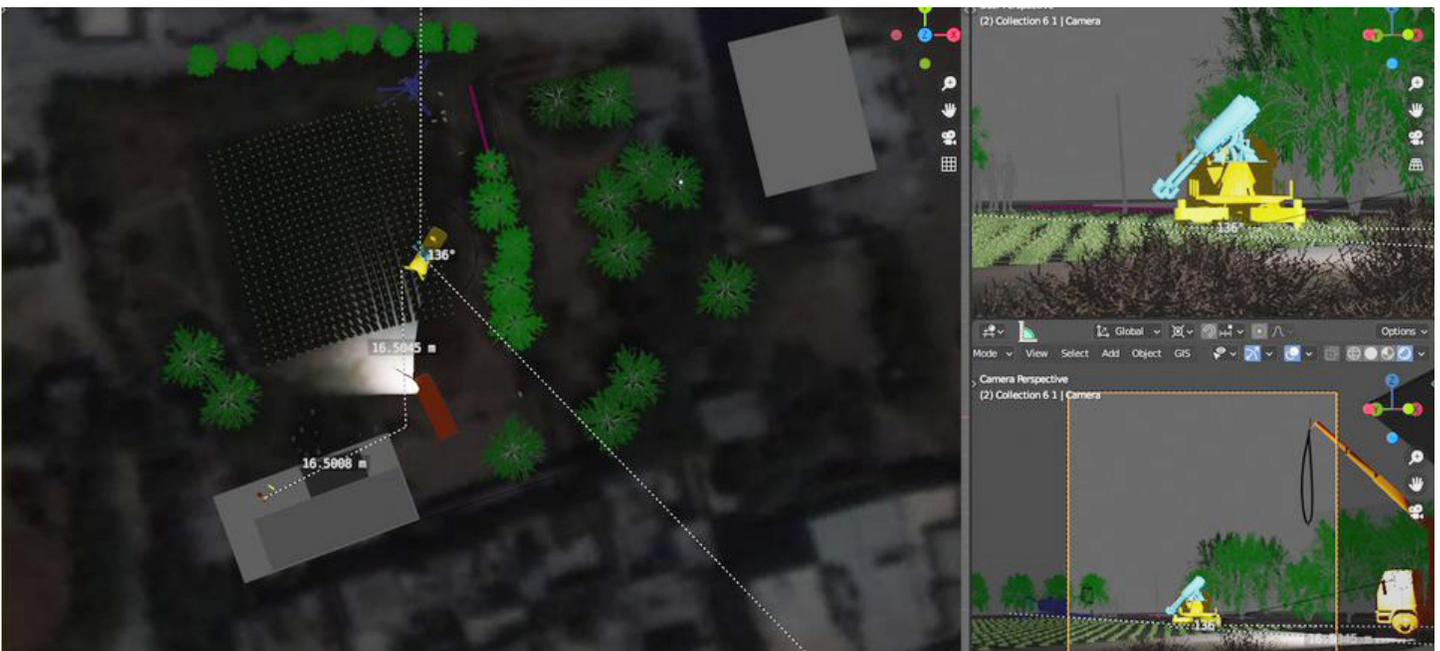




A ditch previously hidden by the group of trees



The cameraman walks 44 steps (~33 meters) from the launcher. After 20 steps the sound of his steps clearly changes from soft (vegetation) to hard (concrete). Additionally, in the double-launch video, the change in sound happens after the cameraman steps outside of the crane's light. This matches perfectly the path below - walking straight towards the concrete platform and then walking alongside the building to the farthest spot.



In some frames, an illuminated object can be seen near the row of little trees. This object could be the illuminated front end of the D-30 barrel. We couldn't find more information on this, since in other shots, it is in darkness or obscured by the fireball and smoke.



Considering the general light direction and the pole, the camera in the D-30 video approaches it from the east.



As it turns out, the trees to the right and left of the path confirm this logic. Taken together, the pole, the light direction, and the distribution of trees along the path provide a strong indication of the D30's location.



Same person in both the D-30 and rocket videos



Small fighter seen at the launcher and D-30

Space for launcher and truck relative to trees and camera angle:



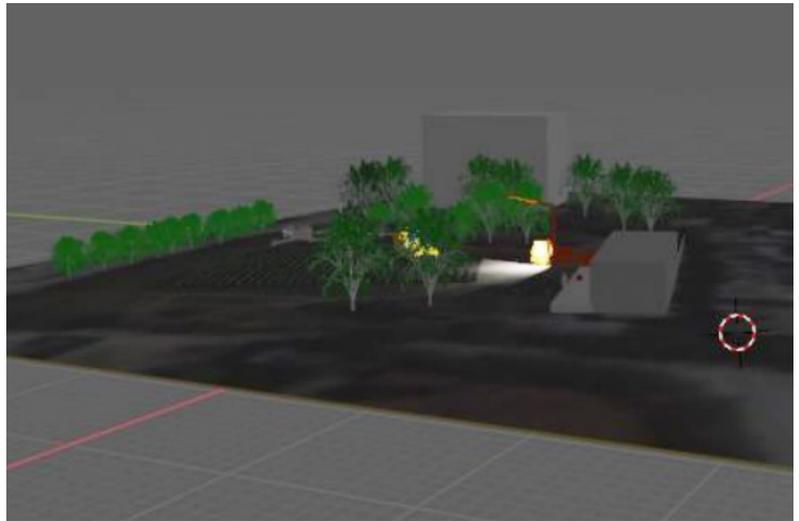
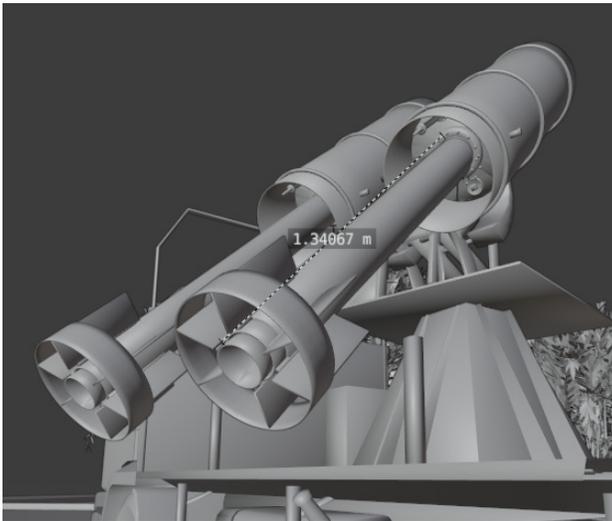
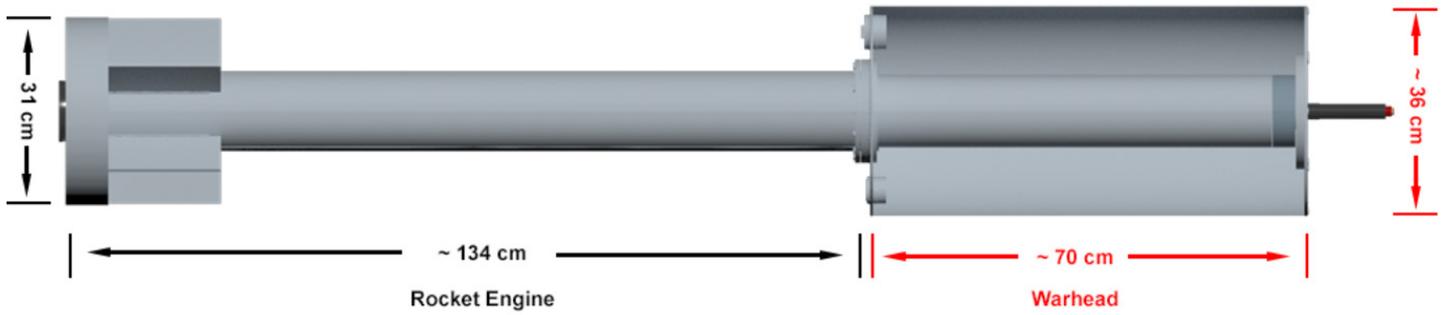
Finally, we generated anaglyph 3D images from video frames taken at different angles, providing realistic depth perception of the scene. These images confirm that the launcher is a good distance away from the group of trees.



Anaglyph image – use red/blue (left/right) glasses to view.

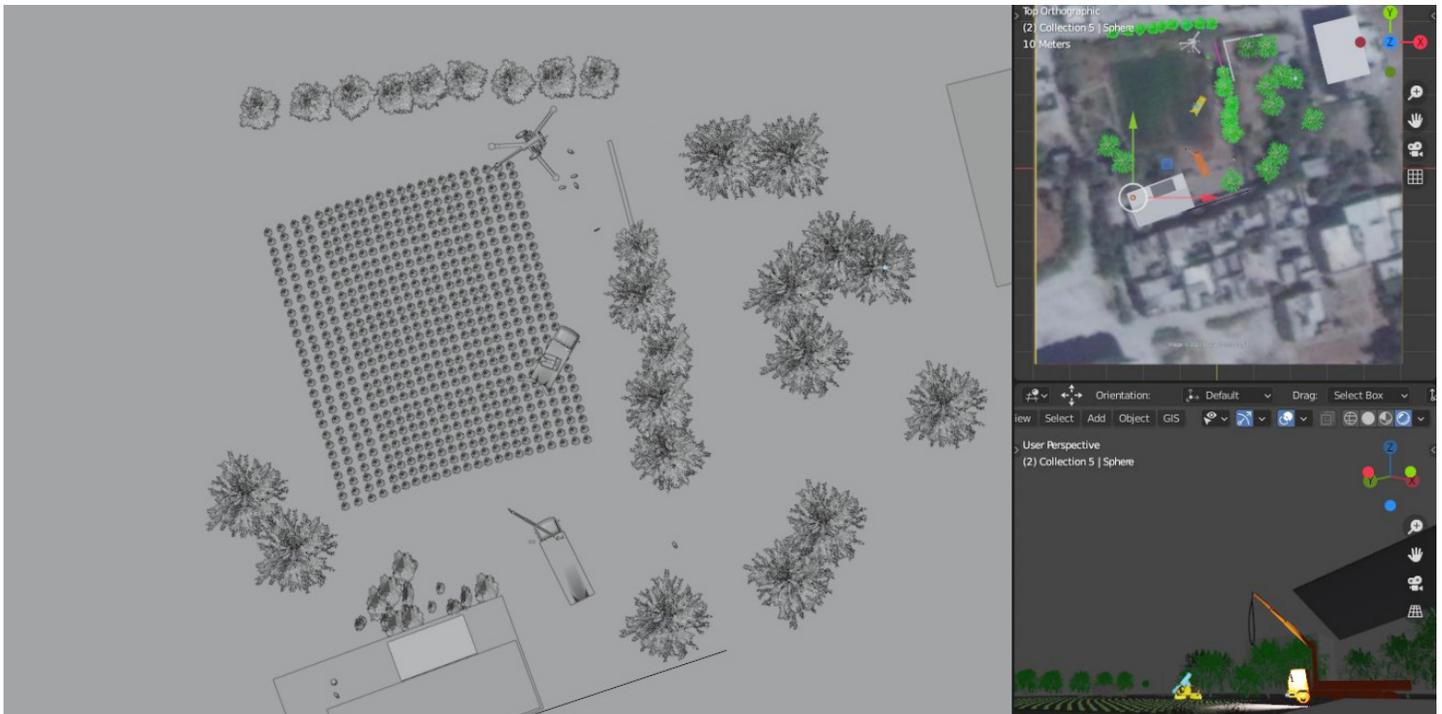


3D Modeling



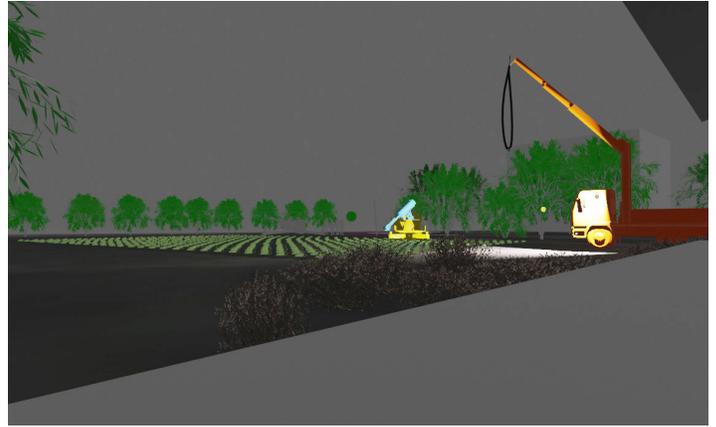
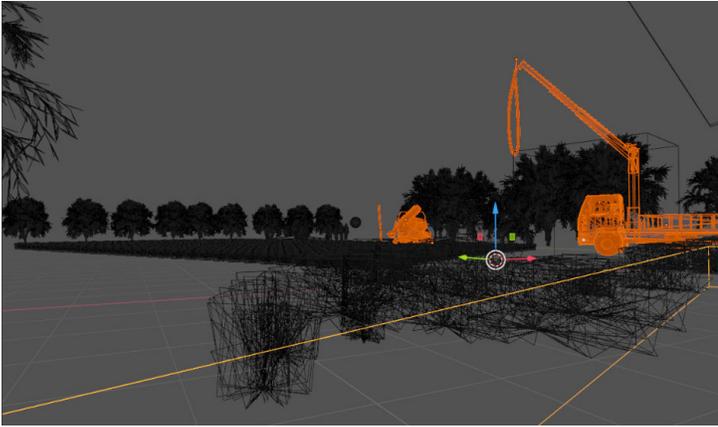
Scaling the rocket launcher and 100 x 100 meters plane

Using the satellite image of the field (24 August 2013), the known size of some elements (e.g. the rockets), and their relative relation in the videos, we were able to scale and position the other elements. We recreated the scene as a 3D model that, from the camera's point of view, is remarkably close to the Liwa al-Islam videos. Using this model, and a virtual camera lens of 40mm, the scene could be reproduced relatively accurately.



Final placement of the elements to fit the Liwa al Islam videos.

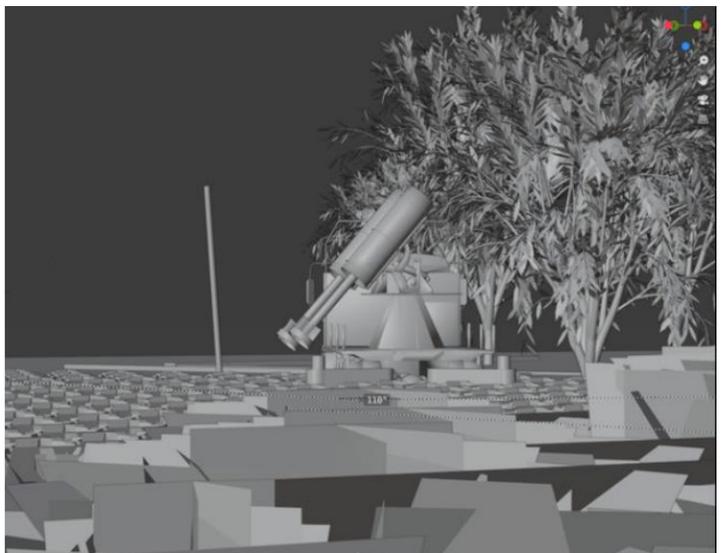
Some Details

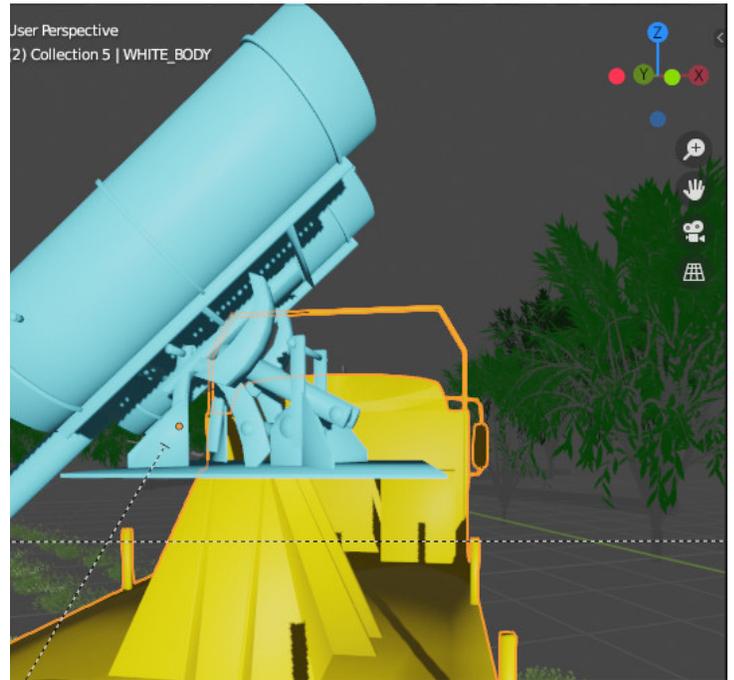


Alignment of launcher and crane as seen from the paved area.

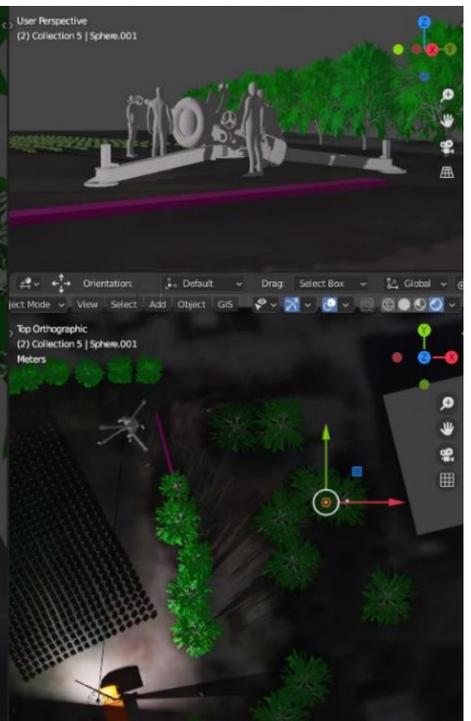
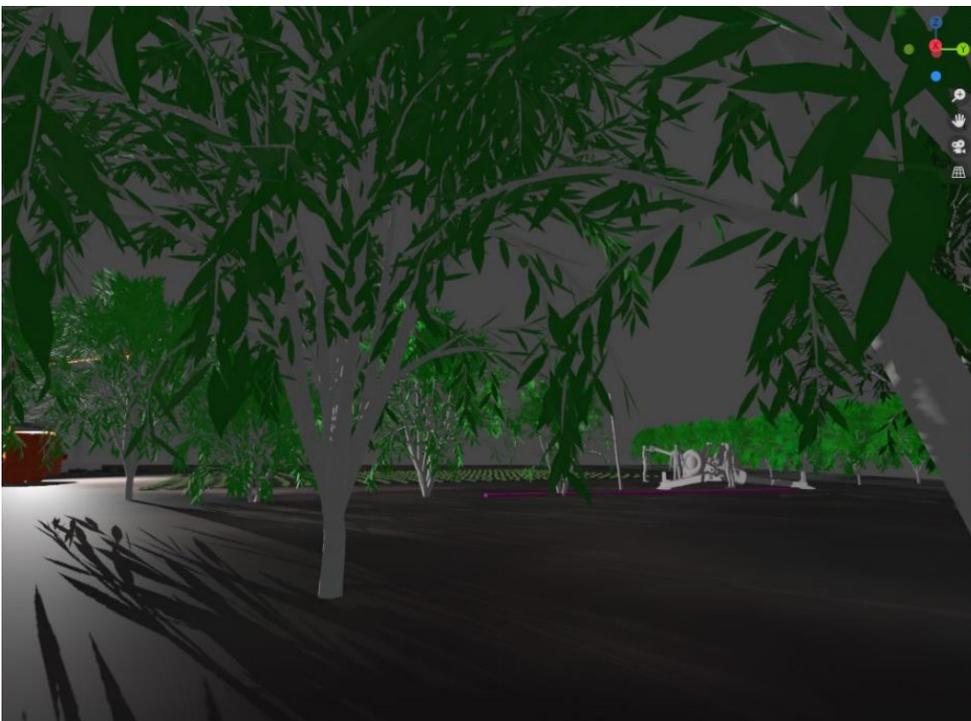


Alignment of the rockets

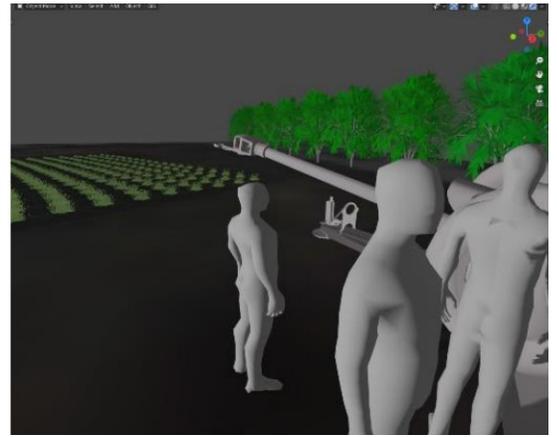




Shadow alignment for the launcher – crane relation



Approaching the D-30 (left – as seen from “tree1”, right top – close to the ditch) note the glow on the left edge of the middle screenshot above



Field corner, small fighter at the D-30



Lighting 1

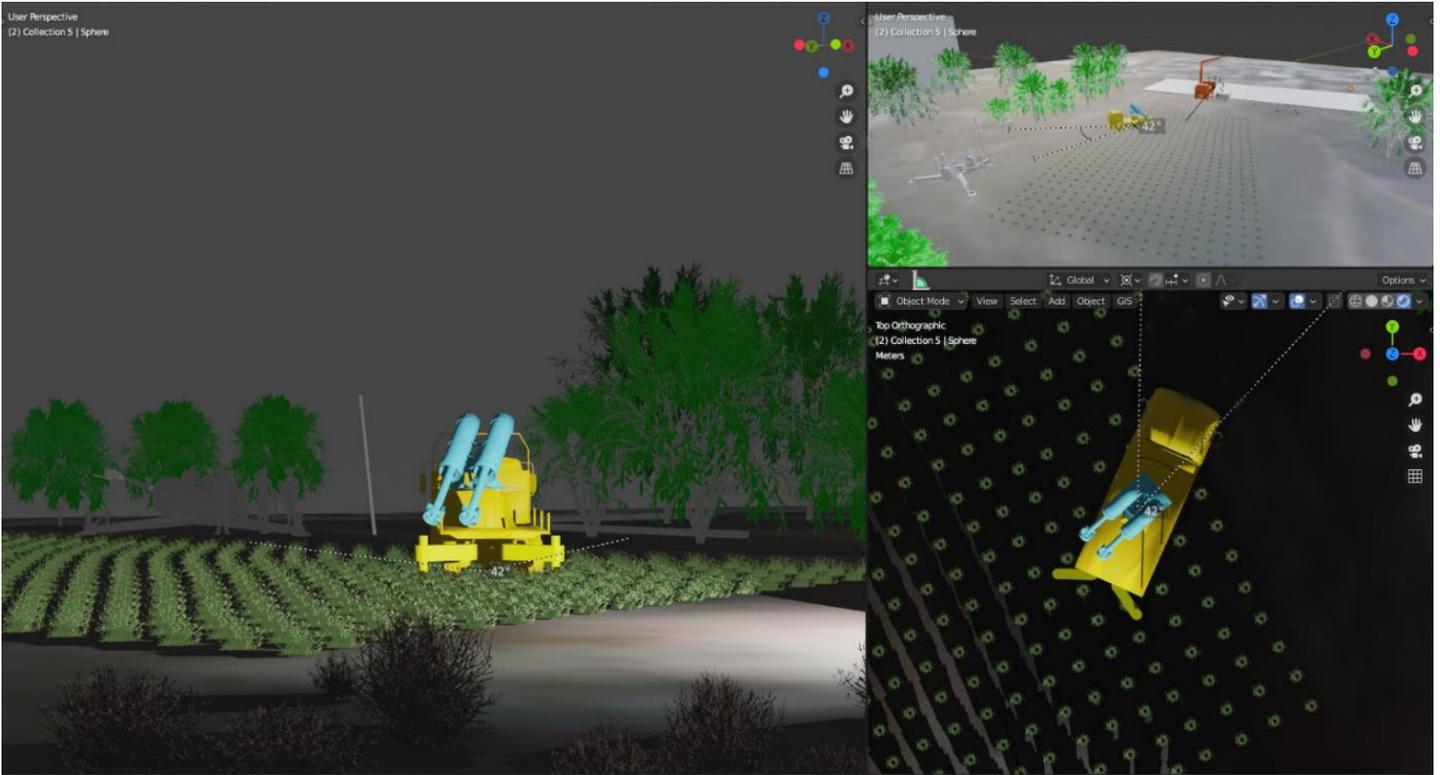


Lighting 2 after the crane has been moved, probably in order to reload the launcher.

Shooting Direction

The 3D model also helped analyze the launch direction. This is not only relevant for matching this video to the sarin attack on Ghouta, but also interesting in the context of the statements made in the video.

In the video, the men claim they are firing at “Assad’s dogs” in Jobar and Qaboun. However, in order to target the Syrian Army, the launcher would have had to fire in a direction of less than 42° , effectively shooting away from the camera. That is not what is seen in the videos.



The video actually shows the two rockets nearly covering each other. This is consistent with two possible launch directions.



Possibility 1: An azimuth of about 110° .



Positioning the model of the launcher at an azimuth of 110° generates a view similar to that seen in the video.



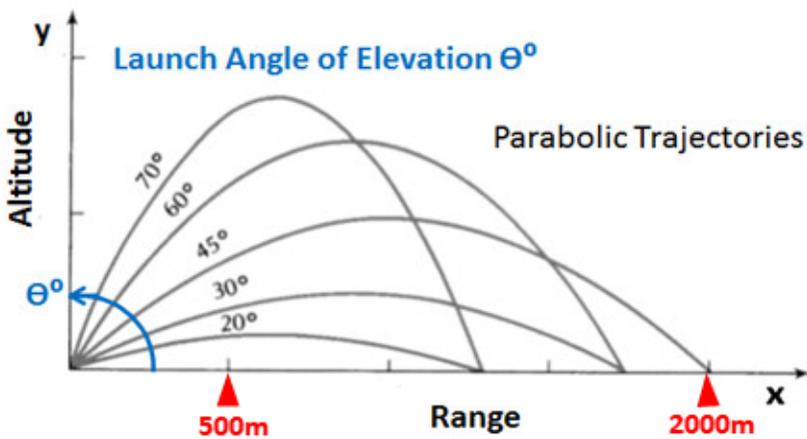
110° is the second azimuth measured by Al Jazeera, which we assigned to the most northeastern impact sites documented by HRW, and the unknown location reported by the Syrian Archive. However, within a reasonable error of this azimuth, there are 4 other impact locations reported by HRW.



Another target to consider is the Tohme Checkpoint (33.533217, 36.347404). At this checkpoint, SAA tanks had reportedly gathered that night to try to break through on the highway to the west. Liwa al-Islam certainly had a motive to shell this checkpoint. In that case, they would have had to fire at a very steep or shallow angle of elevation, to shorten the 2 km range to 550 meters. In practice the videos show an elevation angle close to 45°, making this option impossible.

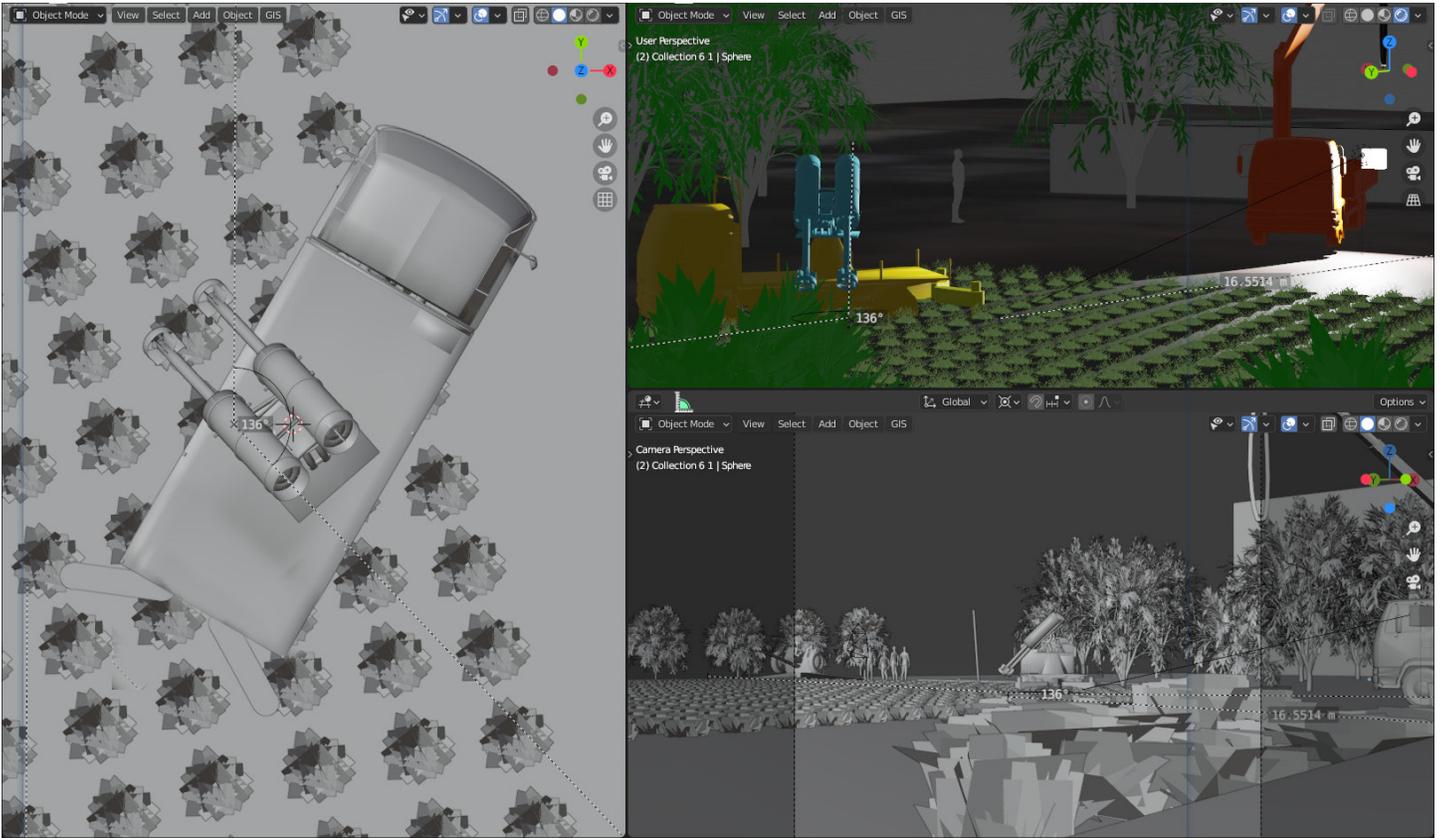
The Artilleryman's Range Equations

Range R vs Launch Angle θ for a Given Initial Velocity V_0



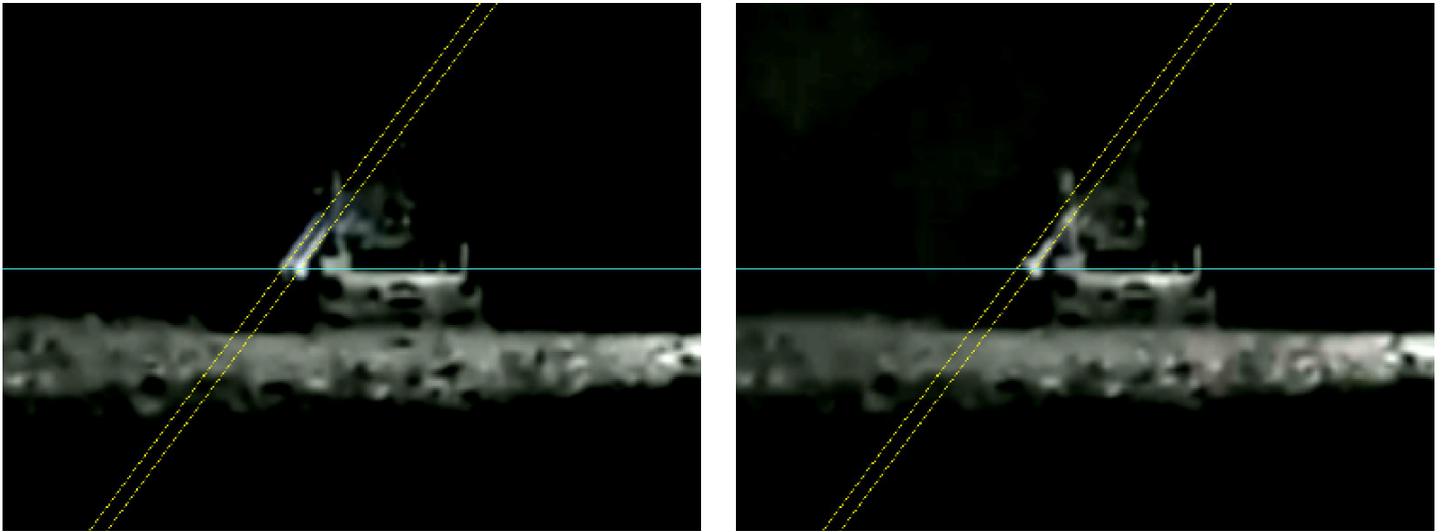
Possibility 2: An azimuth of about 136°

Positioning the launcher at an azimuth of 136° also results in a similar view, reversing the position of the two rockets.

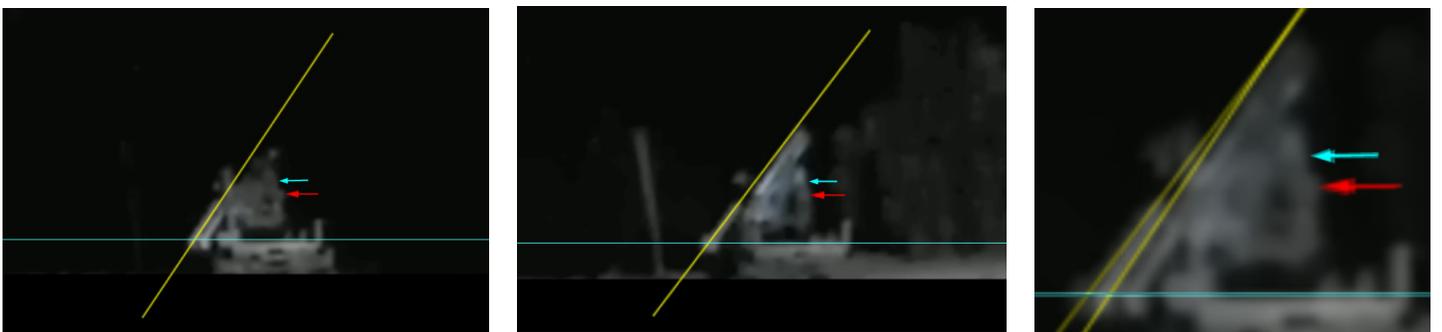


This is the azimuth identified at location "Wall 1" above. Within 200 meters of that site are two other impact sites (roof and field).

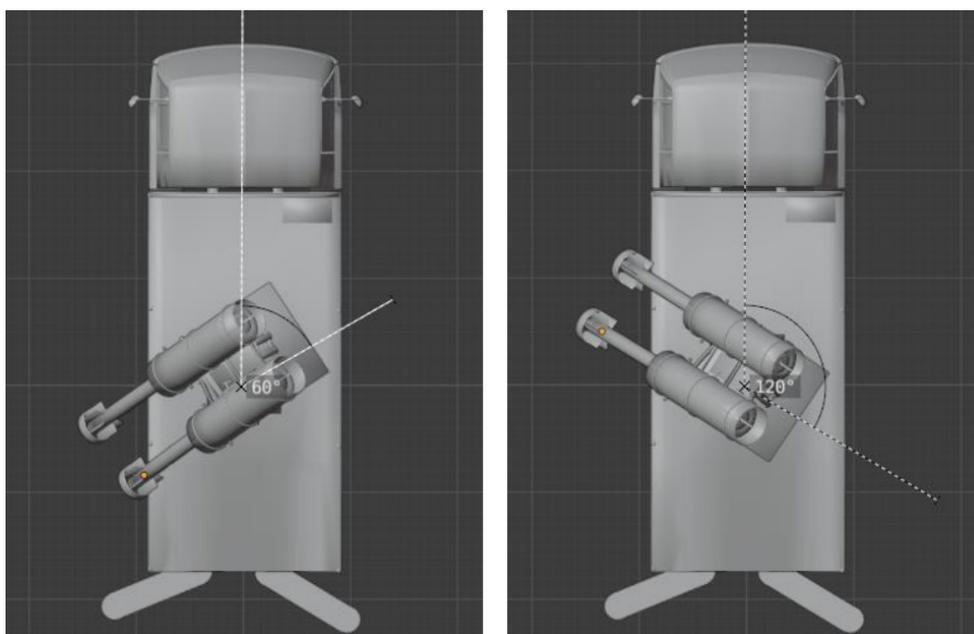
Comparing the two video frames below it seems to show that the far rocket is above the near rocket in the shot and was fired first. This indicates that possibility 1 (110°) is the more likely one.



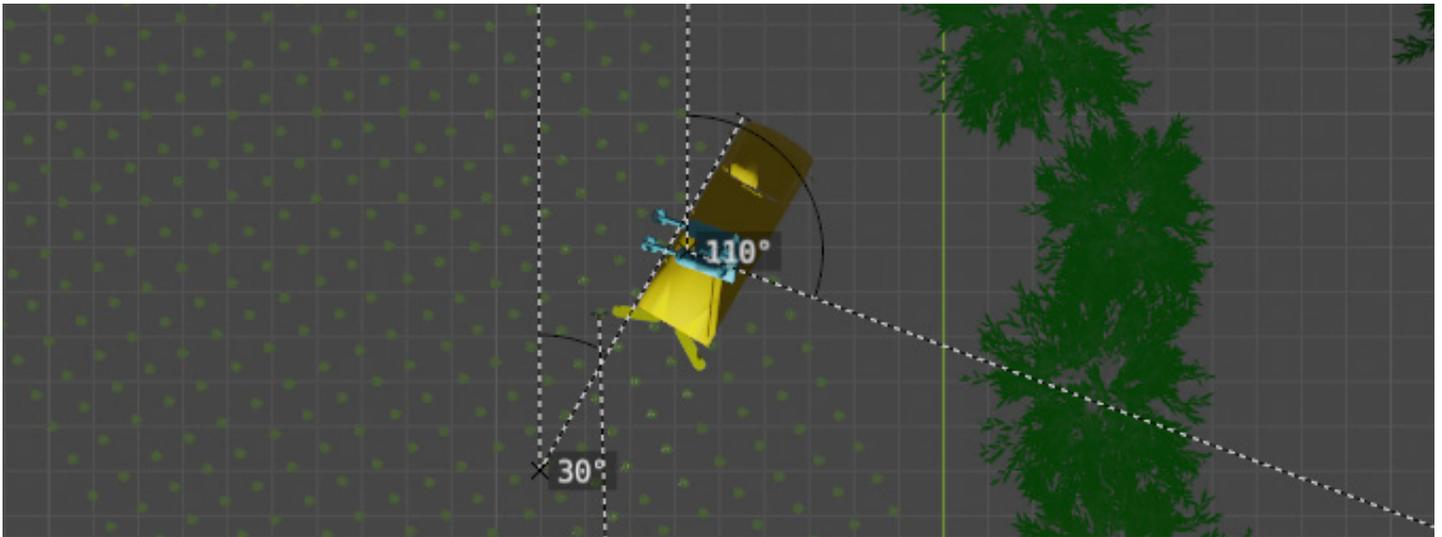
Comparing this to the second Volcano video (showing a single rocket being fired), seems to show a change in shooting direction of about 5 to 10° to the west. This indicates the team was slightly changing direction between each launch, attempting to 'sweep' a wide area, which is evident in the actual distribution of impact sites.



Due to the protruding rocket motors, a Volcano launcher of this type can only fire sideways, to avoid the rockets touching the long loading area. The estimated range of possible firing angles is 60° to 120° relative to the longitudinal axis of the launcher. It may be extended when launching at a lower elevation of the rockets or when loading only one rocket.



According to our analysis of the videos, the launcher in the Liwa al Islam videos has an azimuth of 30° . This means that the intended firing direction at deployment was $120^\circ \pm 30^\circ$. In this position, it could reach all known impact locations of the sarin attack, all of which correspond to the Volcano range at an elevation angle close to 45° .



Control of the Area

Source: <https://www.youtube.com/watch?v=6gpd54sWyfA&t=267s>

Besides this location being under opposition control, as shown above, it is interesting to note that 3 days later, as Syrian army forces entered the area, they were attacked by sarin, just 200 meters from this field. This attack is detailed in the UN report (p. 61), which they independently verified using blood samples they took from the affected soldiers.



Source: UN Mission - [Final report](#), launch site added (yellow)

Illustrates an overview of the Jobar area in Damascus. A red pin indicates the site of the alleged incident.

Publicly available video footage from ANNA News and other media outlets confirms areas of control shown in the map above by Charles Wood. In many hours of video footage, we could find only one [shot](#) showing the suspected launch site, taken by a tank from the north (33.533850°, 36.341475°).



This video was taken after the attack the building (orange) is still intact in satellite images taken on August 24th. The next available satellite image is from the following January and shows exactly the damage to the roof seen in the tank video. This means that this cautious approach by the tank towards the launch site occurred after August 24th, confirming the site was likely beyond the Syrian Army's reach during the attack.

CONCLUSION

Following the August 21st 2013 chemical attack, videos were published showing seven rocket impact sites. The locations of six sites were identified with very high confidence, and one with medium confidence. Additionally, each of the sites had evidence indicating the trajectory of the incoming rocket. Four sites had damage at two locations, allowing to calculate an azimuth from connecting the two. In two other sites soft ground was hit, leaving a directional crater, and in one site the rocket's motor was lodged in the ground, with no indications of lateral bending.

Remarkably, when plotting each trajectory from its respective impact site, they all converge to a small area. This area happens to be around 2 kms from all impact sites, which is indeed the known range of the Volcano rockets used in the attack. Multiple reports and videos indicate this area is opposition-held, and close to the frontline with the Syrian army. There is no location within army control that fits the identified rocket trajectories and is within rocket range. Additionally, three days later, when the army approached the area, they were attacked with sarin IEDs.

Within the identified area are two fields that could support a Volcano launch. One of them has several features that strongly match three videos leaked a month after the attack, which show Jihadist fighters in gas masks launching Volcano rockets on the night of the attack.

These features include two rows of trees, low vegetation, a paved platform, and more, all located in the same distance and relative position as seen in the videos. Additionally, the launcher seen in the video is at a location and angle that perfectly match the trajectories identified above.

These new findings clearly indicate the 2013 sarin attack was carried out by an opposition faction from within opposition territory.

Previous prevailing hypotheses for government involvement are now directly contradicted by the evidence. While new hypotheses can be conjured, those would entail highly bizarre scenarios, such as the army originally launching from the absolute edge of its territory (instead of a safe army base), and two weeks later reenacting the attack for a staged video, from a nearby field, launching rockets towards the same targets, while UN inspectors are at work. Of course, as many identified early on, there is no clear motive for an army chemical attack on uninvolved civilians, while the opposition could definitely view it as a necessary sacrifice to draw international intervention on their side.

Until now, all Western authorities over-confidently placed blame on the Syrian government, often pushing for military escalation. This failure demonstrates that Intelligence agencies have not learned the lesson of the Iraq WMD fiasco, and NGOs and the media need to develop more reliable and independent investigation methods.