Landscape and Visual – Composite and rendering analysis.

Feedback on the information supplied by the Applicant in document "Response by the Applicant on Landscape and Visual Matters" EN010122/D5/13.11

The Applicant has provided a lengthy defence of the techniques used to create their CAD models and check the ground topography by virtual means.

However, the accuracy of CAD modelling is just one of many critical factors to consider when compositing images.

The virtual camera position within the computer rendering must match the real-world camera position and height as well as lens angle, focal length etc.

The CAD model must also overlay onto the original photograph precisely. It is extremely difficult to be completely accurate in this process as even minor deviations in any of the above parameters can throw off distant objects by a significant amount.

Section 6.1.2 of the Landscape Institute Technical Guidance Note (Visual Representation of Development Proposals LI TGN 06/19) states:
"Incorrect image production and presentation can render otherwise correctly photographed images unfit for purpose. It is crucial that the size of the proposal and its location within the scene depicted in the photograph are accurately represented. In order to achieve this, it is necessary to match the perspective parameters of the photograph accurately, to record viewpoint location and camera settings, and to use 3D software correctly."

Therefore, it is essential to use on-site measurements (surveying) and real-world visual markers to verify the camera angle, scaling and positioning within the composited images. The Applicant has provided no evidence to demonstrate that they have done this and it remains clear that on-site visual clues have not been used to sense-check the scaling. As a result, significant and misleading inaccuracies remain in the visualisations which I have attempted to describe over the following pages, with particular focus on the only two views addressed in the Applicant's latest document.

I remain concerned about the validity of <u>all</u> of the Applicant's visualisations, as I have seen no proof that confirms that any of the images were calibrated correctly.

Please view this document in Adobe Acrobat using "Full Screen Mode" (Ctrl-L) as this will facilitate aligned direct comparison of the images. You can then flick backward and forward between pages without the image jumping.

Please press CTRL-L to view the following in full screen mode.

View from Twin Oak tree looking roughly South – Original photograph.

This is the original winter photograph used by the Applicants. I have marked on key features and dimensions as shown (in metres).

The yellow and blue lines show the height of the metal gate to the field, along with the track route, width and barrier post positions.

These are my own measurements, but they can be validated by the Applicant.

Note that the right-hand support post for the swing barrier across the track is well within the width of the hedge, surrounded by foliage (even in winter).

View from Twin Oak tree looking roughly South – Applicant's visualisation.

This is the Applicant's visualisation, with the reference positions and heights from the original photograph transposed.

Firstly, see how the new track is narrower and located much further to the right than on the initial image.
In reality, the right-hand side of the new track must match the original image (blue line) if the hedge is to remain in situ.
The on-site tracks will either be 6m or 3.5m wide. If this is to be a 3.5m track, then it needs to be shown as wider than the original track in the source photograph.
Note how small the solar panels on the left of the image look, in comparison to the post height of 1.4m

Now compare the height of the 2.2m security fence to the yellow line which references the height of the 1.1m gate from the original image.
The Applicant's claim that the gatepost is "significantly further forward" than the fencing, but comparing the bottom of the yellow line to the shadow of the security gate, shows that they are reasonably close together (yellow arrow). The distance involved could not lead to such significant foreshortening of the security fence height.

I continue to maintain that the rendered additions have not been scaled to match the original photographic image appropriately.

View from Twin Oak tree looking roughly South – Applicant's visualisation.

This is the Applicant's visualisation, with the solar farm and security fence traced in red, the track in light blue and the hedge in green.

Rendered image with traced lines of 3D modelled elements for later reference.

View from Twin Oak tree looking roughly South – Original photo with traced overlay.

This is the original photograph with the traced overlay of the visualisation track and hedge.

Here, it is clear to see how the new track looks to be visually only about half the width of the existing track (especially at the point of the swing barrier).
It is this distortion that then sets the perspective for the rest of the rendered composite image.

If the track was composited into the photograph in the right location and to the correct scale, then the other modelled elements might also be scaled correctly.

View from Twin Oak tree looking roughly South – Original photo with overlay of all new features.

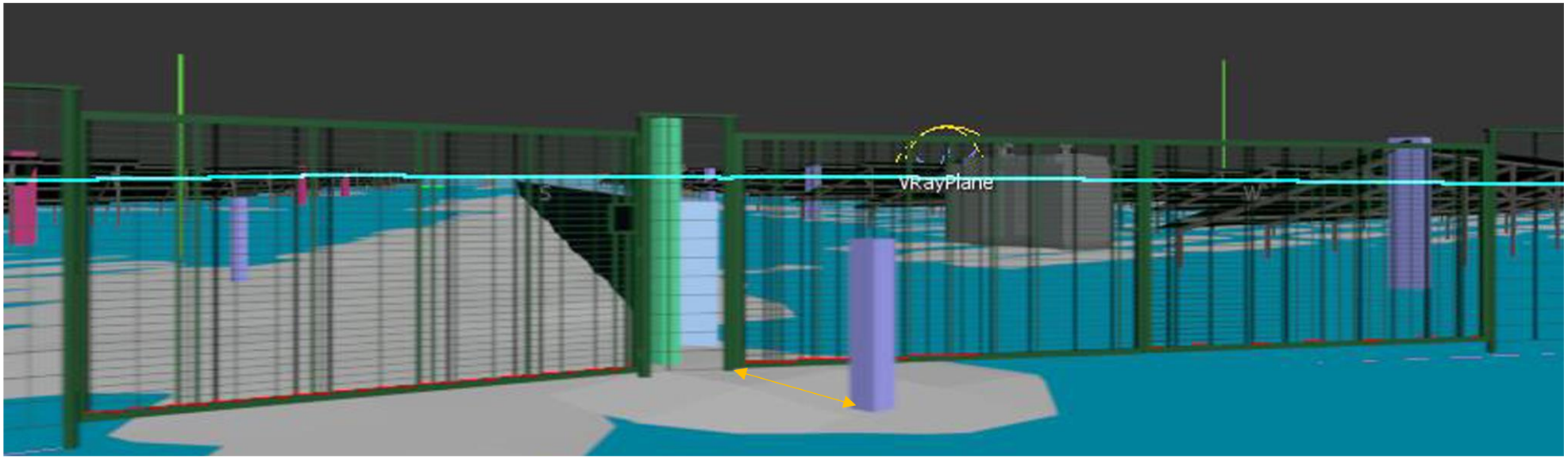
This is the original photograph, with all of the features from the solar installation traced as an overlay.

This image is now becoming rather complex, but I have included it for reference.

It can be seen on both sides of the image that the 2.7m tall solar panels (in red) barely exceed the height of the 1.6m hedge.
This again calls into question the scale (or field of view / camera position), at which the rendered model has been brought into the photograph.

View from Twin Oak tree looking roughly South – CAD model supplied for scaling reference.

This is the rendering provided by the Applicant (EN010122/D5/13.11 Image 4).



The Applicant stated in EN010122/D5/13.11:

"It is apparent that the cross check undertaken by Ms Abbott has not fully taken account of perspective, as the heights of existing elements are unlikely to be at the exact same distance from the camera as the element they are being used to gauge the scale of. Note for example the existing gate is significantly further forwards when compared to the actual position of the proposed security gate, as shown by the purple block in Image 4."

It is not clear how the Applicant has ascertained the position of the gate post in the model above as no surveys have been mentioned.

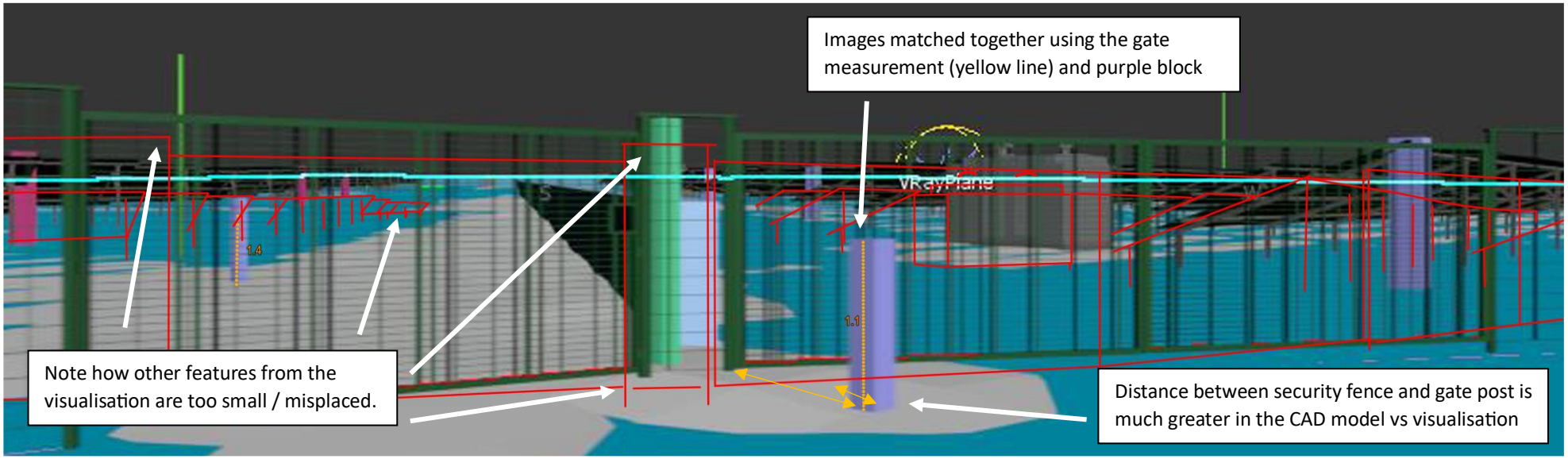
Appendix 14 of the Visual Representation of Development Proposals LI TGN 06/19 goes into detail about the relative accuracy of satellite imagery positioning and includes an example with positional errors between 63cm and 78cm for a clearly visible landscape feature (from Bing and Google imagery).
The gate post in this image is unfortunately not visible on satellite imagery, so the accuracy of positioning within the CAD model remains highly suspect.

It is quite possible that the "significantly further forward" problem with the gate post is as a result of incorrect positioning within the model.
The perceived distance from the purple bar to the security fence looks much greater in this image than in the original photographs (yellow arrow).

I conclude that this image does not provide any evidence to refute my concerns with regard to the scaling and calibration.

View from Twin Oak tree looking roughly South – CAD model with tracing overlay.

This is the rendering provided by the Applicant with overlay from original visualisation – sized to match the gate post heights (purple block and yellow line).



Because this view uses a slightly different camera angle from the original photographs it is exceedingly difficult to draw any meaningful conclusions.

When the traced lines from the original visualisation are overlaid onto this image by lining up the yellow line and purple block, then it can be seen that everything else is out of alignment, and much smaller than originally modelled in the visualisations.

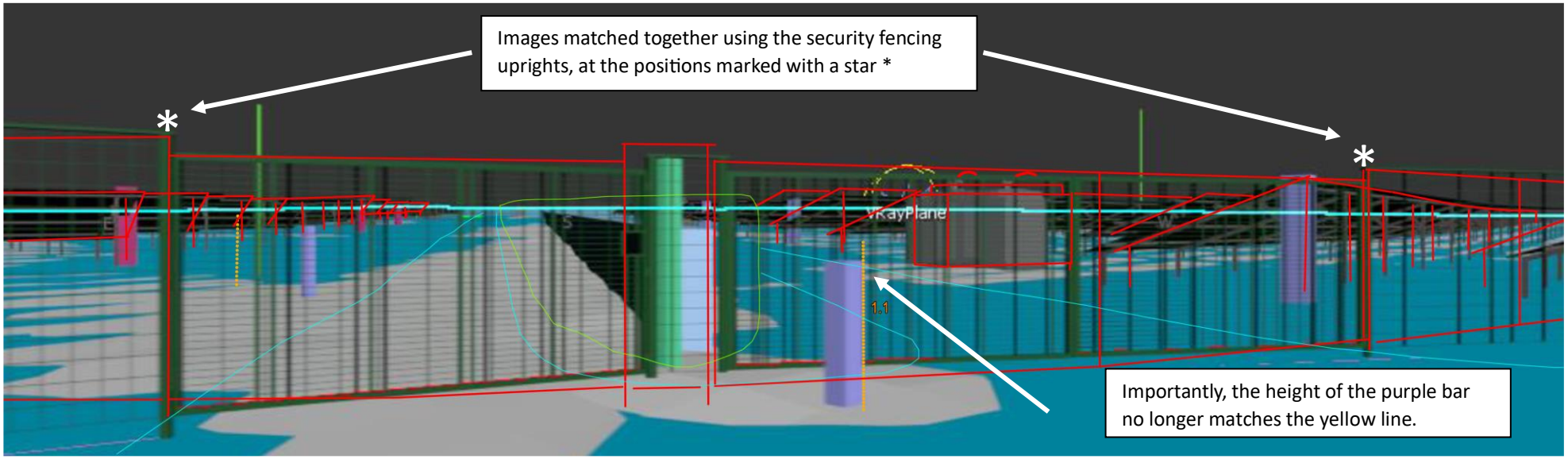
This demonstrates just how important it is to get the correct field of view, but might also point to a problem with scaling based on an incorrect position for the gatepost in the model.

Appendix 14 of the Visual Representation of Development Proposals LI TGN 06/19 clarifies this when it states, “In summary, knowing the precise location of the camera, relative to the site, matters more when the subject (site) is closer to the viewpoint, than when it is further away.”

Alternatively, the horizontal positions of the security fences could be matched together, as shown on the following page:

View from Twin Oak tree looking roughly South – CAD model with tracing overlay.

Applicant's CAD model, with overlay from original visualisation – uniformly scaled to match security fence positions *.



The slight variance in camera angle makes it hard to align the images exactly, but now most of the solar farm features are better matched throughout the image.

The gate post remains further from the security fence than in the original visualisation.

Critically, when matching up most of the features of the solar farm, the purple post height no longer matches the yellow marker that represents the 1.1m gate, once again indicating a problem with scaling.

Without access to the CAD model, I cannot tell where the error arises, or if it is purely as a result of the camera angle change, or even design change in the position of the fence. But it can be concluded that without on-site positioning surveys, that the Applicant has not provided any concrete evidence to refute my initial claims that the calibration of the visualisation is somehow incorrect.

Review of Lidar vs OST5 datasets

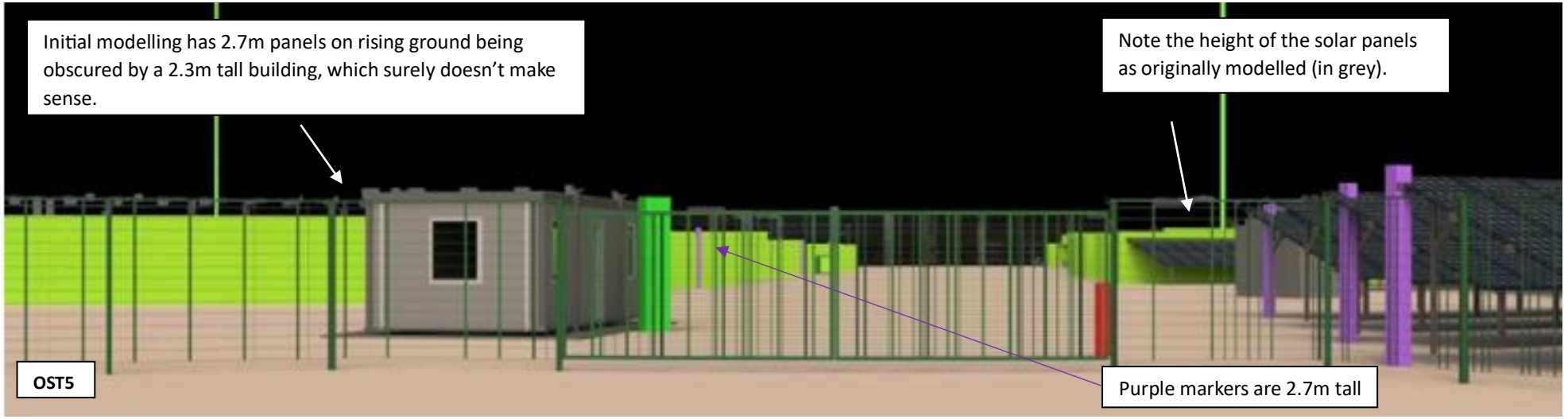
As far as I can tell, the Applicant's recent analysis indicates that OST5 models have a RMSE (Root mean square error) of 2.5m whereas the Lidar vertical height accuracy may be as good as +/- 15cm or better. The increased accuracy of Lidar makes it hard to understand why OST5 data was used in the first instance.

The Applicant has conducted spot checks at 10 (undefined) locations and concluded: "The variances identified in the sample do not exceed around 46cm and are generally much less than this." It would be helpful of the locations of these spot checks were confirmed.

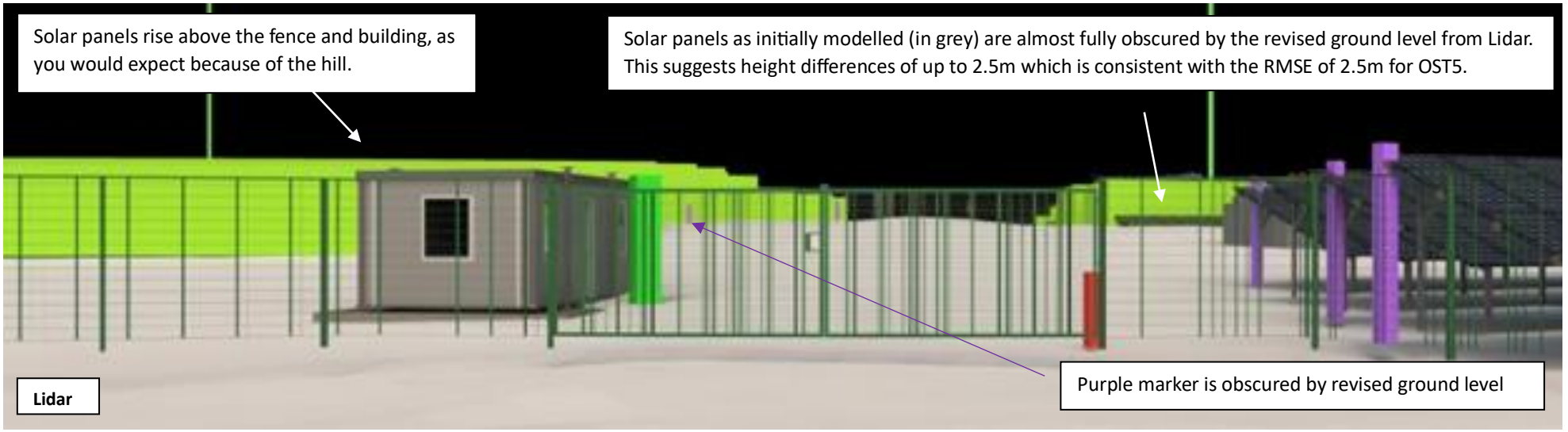
To demonstrate the difference in topography between the two datasets (Lidar and OST5), the Applicant provided some images, which I include below. Unfortunately, once again they have failed to match the camera position and field of view between these two images, so any comparisons are difficult. However, I have attempted to crop the images to be as similar as possible.

Having viewed the Applicant's supplied images (see over) it appears that visually the variance between the two sets of data might be larger the stated 46cm, and in places might be as much as the stated RMSE for OST5. I have tried to show this on the following pages.

Applicants OST5 image (looking North from Twin Oak tree)



Applicants Lidar image (looking North from Twin Oak tree)



Discussion of the topographic comparison images above.

The Applicants have provided a lengthy document describing the differences between OST5 and Lidar, and have concluded that their original visualisations are a "good representation of what the development would look like" and that "none of the differences are appreciable in terms of the landscape and visual effects that they would lead to."

Unfortunately, I don't believe that the images supplied by the applicant provide evidence that backs this statement up. I think that the evidence they have presented shows that relying on OST5 with its 2.5m RMSE can have a great influence on the landscape effects of a solar installation that is typically 2.7m tall.

It can be seen from the images on the previous page, that the Lidar image is a more accurate reflection of the ground topography that is visible in real life. See how the horizon behind the gateway rises much higher than in the OST5 image, this is consistent with what can be seen when on site.

The purple height markers and many of the rendered solar panels from the OST5 image have ended up being obscured by the ground level in the Lidar image, to an extent much greater than the 46cm quoted by the Applicant.

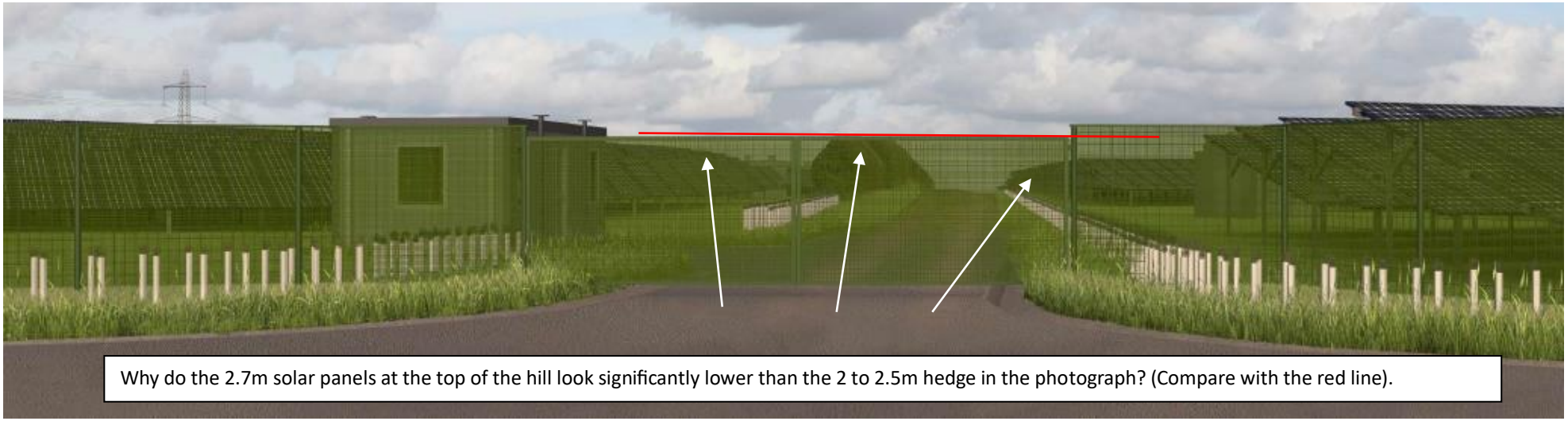
I believe that it is clear from this comparison that it would have been much more accurate to model the renderings on Lidar data rather than OST5.

Applicant's original visualisation (looking North from Twin Oak tree)

I hope to have shown that the images supplied by the Applicant in document EN010122/D5/13.11 do not appear to back up their conclusions.

However, despite the differences in modelled datasets and topography, the key errors that I initially raised were with respect to the way in which the CAD renderings had been incorporated into the photomontages without adequate size calibration or visual sense-checking.

The image below clearly shows this: why are the 2.7m tall solar panels modelled at only a fraction of the height of the hedge at the top of the hill?
(The hedge is estimated to be approximately 2 to 2.5m tall).



Why do the 2.7m solar panels at the top of the hill look significantly lower than the 2 to 2.5m hedge in the photograph? (Compare with the red line).

Similar issues were present on many of the other views, where hedges behind 2.7m solar panels remained fully visible (down to ground level) when in reality they should be either fully or partially obscured behind the new infrastructure. I mentioned this in previous submissions, but the viewpoints affected include; 10 b&c, 10 j&k, 10 o&p,11 b&c, 11 f&g, 11j&k, 12 b&c, 12 f&g, and 14 b&c.

The Applicants have not addressed this problem, apart from stating that the 5m offset from hedges means that solar panels are not immediately in front of field boundaries. A 5m offset may be present, but this does not remove the potential for solar panels to obscure the visibility of the skyline or field margins.

The Applicant's Landscape and Visual Effects analysis section 5.147 summarised their finding that "The gently rolling landform will be retained as PV panels follow the contours and therefore unlikely to notably alter the skyline."

On the basis that many of the visualisations seem to have underestimated the height of the panels, I think that it is highly likely that the skyline will be notably affected at many of the viewpoints around the site, and this has not been considered sufficiently.

Summary

I continue to maintain that the Applicant's visualisations are misleading and do not provide a reasonable representation of how the Solar Farm will change the local environment. This in turn may have impacted on the findings of the Landscape and Visual Assessment.
The extra information the Applicants have recently presented does not provide any firm evidence that their photomontages are correctly compiled.

Using Lidar instead of OST5 datasets may have helped avoid some of the errors, but careful sense-checking of the images should have highlighted some of the issues before the visualisations were released for public scrutiny.

Many of the viewpoints used do not really reflect those vistas that will have the greatest impact on the community. The site will be highly visible from multiple locations, especially on the local road network, such as from Lad's Grave and on the roads between Walton on Trent, Coton in the Elms, Rosliston and Drakelow and yet the current viewpoints could be seen to have been cherrypicked to downplay the impact, or to focus on areas where the public rarely view the site from.

The proposed opaque screening material that will be used to prevent glint and glare for the first ten years of the development has not yet been specified, therefore it is unknown whether the current visualisations include a reasonably accurate rendering of it. Nor have the Applicant's provided any visualisations of the expected impact during the construction phase or highlighted changes to the landscape character from tree felling / site clearance.

I do not think that the Applicants have met the requirements of the Visual Representation of Development Proposals LI TGN 06/19, Section 1.2.9 which states "Visualisations should provide the viewer with a fair representation of what would be likely to be seen if the proposed development is implemented and should portray the proposal in scale with its surroundings. In the context of landscape / townscape and visual impact assessment, it is crucial that visualisations are objective and sufficiently accurate for the task in hand. In short, visualisation should be fit for purpose."