

Appendix 5: ZTV Mapping

- 1.1 A number of Zone of Theoretical Visibility (ZTV) maps have been generated in order to better understand the likely extent of the surrounding landscape across which the Proposed Development would be visible.

Limitations

- 1.2 A Zone of Theoretical Visibility, as the name implies, is not an absolute indication of the extent of visibility but rather a computer-generated aid that utilises available relative data to indicate areas of inter-visibility and screening in relation to a specific modelled object. The technique aims to give a better understanding of the areas where visibility is likely and unlikely but imperfections in data are such that it must only be seen as an aid to understanding. This limitation needs to be recognised when interpreting the ZTVs.

Data Source

- 1.3 The ZTV was generated using a commercial Aerial Photography-derived 2m Digital Surface Model (DSM), produced by Getmapping (<https://www.getmapping.com/>). This dataset consists of a series of spot levels across the study area at 2m intervals. The declared 'root-mean-square error' (RMSE) of this dataset is approximately 50cm, i.e. the degree of error between the actual on-the-ground height of any particular location and the height as indicated by the DSM is approximately 50cm. Further information about how the DSM dataset is derived can be found on the Getmapping website¹.
- 1.4 The DSM takes account of the presence of landform as well as all of the buildings and vegetation elements that were present within the landscape at the time the source aerial photography was taken (in the case of the study area this was in 2009).
- 1.5 Use of this type of DSM to generate the ZTV results in a more realistic output than from those derived from the more commonly used 'bare-earth' digital terrain model (DTM) data, which is based purely on the landform and does not include buildings or vegetation.

¹ <https://www.getmapping.com/products/height-data/height-data-getmapping#faq> <accessed 04 Jan 2019>

- 1.6 Whilst more realistic than a DTM, a DSM dataset nonetheless has its limitations. In addition to the above mentioned 50cm RMSE error, the dataset reflects the presence of buildings and vegetation as observed from the air at a particular point in time, in this case during 2009. The extent and/ or height of vegetation cover is dynamic and will inevitably have changed in the nine years that have elapsed since this date as vegetation variously grows in stature and/or is planted, trimmed or removed. Similarly, there is potential for buildings to have been erected, demolished or modified.

Verification

- 1.7 A field visit was undertaken to verify whether the heights of specific areas of vegetation seemed to be reflected in the DSM with a reasonable degree of accuracy. Areas of significant tree cover along Station Road, Chirk, and along the canal cutting west of the Kronospan site were visited and it was established that vegetation heights observed on the ground in 2017 (and hence the contribution of this vegetation to screening of views) were similar to what was recorded in the DSM.

Enhancement to DSM

- 1.8 Accurate three-dimensional data is held by the Applicant for the existing structures at the Kronospan site. This data was added manually to the DSM, in order to ensure that the presence of these was reflected as accurately as possible in the ZTV output.

ZTV creation

- 1.9 The ZTV was calculated and created using LSS software, produced by McCarthy Taylor Systems Ltd. The ZTV calculation process within LSS takes account of the curvature of the earth's surface and light refraction. The eye height of the receptor in the computer model was set at a conservative 2m above ground level.
- 1.10 Two ZTV's were calculated. The first was produced to illustrate the theoretical visibility of some of the taller structures at the existing Kronospan site, specifically the existing CHP Stack, WESP Stack and MDF Cyclones (the three tallest structures). A second ZTV was then produced for the Proposed Development. Comparison of these two ZTV's illustrates that, as might be expected, the Proposed Development would be visible across a lesser extent of the surrounding landscape than the existing taller elements on the site. These two ZTVs are presented as Figures 1 and 2 in this appendix.

- 1.11 Figure 3 is a combined ZTV, with Figure 1 overlaid onto Figure 2. Any areas shaded blue on this Figure illustrate those areas from which there is theoretical visibility of the proposed development but not of the existing tallest elements on site. NB This is not to say that other elements of the existing Kronospan site are not visible from areas shaded blue, as some of the extensive factory buildings east of the tall stacks are likely to be visible from these locations.

ZTV modifications

- 1.12 The DSM does not distinguish between the ground surface and the surface of structures and vegetation. As a consequence, the initial ZTV output indicated visibility from areas known to be occupied by woodland and buildings. Whilst in theory it may be possible for people to experience the views from such locations (by climbing onto roofs or into the tops of trees), this is not representative of typical day to day visibility, and as such has the potential to significantly over state visibility.
- 1.13 In order to improve this anomalous output, a manual exercise has been undertaken in which the majority of buildings outside the Kronospan site boundary, and the principal areas of mature vegetation have been removed from the image of the ZTV by shading over them in solid white on the ZTV Figures. It has not been practical to identify every single tree and structure and so the ZTV remains subject to a degree of inaccuracy in this regard and the extent of visibility is likely to be somewhat overstated as a consequence.