CAPITA

# Appendix B

## B.1 Sensitivity testing

### *B.1.1 Grid sizes*

The flood hazard assessment undertaken for the Treforest LDO area was performed by dividing the area into a grid comprised of 50m$^2$ sub-areas and examining the flood hazard for each grid. Prior to selection of this size of sub-area, a total of three grid areas were considered: 100m$^2$, 50m$^2$ and 20m$^2$. The three sub-area sizes and the associated grid size overlaid on top of a portion of OS mapping is shown in Figures B-1 – B-3.

**Figure B-1 - Treforest Industrial Estate LDO in 100m$^2$ grids and grid overlaid on OS Map**

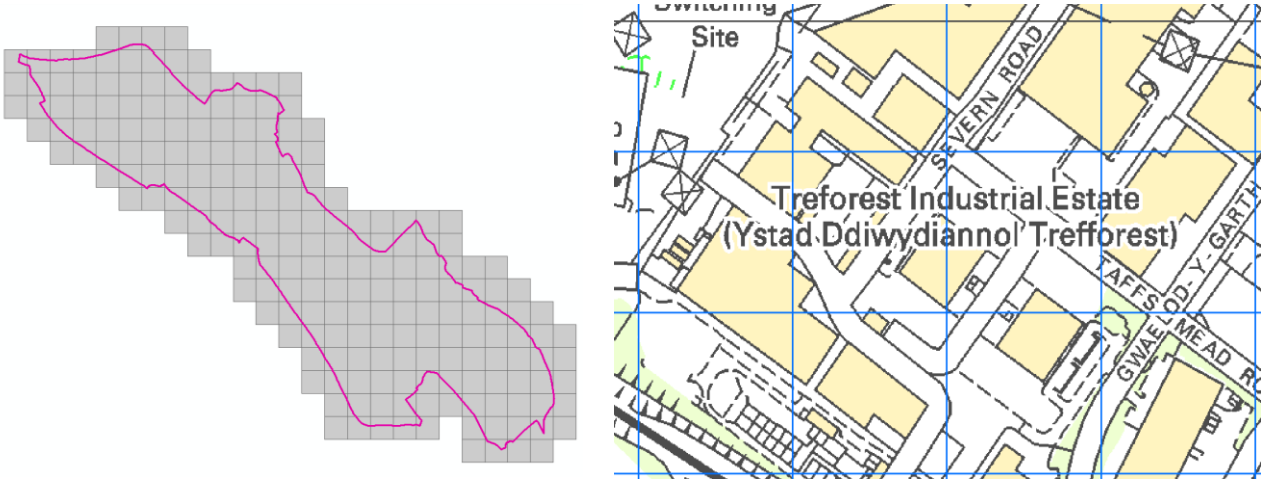



**Figure B-2 - Treforest Industrial Estate LDO in 50m$^2$ grids and gird overlaid on OS Map**

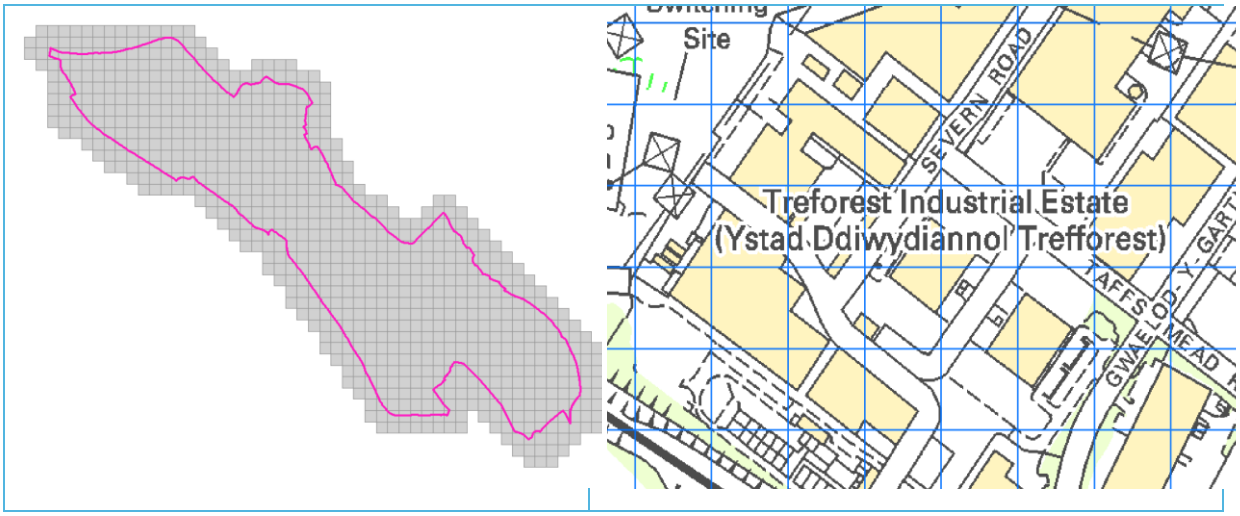
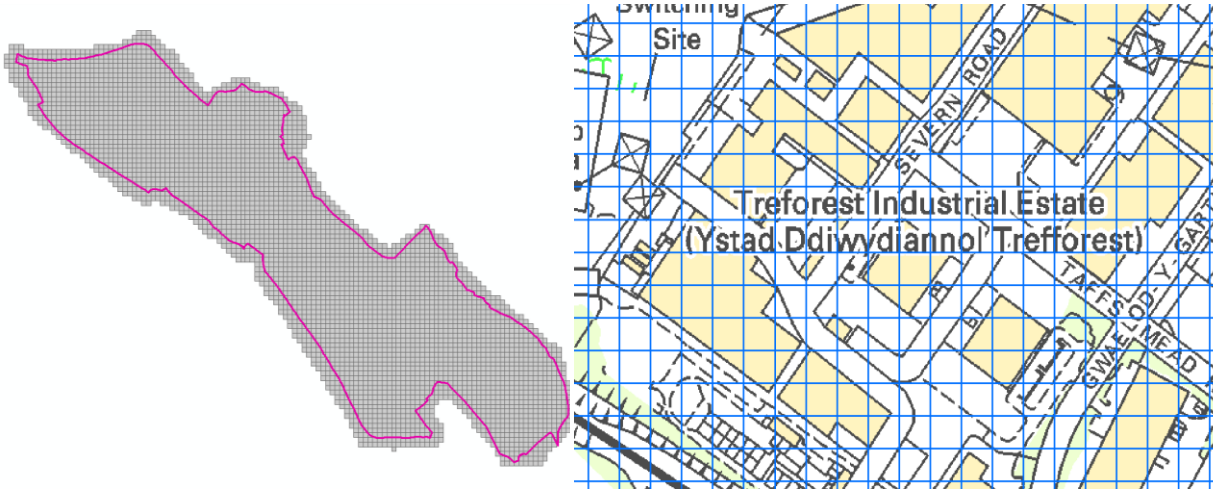



**Figure B-3 - Treforest Industrial Estate LDO in 20m$^2$ grids and grid overlaid on OS Map**




Following a review of the three grid sizes it was concluded that the small format grids (20m$^2$ area) may make identification of the Zone(s) applicable to a proposed development difficult as multiple

zones may be identified adjacent to one another in a relatively small area. The small grids may indicate that small portions of a site lie within a higher risk zone, which may trigger more rigorous development proposal submission requirements, whereas only a small portion of the site falls within a higher risk zone. It was concluded that this size provided too fine a resolution assessment, whereas a grid size more suited to evaluate submissions on a development scale was desired.

A larger gird size (100m$^2$ area) was then assessed, as shown in Figure B-1. This size, however, was determined to be too large as large blocks of existing properties can be seen lying within 1-2 grids. It was concluded that this size may underestimate or overestimate the flood hazard for a large area, as hazard ratings would be averaged over a much larger area. Following this review, a grid size between the two initial sizes (50m$^2$ area) was selected as the best size for use in assessing the flood risk for the Treforest LDO area.

### *B.1.2 Weightings*

When developing the Treforest LDO Development Advice Map additional consideration was given to the hazards associated with more frequent return period events. As such weighting factors were applied to the hazard values calculated for each of the 50m$^2$ sub-areas assessed within the Treforest LDO area. These weightings were applied in order to adjust the greater hazard figures associated with the 1% AEP flood event and greater magnitude events would tend to skew the averaged hazard rating for each 50m$^2$ sub-area.

Weighting factors were initially set at values that would significantly increase the hazard ratings associated with more frequent return period events whilst also significantly reducing the values associated with less frequent events. The initial weightings are summarised in Table B-1 below.

**Table B-1 – Initial Flood hazard rating weighting factors**

| Flood frequency | 20% AEP | 10% AEP | 5% AEP | 2% AEP | 1.5% AEP | 1% AEP | 1% +CC AEP | 0.5% AEP | 0.1% AEP |
|---|---|---|---|---|---|---|---|---|---|
| Weighting factor | 20 | 10 | 5 | 2 | 1.5 | 1.2 | 1 | 0.5 | 0.1 |

As seen in Table B-1, the hazard rating for 20% AEP events would be multiplied by a weighting factor of 20, whereas for events rarer than the 1%+CC AEP the standard hazard rating would be reduced half for the 0.5% AEP event and one-tenth for the 0.1% AEP event. Applying these weighting factors results in the weighted hazard values in Table B-2.

**Table B-2 – Final Flood hazard rating weighting factors**

| Sub-area code | Hazard Ratings | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Flood frequency | | | | | | | | | Average |
| | 20% AEP | 10% AEP | 5% AEP | 2% AEP | 1.5% AEP | 1% AEP | 1% +CC AEP | 0.5% AEP | 0.1% AEP | |
| K2 | 342.5 | 187.1 | 98.8 | 43.2 | 32.7 | 27.0 | 24.1 | 12.0 | 3.1 | **85.6** |
| K3 | 0 | 0 | 0 | 3.1 | 2.7 | 2.6 | 4.5 | 2.0 | 0.9 | **1.8** |
| K4 | 0 | 0 | 0 | 0 | 0.9 | 0.8 | 2.5 | 1.0 | 0.6 | **0.7** |

After applying the weighting factors in Table B1, the resulting weighted hazard ratings and average values were reviewed. This review observed that the weighting factors greatly distorted the hazard for the more frequent events, and created large gaps in the average hazard ratings. This is observed when comparing the average hazard rating for sub-area 'K2' to the adjoining cells (85.6 for K2 vs 1.8 and 0.7 for K3 and K4 respectively).

In order to reduce the large variations in hazard rating values various iterations of weighting factors were applied and the outputs reviewed. Following this sensitivity analysis process, a series of weightings were identified that provided the desired increase in consideration given to the hazard posed by more frequent events whilst not entirely dismissing the hazard associated with the rarer return period events. These final weighting factors are provided in Table B-3.

**Table B-3 – Final Flood hazard rating weighting factors**

| Flood frequency | 20% AEP | 10% AEP | 5% AEP | 2% AEP | 1.5% AEP | 1% AEP | 1% +CC AEP | 0.5% AEP | 0.1% AEP |
|---|---|---|---|---|---|---|---|---|---|
| Weighting factor | 7.3 | 4 | 2.3 | 1.3 | 1.2 | 1.1 | 1 | 0.75 | 0.25 |

Following application of these weighting factors, the hazard ratings for the same sub-areas 'K2' through 'K4' are shown in Table B-4 below.

**Table B-4 – Final Weighted hazard ratings for each flood frequency event for a sample number of sub-areas**

| Sub-area code | Hazard Ratings | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Flood frequency | | | | | | | | | Average |
| | 20% AEP | 10% AEP | 5% AEP | 2% AEP | 1.5% AEP | 1% AEP | 1% +CC AEP | 0.5% AEP | 0.1% AEP | |
| K2 | 125 | 75 | 46 | 29 | 25 | 24 | 24 | 18.0 | 7.7 | **41.6** |
| K3 | 0 | 0 | 0 | 2.1 | 2.1 | 2.3 | 4.5 | 3.0 | 2.3 | **1.8** |
| K4 | 0 | 0 | 0 | 0 | 0.7 | 0.7 | 2.5 | 1.5 | 1.6 | **0.88** |

As shown in Table B-4 the 20% AEP event is given greater emphasis, but does not result in such a large hazard rating for the 'K2' sub-area. The lower value also has a less distortive effect on the average.

Following completion of the sensitivity analysis process and selection of the weightings in Table B-3, they were applied to assess the hazard for the entire Treforest LDO area.