A proliferation of 3D geological models has been created by the British Geological Survey (BGS) over the last 15 years, following significant developments in software, hardware and modelling methodology. Modelling of the subsurface by the BGS has been widespread, ranging in depth from 1m to 15000m, and covering areas in the orders of 0.1 km2 to 100 km2. These models have been produced to increase our understanding of the subsurface environment and to help us communicate issues pertaining to it, such as geological hazards, water protection and resource management. For these reasons, particular focus has been drawn to the major urban areas of the UK such as the Lower Mersey Corridor (Liverpool to Manchester), the Clyde basin (Glasgow and surrounding region) and Thames basin (London and surrounding region). This has led to the development of a number of overlapping models in these regions and, since these models have been created for specific purposes and at varying scales, there has been little consideration given to ensuring that the individual geological surfaces within them are consistent from one model to another. Methodology has now been developed through the Thames Basin Cross- Cutting Project to amalgamate multiple versions of individual geological surfaces taken from existing 3D models, some of them overlapping, into a series of unified surfaces that represent the preferred geological interpretation at any given set of coordinates. The methodology alleviates some of the issues that have arisen with the existing models, such as different scales of overlapping surfaces (expressed as cell or mesh size), and the use of different subsets of the available records (boreholes/seismic reflection profiles/geological maps), commonly with different interpretations. This methodology has been tested on four key horizons within the Thames basin catchment area which are the stratigraphic tops and bases of the Lambeth Group and Chalk Group. The unified surfaces will provide a consistent representation of the subsurface for use by other modelling disciplines, including groundwater science. They will contribute to a whole-systems approach to climate change research, structural modelling, process modelling and palaeoclimate studies. They will also provide a starting point for future geological modelling that takes account of the work already done for existing 3D models, rather than one that goes back to the original data.