A three-dimensional shear wave speed model for the upper mantle beneath the Australian continent and its surrounding region is constructed from multi-mode surface wave dispersion. A large number of phase speed data measurements from both Love and Rayleigh waves covering the entire Australian continent allows us to extract lateral heterogeneity as well as radial anisotropy with extended horizontal and vertical resolution. We employ a fully automated technique of multi-mode dispersion measurements with a nonlinear waveform fitting based on a direct model-parameter search using the Neighbourhood Algorithm. This approach is applied to long-period three-component records of seismic stations in the Australasian region over the period from 1990 to 2008, using the networks reporting to IRIS, as well as portable seismic arrays deployed by the Australian National University. The path-specific phase speeds are inverted to produce multi-mode phase speed maps incorporating approximate finite-frequency effects via the surface-wave influence zone, within which surface waves can be considered to be coherent in phase. A 3-D radially anisotropic shear wave speed model is then obtained from simultaneous inversions of local dispersion curves of multi-mode Love and Rayleigh waves. The new 3-D model indicates a good correlation of fast shear wave speed anomalies with regions of Archaean and Proterozoic cratons in the western and southern Australia down to a depth of about 200 km. The subduction of the Australian plate in the north beneath Indonesia has also been mapped clearly owing to the enhanced vertical resolution with the higher mode information.