The Old Ammassuo Landfill (Espoo, Finland) covers an area of 52 hectares and contains about 10 million tonnes of waste that was landfilled between 1987 and 2007. The majority of this waste was mixed, of which about 57% originated from households. This paper aims at describing the management of the Old Ammassuo Landfill throughout its operational lifetime (1987-2007), and at developing an environmental evaluation based on life-cycle assessment (LCA) using the EASEWASTE-model. The assessment criteria evaluate specific categories of impact, including standard impact categories, toxicity-related impact categories and an impact categorized as spoiled groundwater resources (SGR). With respect to standard and toxicity-related impact categories, the LCA results show that substantial impact potentials are estimated for global warming (GW), ozone depletion (OD), human toxicity via soil (HTs) and ecotoxicity in water chronic (ETwc). The largest impact potential was found for SGR and amounted to 57.6 person equivalent (PE) per tonne of landfilled waste. However, the SGR impact may not be viewed as a significant issue in Finland as the drinking water is mostly supplied from surface water bodies. Overall, the results demonstrate that gas management has great importance to the environmental performance of the Old Ammassuo Landfill. However, several chemicals related to gas composition (especially trace compounds) and specific emissions from on-site operations were not available or were not measured and were therefore taken from the literature. Measurement campaigns and field investigations should be undertaken in order to obtain a more robust and comprehensive dataset that can be used in the LCA-modelling, before major improvements regarding landfill management are finalized.