Forward osmosis (FO), based on the phenomenon of osmosis, is a breakthrough technology for concentrating different feeds including domestic sewage. Globally, sewage treatment facilities are increasingly focusing on recovery of resources such as water, nutrients (nitrogen and phosphorus) and energy from sludge. In this context, FO can be applied for sewage up-concentration followed by nutrients recovery from the concentrated stream. Using biomimetic aquaporin membranes (thin film composite FO membranes incorporating aquaporin proteins), this work investigated divalent magnesium chloride as draw solution for sewage concentration. The effect of crossflow velocity and draw concentration on water recovery, rejection of organics and nutrients and membrane fouling was studied. Higher draw solution concentration and cross flow velocity enhanced water recovery but concentration of organics (as chemical oxygen demand, COD) remained unaffected. Over 24 h, an average water flux of 5.3 L/m² h was obtained with recovery of water (57%), phosphate (75%), ammonia (66%) and organics (73%). Membrane fouling was confirmed by zeta potential and ATR-FTIR analysis. Membrane cleaning was required after every 24 h cycle to restore the performance. The findings indicate that sewage concentration by FO with divalent magnesium chloride draw solution is promising for water and nutrients recovery.