

Hazel Clemens: Master's project

My Master's project is to investigate how viruses are transported from on-site wastewater treatment systems (OWTS) through the soil below. Viruses in wastewater discharged to land may contaminate groundwater. I will examine how viruses move through free-draining Canterbury soils to understand the risk of groundwater contamination.

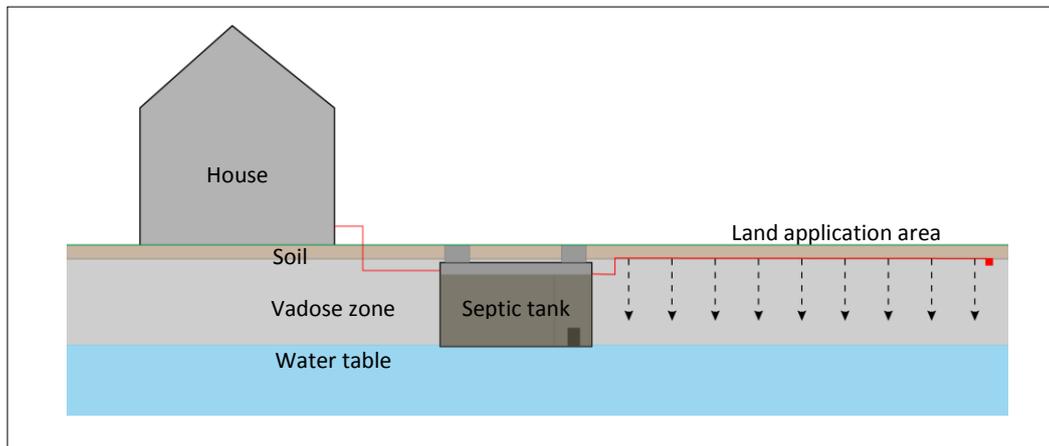


Figure1. Domestic on-site wastewater treatment system. Wastewater is discharged to the soil from the septic tank via the land application system. Contaminants in the wastewater, including viruses, can travel through the soil and vadose zone and reach groundwater

Why is this research needed?

Discharge of domestic wastewater from OWTS releases pathogens to land via disposal fields and land application systems. These pathogens, including viruses, enter the soil and may be transported through soil into groundwater posing a risk to public health. This is of particular concern in areas where discharges are in close proximity to drinking water supply wells. Many households that have an OWTS also have a drinking water supply well.

Appropriate separation distances between OWTS's and groundwater can reduce the risk of pathogens contaminating drinking water supplies. OWTS's are required to have a minimum vertical separation distance of 0.6m to the groundwater table. This vertical separation distance does not consider virus contamination in groundwater, but is based upon faecal bacterial indicator *Escherichia coli*. Bacterial indicators such as *E.coli* are not necessarily appropriate indicators of pathogenic viruses. To mitigate the risk of virus transport from OWTS's the Institute of Environmental Science (ESR) established the '*Guidelines for separation distances based on virus transport between on-site domestic wastewater systems and wells*'. These guidelines are limited by a shortage of relevant data for pathogen removal in local soils, resulting in overly conservative separation distances.

My research aims to investigate transport of pathogens, specifically viruses, through soil and the vadose zone. The goal is to improve current separation distance guidelines. Dr Louise Weaver (senior scientist at ESR) and Dr Leanne Morgan (University of Canterbury) will guide me in carrying out intact core experiments using Canterbury soils.