Background: The Vetiver System (VS) is dependent on Vetiver Grass with reported high evapotranspiration (ET) rates & biomass production (Fig. 1).

Objectives: Obtain data on VS performance & operating parameters including:
- ET performance (wastewater / leachate disposal, & sludge dewatering);
- Carbon (C), nitrogen (N) & phosphorous (P) assimilation performance;
- Impact on performance from water/nutrition availability, climate & salinity;
- Other N, P & pathogen treatment processes in the ebb & flow VS.

Method: Rain gauges, Lysimeters & evaporators (Figs. 2-7), were used to find relative ET & net disposal rates (8 – 11, 13). Pre / post treatment wastewater analysis, dry yields, & tissue analysis were used to find assimilation rates, & contribution of soil processes to treatment (Fig. 12, 14 - 15, 17). Current carbon prices were used to evaluate potential CO2e sequestration income (Fig. 16).

Results & Discussion: Results are given in Figures 8 – 17. Key findings include:
- Highest ET performance achieved in drained nutritious soil (Figs. 8 – 9) indicating beneficial net annual disposal rates (Fig. 13).
- Saline landfill leachate irrigation resulted in rapid VS failure (Figs. 10 - 11).
- High P, N & C assimilation rates (Fig. 12, 14 - 15 & 17) & further soil treatment of N & P (Figs. 14 - 15) was achieved. Soil treatment reliably reduced E. coli to ≤10 cfu/100ml.
- High biomass production (Fig. 12) indicates good potential for carbon sequestration farming (Fig. 16 - 17).
- The solar edge effect in these studies is likely to have amplified performance.

Conclusions: Studies indicate VS is suitable for wastewater disposal, biosolids dewatering, and N, P & pathogen treatment. VS is unsuitable for treatment or disposal of typical Perth landfill leachates. Exceptionally high root biomass production indicates VS could also make a significant contribution to carbon sequestration. This could generate significant carbon farming income in Australia should a carbon pricing mechanism be introduced. These preliminary studies have demonstrated the research value of upsize field studies.

Further Research: Proposals for currently estimated $1.8m upsize field studies are currently being prepared. These will control for edge effect, & incorporate lessons learned for improved repeatability & significance of statistical analysis. Further research will also contribute to establishment of reliable methods of VS carbon accounting. This is necessary for a regulatory framework to incentivise VS carbon farming in an accelerated timeframe. Expressions of interest in these studies should be directed to the team below.