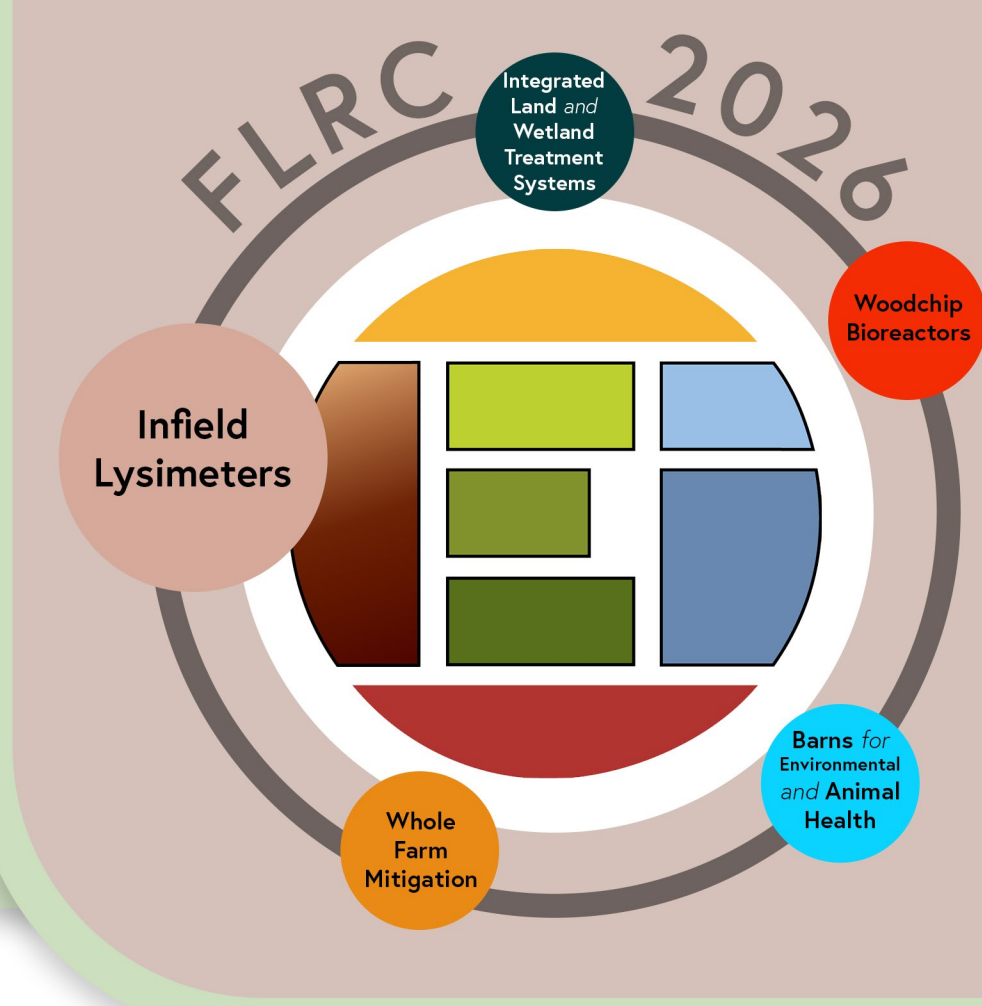


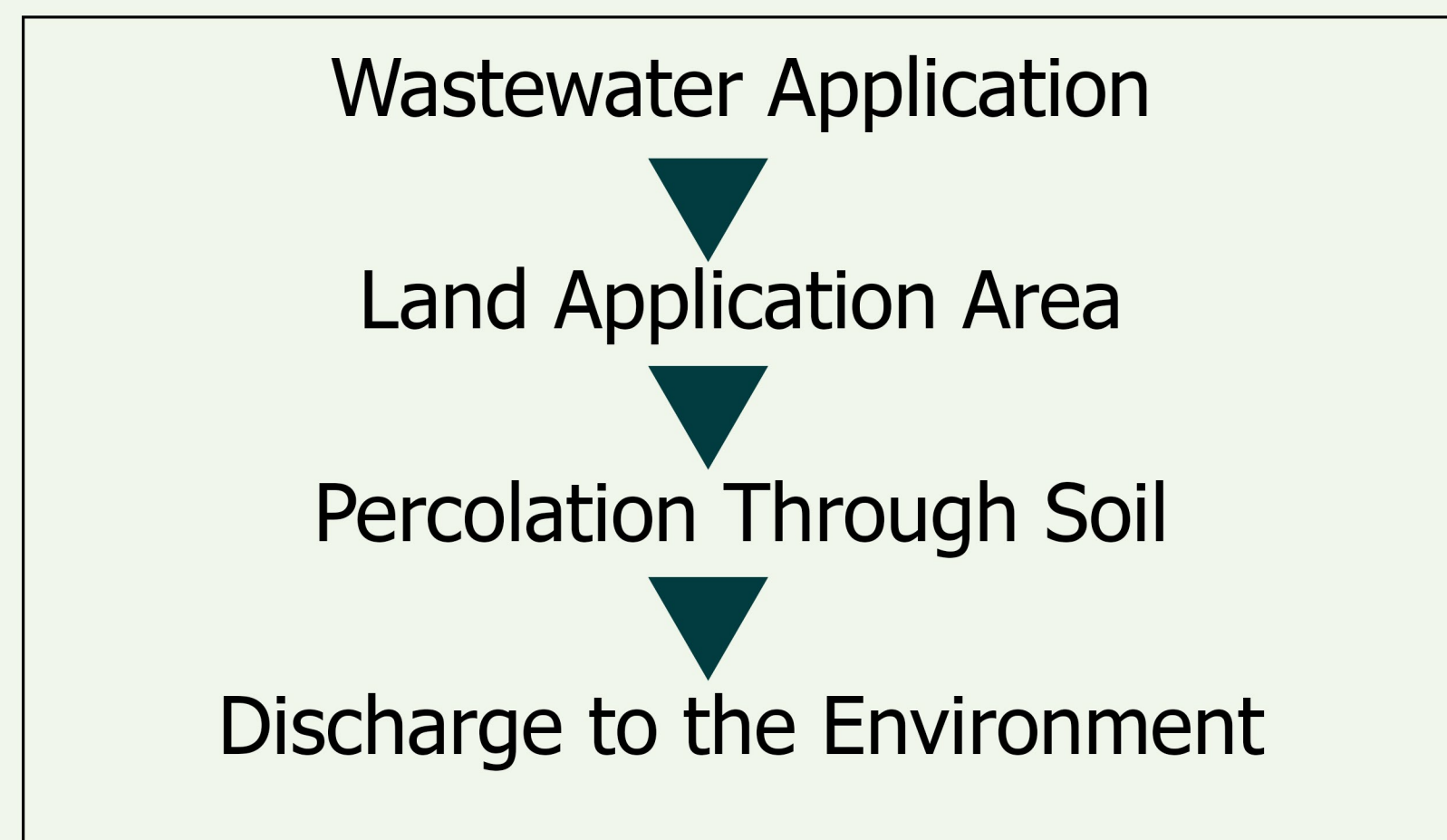
# What You Get *from* Infield Lysimeters *at an* Industrial Site

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## Outline



## Objective

- To monitor water and nitrogen behaviour using on-site lysimeters to support system performance assessment, consent compliance, and optimisation of irrigation management.

## Introduction

- Wastewater generated at the **meat processing plant** is irrigated to land
- Current Resource Consent conditions for the discharge include installation management, data capture and recording information collected from the lysimeters

## Methodology

### Wastewater Irrigation

- Five irrigation blocks (Figure 1)
- 2012 to 2023: Travelling irrigators; and in 2023, 8 centre pivot irrigators were installed
- From June 2024: Application depth shall not exceed 15 mm/day, and average application depth of 5 mm/day in any 7-day period
- Average N load applied: 286 kg N/ha/y

### Lysimeters

- Paired lysimeters, with a capture area of 0.0314 m<sup>2</sup>
- 20 shallow lysimeters: installed in the root zone (depth: 300 mm)
- 21 deep lysimeters: installed beyond root zone (depth: 600-750 mm)

### Soils

- Four blocks: well-drained allophanic soils
- One block: perched-gley soil



Figure 1: Irrigation Layout and Location of Lysimeters

## Results

- Higher drainage volume and nitrogen removal in shallow lysimeters than deep lysimeters due to plant uptake
- Seasonal patterns were evident, with higher drainage volume and N losses in winter than summer
- Nitrate leaching from control lysimeters were close to 30.1 kg N/ha/y for LUC 1 in the Tukituki Plan Change 6<sup>1</sup>, and in the range of leaching under grazed pasture (25 to 30 kg N/ha/y)<sup>2</sup>
- Nitrate leaching from shallow and deep lysimeters with irrigation were on average 131 and 68 kg NO<sub>3</sub><sup>-</sup>-N/ha, respectively

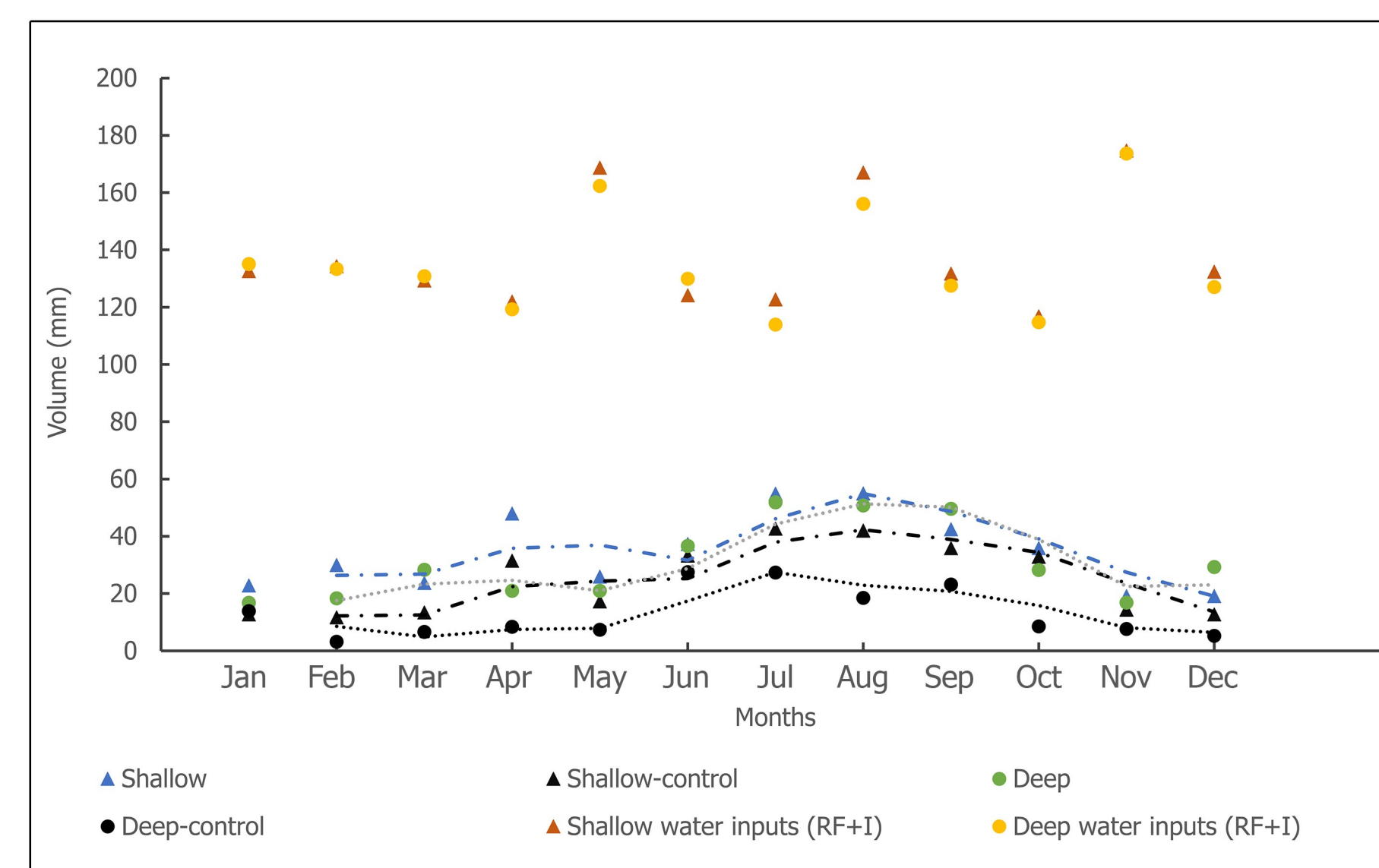


Figure 2: Average monthly drainage volume (mm) and average monthly irrigation depth for shallow and deep lysimeters (the solid and dash lines are an average trendline for shallow and deep lysimeters, respectively); (RF+I: rainfall and irrigation)

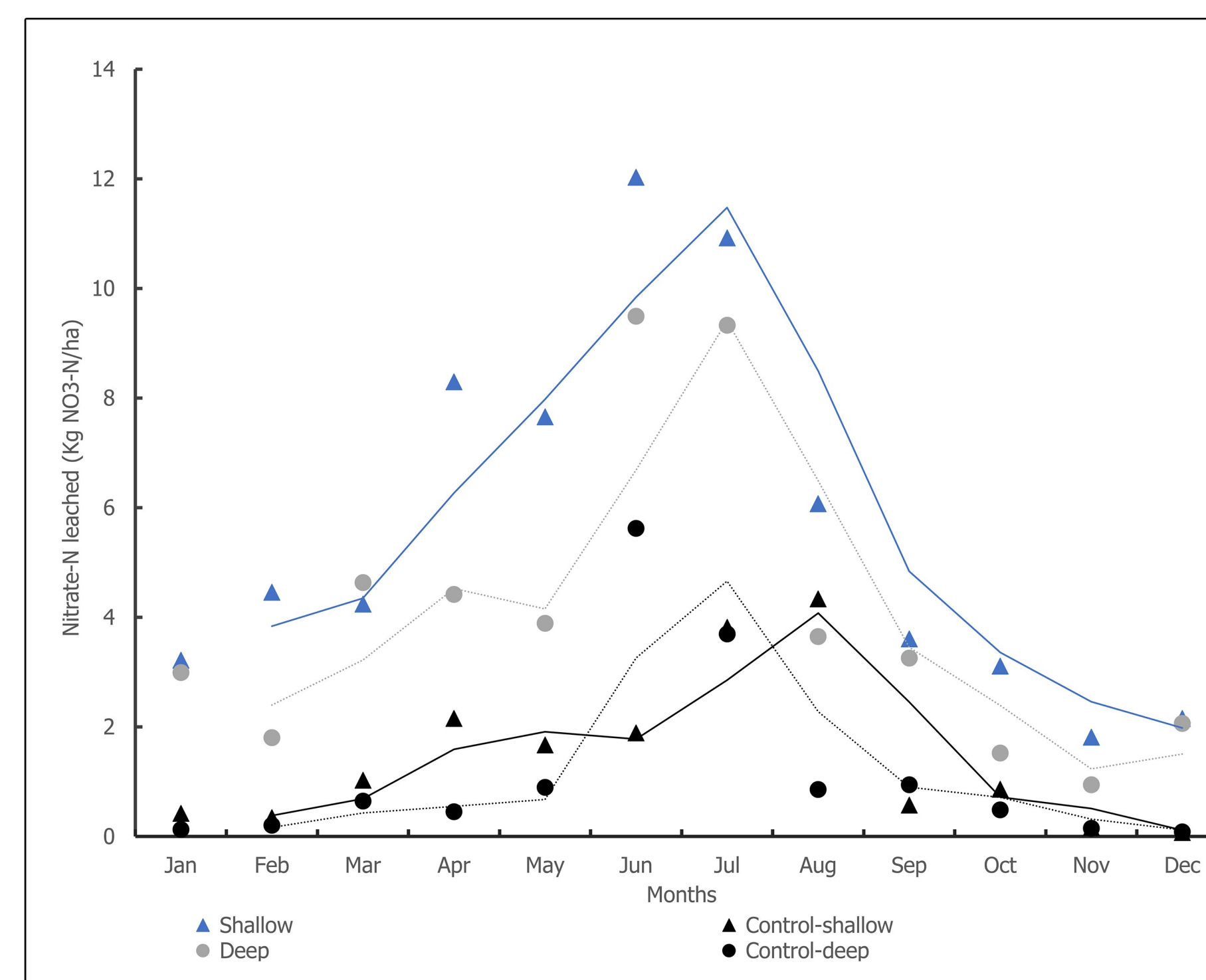


Figure 3: Average mass of NO<sub>3</sub><sup>-</sup>-N (kg NO<sub>3</sub><sup>-</sup>-N / ha) loss per month (the solid and dash lines are average trendlines)

## Conclusion

- Paired lysimeters at different depth provide an assessment of the effects of plant uptake and deeper drainage on water and nutrient movement

### Lysimeters on site:

- Can give reliable, real-time information on how irrigation of wastewater is managed
- Provide results that are consistent with published data
- Generate valuable data for consent compliance, optimisation of the system, and guiding future design or operational changes
- Need to be managed with certain level of maintenance
- To interpret the data appropriate expertise is required

### References

<sup>1</sup>Plan Change 6 to Hawke's Bay Regional Resource Management Plan- Tukituki River Catchment, October 2015.

<sup>2</sup>Cameron, K.C. & Di, H.J. (2013). Nitrogen losses from the soil/plant system: a review. Ann Appl Biol, 162: 145-173. <https://doi.org/10.1111/aab.12014>