



BIOSCIENCE PTY LTD ABN 26 547 517 746

488 NICHOLSON ROAD FORRESTDALE WA 6112
PO BOX 5466 CANNINGVALE SOUTH WA 6155
PHONE (08) 9397 2446 FAX (80) 9397 2447
EMAIL bioscience@biosciencewa.com
WEB www.biosciencewa.com

Anthony Sutton
Executive Director
EPA Services
168 St Georges Terrace
Perth WA 6000

Dear Mr Sutton,

RE: CMS17475 NOTICE REQUIRING FURTHER INFORMATION – PIVOT IRRIGATION SYSTEM RESEARCH

I am providing the requested information.

Spatial Data:

The following shapefiles are provided: property boundary, lot boundary (development boundary for stage 1), infiltration test locations, proposed area of irrigated pasture/ area of pivot (indicative), proposed spoon drain surrounding irrigated area (indicative), proposed vegetated capturing structure for runoff (indicative), proposed monitoring bore locations for two pairs of nested bores and two single bores (indicative locations), proposed locations of lysimeters (indicative).

Nutrient management:

The objective of this project is to develop means to ensure that there is no significant nutrient leaching into the estuary while at the same time increase the economic potential of the primary sector in the Peel Harvey Catchment and to demonstrate and quantify the optimisation of best practice in environmental and sustainable management for fertilised and irrigated pasture production. Multiple measures are to be taken to minimise the potential of nutrient export.

The first step is to amend the soil on the site (Bassendean Sand), which is currently not showing high nutrient retention. The soil within the irrigated area will be amended with clay, spongolite, and/or Iron Man Gypsum. The soil within the irrigated area will have a PRI of at least 10. As modelling from the Department of Water (WST 33) has shown, increasing the PRI of soils to a PRI of 10 within the Peel Harvey Catchment decreases the nutrient export markedly. The proposed soil amendments improve the water holding capacity of the soil and reduce runoff. This project will optimise materials used and application rates to understand maximum assurance while enabling plant productivity.

Pasture production requires fertiliser input. The maximum phosphorous (6.5 kg/ha/yr) and nitrogen (45 kg/ha/yr) input rates recommended by the Department of Water and Environmental Regulations will not be exceeded unless mass balance calculations demonstrate that at least 90% of these values have been exported from the site, or are in the form of stable biomass. Predominantly, pasture will be cut and baled as silage for export to other Kelliher farms. The removal nutrients can be determined through leaf tissue analysis. Another important part of nutrient mass balance is the role of soil microflora which increase nutrient cycling and retention. This will be quantified through this proposal.

The advanced technology in nutrient application by foliar spray enables precise management of nutrient application and increases fertiliser use efficiency. By using foliar spray including adjuvants for the application of phosphorous when the leaf index is high, we anticipate that 70-80% of the applied phosphorous is taken up by foliage, rather than applied to soil.

Modern software to manage and remote control pivot irrigation enables real-time control of irrigation and fertigation according to current weather conditions, soil moisture and the development stage of



the crop. The use of continuous monitoring soil moisture probes will minimise subsurface saturation as irrigation is managed based on data retrieved from probes. Our proposal involves monitoring both upgradient and downgradient groundwater and surface water levels and quality, thus enabling quantification of possible baseflow nutrient export.

The real-time management of irrigation control enables immediate stop of irrigation at rising soil moisture to prevent runoff. However, to accommodate runoff, a spoon drain is proposed around the pivot area. The spoon drain collects and directs runoff to a vegetated water retention basin to strip off nutrients before infiltration. Soils on the site have shown great water infiltration of up to 125 mm/h, much more than a pivot irrigator can apply (maximum of 11 mm/day).

Flora and Vegetation:

Historically, the site has been cleared for grazing livestock. In the proposed area for the pivot, remnant vegetation which includes scattered *Melaleuca preissiana* and sedges will be cleared to incorporate soil amendments to lift phosphorous retention of the soil. The irrigated area will be planted with deep-rooted pasture grasses and legumes. Water retention basins outside pivots will be vegetated such that there is no net loss of native vegetation.

Stakeholder Consultation:

A preliminary meeting with the Shire of Murray, Department of Primary Industries and Regional Development, Department of Water and Environmental Regulation, the Peel Development Commission and the Peel Catchment Council to explain the intention and features of the project was held on 16 February 2016. Main concerns raised were the management of runoff from pivot irrigation, the risk of export of nutrients and the monitoring of nutrients. These issues were addressed in the first version of the Nutrient and Irrigation Management Plan that was given to the Shire of Murray for comments. After circulation of the draft to regulatory authorities, feedback via the Shire of Murray led to further elaboration and explanations before lodging the final version of the development application including a Nutrient and Irrigation Management Plan. The communication between Bioscience and the Shire of Murray is attached.

Approvals:

A development application was submitted to the Shire of Murray on 30 July 2018. The filled-out form is attached to this letter (unsigned), the signed development application is with the Shire of Murray.

Yours sincerely,

Peter Keating
Managing Director
Bioscience Pty Ltd

November 2, 2018