Department of
Primary Industries and
Regional Development

GOVERNMENT OF
WESTERN AUSTRALIA

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# Agribusiness Development Guidelines

## Site Assessment for Waste Irrigation

## Purpose

This document is written for owners and operators of agribusiness needing to dispose of liquid waste via irrigation. It outlines the key environmental considerations for determining whether a site is suitable for waste irrigation and provides criteria to map the available area within a property.

## Principles

- Agribusiness trade waste needs to be treated separately to domestic wastewater (e.g., from toilets, showers, hand basins and other domestic fixtures).
- The use of leach drains is not a recommended disposal method for agribusiness trade waste.
- Irrigation of trade waste should be the last disposal option, with connection to sewer, evaporation or removal offsite considered the recommended alternatives.
- All waste applied to land should be done without contamination or degradation of soil, groundwater or surface water.

## Disclaimer

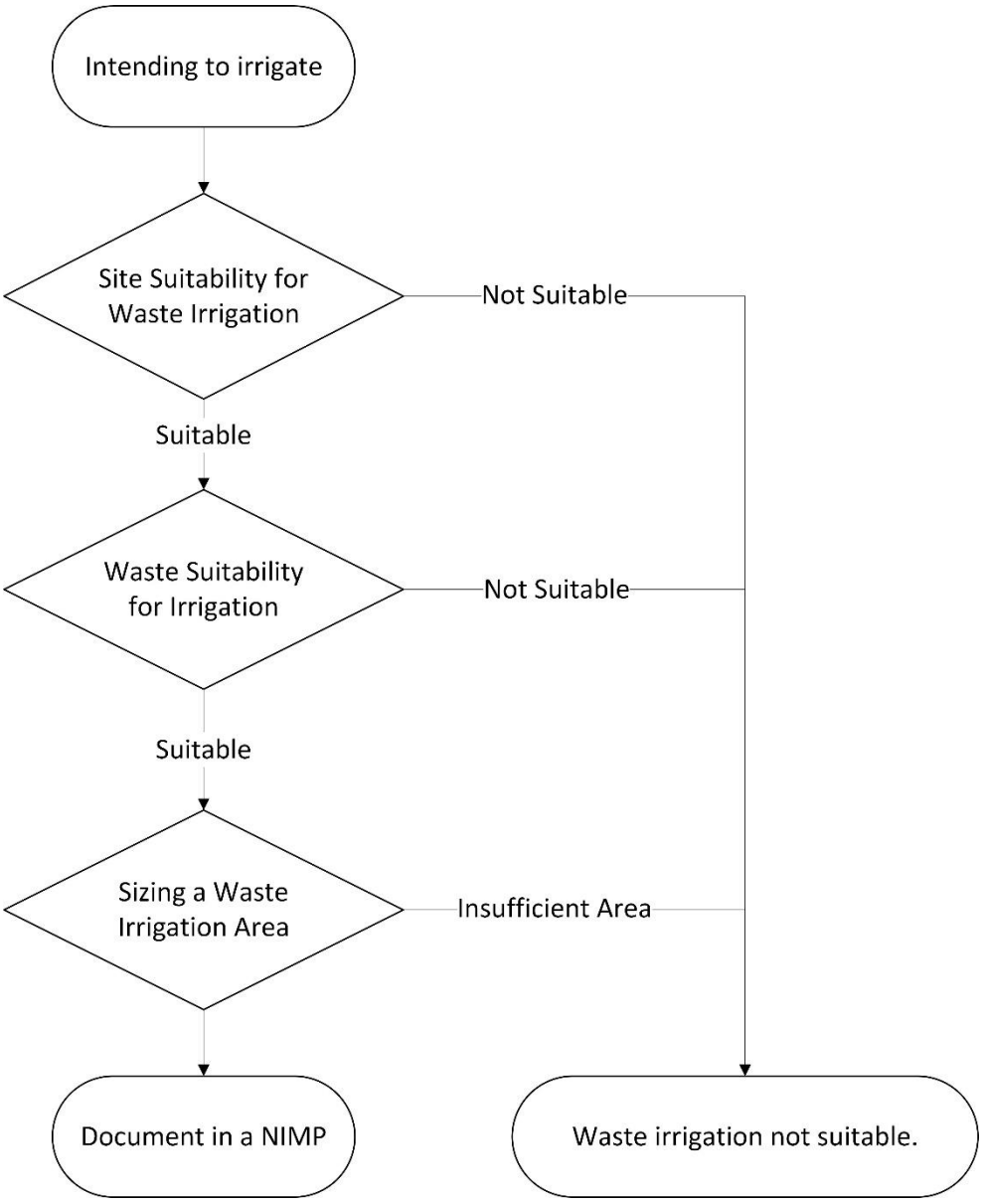
Public amenity factors such as odour, lighting, dust, noise and traffic are important to consider when choosing a site, particularly for large agribusinesses. Therefore, it is recommended that consultation with the Local Government Authority (LGA) and neighbours is done early in the planning process.

This guidance does not consider emissions associated with amenity (ie odour, lighting, etc) or other planning considerations such as land use compatibility or traffic management.

## How to use this document

This guidance is part of a three-document series that addresses environmental factors of irrigation waste disposal.

Whilst each document stands alone to support particular decisions, they should be read together to develop a comprehensive Nutrient and Irrigation Management Plan (NIMP) following the rationale outlined below.




Where waste irrigation is not suitable, seek professional advice or contact agribusiness@dpird.wa.gov.au

# Site assessment

Determining whether a site is suitable is the first step in planning for waste irrigation. There are certain health, environmental and physical constraints that may prevent waste irrigation in some parts of, or in rare cases, the entire property. These constraints are outlined below, where irrigation is not recommended if:

- Separation to groundwater less than 2.0m
- Within a Public Drinking Water Source Area (PDWSA)
- Within 200m of a wetland or estuary
- Within 100m of a watercourse
- On a coastal plain
- Within an Environmental Protection Policy (EPP) area
- Land slope greater than 10% (5.7°)
- Soil thickness less than 0.8m

For difficult locations where these constraints do apply, advanced engineering and management controls can be used. These controls include sophisticated treatment technologies or advanced irrigation controllers.

For example, wastewater irrigation may be appropriate within a PDWSA if the effluent is treated to potable water quality as per the Australian Drinking Water Guidelines (ADWG). Similarly, waste irrigation could occur on a site with inadequate groundwater separation, if sufficient winter storage was available to cease irrigation during the months where groundwater was within 2.0 m of the surface.

However, advanced engineering or management controls should be approached with caution because they often require longer approval timelines, are technically difficult to manage, and often draw a higher level of scrutiny by the regulators. Therefore, a higher level of due diligence during site selection will have a big impact on the overall waste management effort.

## Separation to Groundwater

Adequate groundwater separation[1] is important to prevent nutrient leaching into groundwater and to maintain plant health. Environmental attenuation[2] is greatest in the top 2 meters of the soil profile and movement of contaminants is greatly accelerated when groundwater is in contact.

A seasonal high[3] groundwater separation needs to be measured below the irrigation area.

If on-site monitoring data is not available, groundwater data from existing bores (available online[4]) could be used, provided the following points are considered:

[1] Distance between groundwater and surface.
[2] In this context, this is referring to plant nutrient and water uptake in the root zone, and soil microbial action on nutrients.
[3] For the south-west of WA, this occurs during September/October
[4] http://www.bom.gov.au/water/groundwater/explorer/map.shtml
https://www.wa.gov.au/service/natural-resources/water-resources/water-information-reporting

- Proximity to irrigation area – monitoring bores that are within 1 km of the irrigation area in a relatively flat landscape will give reasonable confidence that groundwater separation is representative.
- Age of data – not older than 5 years.
- Relevance to seasonal high – groundwater levels generally peak at the end of the wet season, which corresponds to September and October for the south of the state. Where a multi-year trend showing the yearly fluctuations is not available, single data points from the seasonal high should be used.
- Number of data points – a single recent groundwater level directly underneath the irrigation area will give good accuracy, however, if proximity, age and relevance to seasonal high are needed then more data points would be required.

The recommended separation to groundwater is 2.0 m while irrigating. This means that a site is generally not suitable for irrigation during periods when groundwater is within the upper 2.0 m of soil profile.

Where the minimum separation distance to groundwater cannot be reached, appropriate monitoring and/or controls may be needed to protect the environment. As an example, 6 monthly-monitoring of groundwater for total nitrogen (N) and phosphorus (P) provide a way to track concentrations in relation to background levels or established water quality guidelines.

Another control is to account for reduced plant yields brought on by waterlogging. Inadequate groundwater separation will likely reduce the maximum plant yields, therefore resulting in lower nutrient offtake. The reduction of yield is highly dependent on plant species, and specialist advice is recommended.

Areas that are known to have rising groundwater trends should be treated with caution. Irrigating these areas may accelerate groundwater rise and subsequent salinity problems.

## Public Drinking Water Source Areas

Public drinking water source areas (PDWSAs) are surface water catchments and groundwater areas that provide drinking water to cities, towns and communities throughout the state. PDWSAs are proclaimed under the Metropolitan Water Supply, Sewerage, and Drainage Act 1909 or the Country Areas Water Supply Act 1947 (Department of Water and Environmental Regulation, 2022).

It is important to check whether your site falls into a PDWSA, as irrigation of waste to land is not permitted in PDWSAs. A statewide map is available here[5,6].

[5] https://catalogue.data.wa.gov.au/dataset/public-drinking-water-source-areas
[6] https://www.wa.gov.au/service/natural-resources/water-resources/public-drinking-water-source-area-mapping-tool

## Proximity to Watercourses, Wetlands and Estuaries

Wetlands and estuaries require a 200 m separation distance from the irrigation area.

Watercourses also need to be considered, however, there are many factors that determine the appropriate separation distance. If intending to irrigate within 100 m of a watercourse, seek site-specific advice to determine whether it is appropriate, and if any additional controls should be in place. This will require knowledge of the intended irrigation scheme including waste volumes and characteristics.

Many Western Australian watercourses only flow for a short time in the wet season (ephemeral), so it is important to identify them early so they are included in your assessment of watercourse proximity. A map of watercourses can be found here[7].

## Coastal Plains

Coastal plains are flat, low-lying areas next to the coast with typical elevations in the 0 - 60 mAHD range. There are many in WA, with the Swan and Scott coastal plains being the most well-known.

The Swan and Scott coastal plains are generally unsuitable for waste irrigation due to the low nutrient holding capacity of the soils and generally low separation to groundwater. If looking to site a waste irrigation scheme within these areas a higher level of analysis should be undertaken, with particular attention to seasonal high groundwater separation.

If looking to irrigate on a coastal plain, additional controls are recommended. Two examples of controls are:

1. Monitoring the capacity of soil to retain P. This can be done using soil tests like P Retention Index (PRI) or unadjusted P buffering index ($PBI_{unadjusted}$)[8]. While it is recommended to collect multiple samples at incremental depths, a sample at 0-10 cm depth often acts as a surrogate for what plants can access to rooting depth. Soil testing data will identify how much P storage capacity remains.
2. Monitoring nutrient levels in nearby groundwater or surface water and comparing with established background levels to track any instances of contamination.

[7] https://catalogue.data.wa.gov.au/dataset/hydrography-linear-hierarchy
[8] Soil sampling and analysis should be undertaken according to guidance provided here: https://fertilizer.org.au/Portals/0/Documents/Fertcare/Fertcare%20Soil%20Sampling%20Guide.pdf?ver=2019-06-17-095413-863


*Figure 1 – Location of the Swan and Scott coastal plains.*

## Environmental Protection Policies (EPPs)

An EPP[9] is an additional layer of environmental regulation that applies within a certain area. Currently, there are two EPPs in force that have relevance to irrigation of wastewater:

1. Western Swamp Tortoise Habitat (Perth, Upper Swan)
2. Peel Inlet – Harvey Estuary

If the development is sited within an EPP area, site-specific professional advice should be sought to determine the additional requirements, and what they mean to the business. An EPP may identify offences and penalties that are beyond the broader environmental legislation for the state.

## Land slope

In erosion-prone areas, the recommended upper limit for land slope is 10% but could be higher on a case-by-case basis.

Wastewater irrigation is not recommended at land slopes greater than 30% as risk of runoff increases dramatically, and additional controls should be in place for irrigation areas that have land slopes between 10-30%.

## Soil

All soil types can be suitable for waste irrigation at appropriate rates. The appropriate irrigation rate is addressed in part 3 of this series, which uses anticipated crop yields for the region and plant water requirements.

For heavier soils the rate of irrigation will be much lower than for sandy soils. Sandy soils drain rapidly, increasing the risk of water and nutrient leaching whilst heavy clay soils drain more slowly, increasing the risk of water and nutrient runoff.

Soils have a higher risk of runoff when they are saturated. Considering both the soil drainage capacity and plant water requirements in irrigation scheduling will minimise offsite risks via leaching or runoff for all soil types and will optimise irrigated wastewater use by plant roots.

Occasionally soils are exceptionally thin, and waste irrigation is not recommended for areas with a soil thickness of less than 0.8m.

Soil type can influence the choice of crop or pasture species as species vary in their sensitivity to pH and adaptation to particular soil textures.

[9] https://www.epa.wa.gov.au/environmental-protection-policies

## Summary

Once an environment is deemed suitable for waste irrigation and any necessary controls have been put in place, this should be documented in a Nutrient and Irrigation Management Plan (NIMP). A site assessment within a NIMP generally includes:

- A map showing the irrigation area
- Separation distances to sensitive environments (if any)
- Brief description of groundwater and soil types, including evidence (photos, references) used in this determination
- Any other relevant site information mentioned in this document

## Contact

If you require additional information, contact the Agribusiness Development team at DPIRD at agribusiness@dpird.wa.gov.au