

SUBSURFACE DRAINAGE GUIDE BOOK



This booklet is an activity from the Subsurface Drainage Return on Investment trial by South Coast NRM and is an investment by the Grains Research and Development Corporation.

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The South Coast Climate

The South Coast region experiences a Mediterranean climate with cool, wet winters and hot, dry summers. Future climate projections suggest that seasonal variations will increase with extreme weather events increasing in both frequency and intensity.

Adapting farm management systems to mitigate the impact of climate variation is critical for the sustainability of our farming enterprises and the environments they operate in. Employing tools such as subsurface drainage could alleviate the effects of waterlogging, improve unproductive soils, and provide additional water sources for future drought proofing.

Learn about the regions past climate trends & future projections from Dr Bryson Bates, CSIRO via South Coast NRM's YouTube.



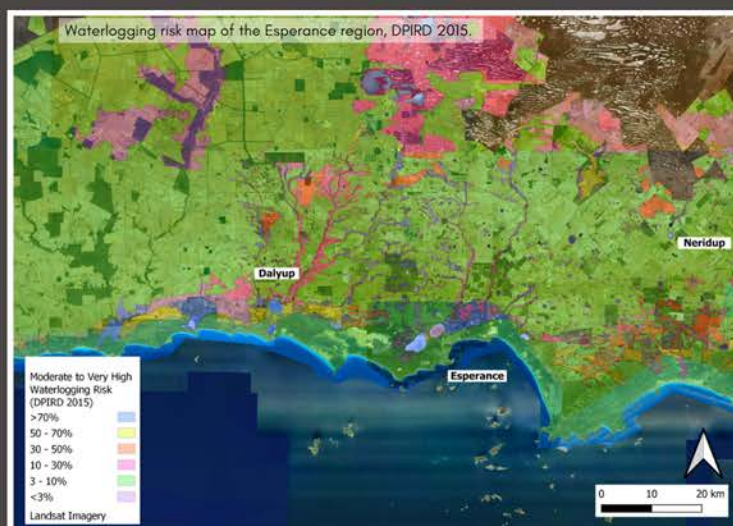
SCAN TO WATCH

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Alleviating Waterlogging

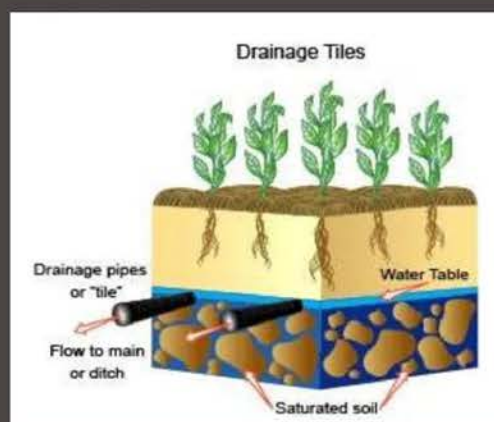
Approximately 3 million hectares of agricultural land in Southwest WA is moderately to highly prone to waterlogging, with Esperance particularly at risk due to its sandy, duplex soils and wet winters.

For cropping enterprises, waterlogging can lead to substantial yield losses, reduced resource efficiency and negative off-farm environmental impacts, including altered hydrology to natural waterways, catchments and groundwater resources.



Subsurface drainage can effectively alleviate waterlogging and mitigate these negative effects. Slotted polypipe is buried to the depth of the clay layer. This depth will vary with the natural variation of the soil profile. The polypipe allows water previously perched in the root zone by an impenetrable clay layer, to drain away, preventing crop drownings and increasing yield.

Addressing waterlogging is increasingly important as high rainfall events become more intense and seasonal rainfall patterns shift. Subsurface drainage has an important role to play in maximising on farm water supplies, and minimising waterlogging extent. Well-designed drain systems may also help to address dryland salinity concerns.



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Designing Good Drains

From open drains to subsurface, consulting and planning with an expert is key to successful design. Here's a few things to consider if you're planning to install subsurface drainage.

ELEVATION

Work with the natural elevation of your paddock, using digital elevation models & mapping tools to improve drainage capacity & rate of flow efficiency.

DISCHARGE

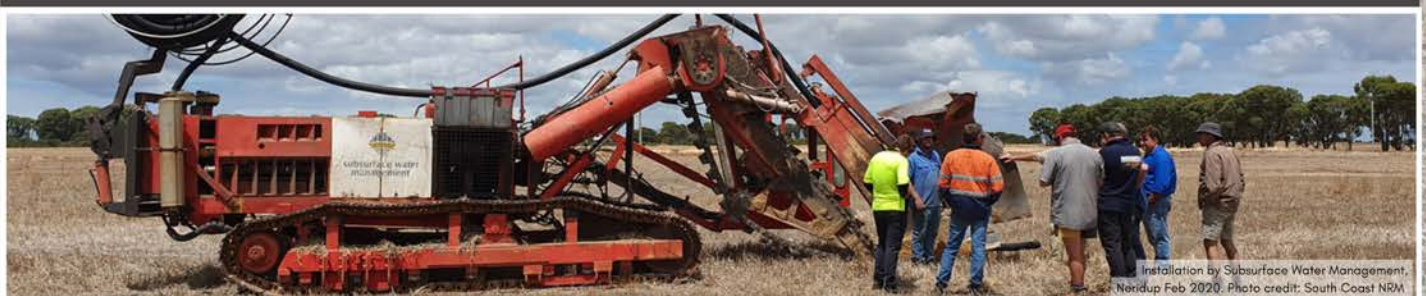
Discharging into dams maximises water harvesting potential, for use on farm (i.e., spraying), or for future proofing against dry periods. If discharging externally, ensure you understand the chemical properties, volume and quality of the water exiting your paddock, and its potential impacts to neighboring properties or natural systems.

SPACING

Guidelines for spacing range anywhere from 5m – 40m depending on your soil type. It's best to consult with an expert to achieve a large zone of influence, whilst minimising length of drain required for cost effective installation.

AGGREGATE

Surrounding the polypipe with an aggregate such as limestone increases the permeability of the buried pipe and prevents damage or blockages from large rocks. Alternatives such as mesh socks or laying the pipe bare may be more economically viable.



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The Subsurface Drainage ROI Trial

The Subsurface Drainage return on investment trial, is an investment by the Grains Research & Development Corporation, to investigate the profitability of subsurface drainage as a tool to alleviate waterlogging. The trial hopes to assist growers' decision making, by determining the time until return on investment.

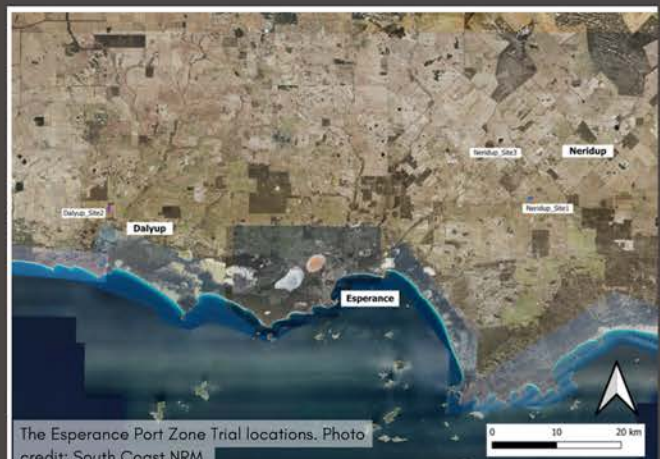
South Coast NRM manage three trials across Neridup & Dalyup, in Esperance.

The first Neridup trial began in 2020 with 2km of tile drain installed across 7.5ha, flowing downfield into a dam. This site includes two 1ha control sites (undrained), dry and waterlogged.

The Dalyup site installed subsurface drainage in 2022 and will expand the drained site in 2023. The second Neridup trial site is set to lay its first drains in early 2023.

Alongside yield, the trial will collect data on weed & disease presence, establishment counts, biomass (via NDVI imagery) and maintenance costs. As an extension of the project, the Technical Advisory Committee are also investigating the water quality differences between surface water runoff and the drained subsurface water.

The final ROI will be released in a full report due mid 2024 including data from the three Esperance project trials, as well as two trial sites in the Albany Port Zone, run by Stirling's to Coast Farmers Group. Find out more about the project via the Southern Soils website, linked in the QR code.



SCAN TO VIEW

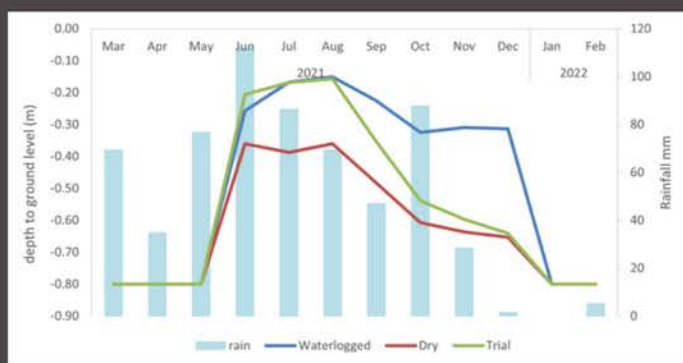
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2021 Trial Results

The Subsurface Drainage ROI trial has completed two years of data collection. Below are the results of Neridup, Site 1 in 2021.

2021 saw a 99th percentile rainfall year across the South Coast, with 479mm falling during the growing season. This provided ideal testing conditions for both drain performance, and crop yield. The undrained, waterlogged control site saw high perched water levels consistently throughout the year, indicating poor drainage action in this part of the paddock.

Whilst the drained site equaled the waterlogged control's perched water levels, the drains proved far more efficient in lowering the water levels at a faster rate. During a high rainfall event (40mm over 12 hours), the drains recorded a significant rate of flow of 0.29m/sec.

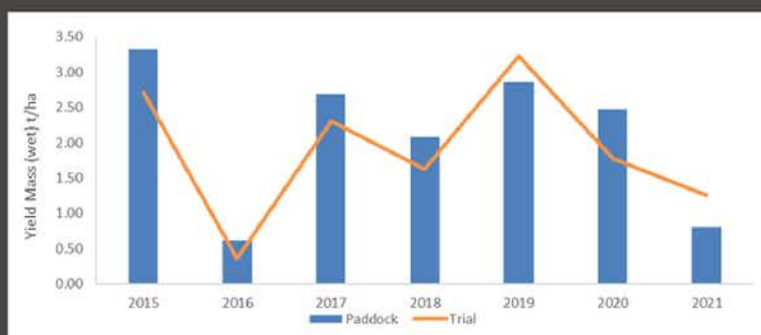


Perched water levels (in top 800mm of soil profile), across the drained (green), control dry (red) and waterlogged (blue) Neridup Site 1, 2021.

Neridup Site 1, grew Canola in 2021, which yielded 56% more in the drained site compared to the paddock average, as shown below. Accounting for yield penalties, the estimated preliminary yield benefit directly due to subsurface drainage for the Neridup site was 25 – 50%. At the time of analysis, canola was priced at \$980/t for 2022 translating to an increased profit of up to \$745/ha.



Yield data Neridup Site 1. Red = low yielding Green = high where the drains are circled in white.



Yield averages between the paddock and drained site for the GRDC subsurface drainage trial in Neridup Site 1, Esperance.

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Our Partners

FARM-XPORT & SOIL-MAX



The Subsurface Drainage Demonstration Day, Dalyup 2023 is proudly brought to you by Farm-Xport, with support from South Coast NRM.

Farm X is a global distributor of water management solutions. Their products include Soil-Max tile ploughs and Ag Leader Intellislope + Water Management programs. We also offer tile design services and pipe sourcing.

Soil-Max is the largest supplier of 'farmer-owned' tile ploughs on the market. With over 80% of the marketshare in North America, the Soil-Max brand continues to grow worldwide. From their tile ploughs to their tile carts, there is a perfect water management solution available for all types of farmers.

Visit the Farm-X website for more information <https://www.farm-x.co/>

THE GRAINS RESEARCH & DEVELOPMENT CORPORATION



The Subsurface Drainage Return on Investment trial, is an investment by the Grains Research and Development Corporation (GRDC).

GRDC's purpose is to invest in research, development and extension (RD&E) to create enduring profitability for Australian grain growers. The Corporation invests in RD&E projects to deliver new and improved varieties, farming practices, technologies and capability to the Australian grains industry. These investments drive the discovery, development and delivery of world-class innovation.

Visit the GRDC website for more information on how they're supporting Australian growers through RD&E www.grdc.com.au

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About Us

SOUTH COAST NATURAL RESOURCE MANAGEMENT



The Subsurface Drainage Return on Investment Trial is delivered in the Esperance Port Zone, By South Coast Natural Resource Management Inc.

South Coast NRM is the leading independent natural resource management organisation in the South Coast region of WA. They are a community based, independent, not-for-profit organisation that works with the community and stakeholders to maintain and improve a healthy and productive environment for the long-term benefit of communities within the South Coast region.

The South Coast region is renowned for its spectacular landscapes and magnificent coastline and is internationally recognised as being part of one of the world's 34 biodiversity 'hot spots'. Much of our region's wealth relies on our natural resources, and their essential ecological services that enhance production and profitability.

REGIONAL AGRICULTURAL LANDCARE FACILITATORS

Regional Agriculture Landcare Facilitators (RALFs) assist agricultural enterprises to improve the quality of their farming operations, while becoming more agile in responding to the challenges of a changing climate and markets. RALFs work with landholders to increase the awareness and adoption of best practice land management to protect and enhance our region's soils, biodiversity, waterways and agricultural landscapes.

South Coast NRM's RALFs are here to support growers across the region. Get in touch to find out how they can help you.

Esperance: sophiew@southcoastnrm.com

Albany: letishan@southcoastnrm.com

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Thank you for attending the Subsurface
Drainage Return on Investment Trial
Demonstration Day March 2023

This booklet was produced by Sophie Willsher, Regional Agricultural Landcare Facilitator East, South Coast NRM and is an activity for the Subsurface Drainage Return on Investment trial by South Coast NRM, an investment by the Grains Research and Development Corporation.