SA Drought Hub Technical Report

Precision made practical – Expanding variable rate tech for more growers

Project ID: DN4_25_16

PROJECT LEAD: Mallee Sustainable Farming

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PROJECT SUMMARY

Soil landscapes in the Mallee region are highly variable and therefore pose significant challenges for optimising fertiliser applications and their return on investment. Yield potentials can fluctuate between climatic seasons and soil types/profiles. Initial SA Drought Hub projects have outlined the potential of variable rate technology (VRT) for improving grower partial gross margins by addressing fertiliser applications to crop requirements within soil types for any given season.

This project set to increase the adoption of paddock zoning and variable rate application across the SA mallee through two main avenues. 1) Targeted training with growers on the background of paddock zoning and support with implementation of VRT and demonstrations of its profitability potential through demonstration fertiliser test strips. 2) Further develop the Agrisolve VRT package to allow growers to assess and implement VRT techniques on their own farms.

Season 2025 provided another season of tough climatic conditions for crop yields that would push nutrient requirements but allowed evidence-based value of VRT by refining fertiliser inputs in response. The project was successful in doubling its original database of grower involvement and stages of the VRT journey.

EXECUTIVE SUMMARY

Growers in the SA mallee region understand their area is characterised by highly variable soil types, which vary in nutrient availability and productivity and, therefore also vary in nutrient inputs required. They are also aware that Fertiliser inputs are one of the highest input costs farmers encounter and in a low-medium rainfall environment, it is important to manage input costs to manage risk. As demonstrated in previous SA Drought Hub projects, variable rate technology in this area is highly applicable with demonstrated significant variability in crop responses to applied fertiliser across varied paddock soil type zones.

As an easy example of how VRT can pay, significant improvements in soil sampling/testing programs based on soil type x production zones has outlined the effect of blanket rates of previous fertiliser applications and what has been left behind. As reported in previous projects, differences in profile nitrogen between production zones alone can be between 50-100 kg N/ha which equates to application differences of 110-220 kg Urea/ha. With current fertiliser prices the differences in the amount of stored N are considerable.

The major hurdle for growers to implement targeted nutrient plans through variable rate technology is knowing where to start, from ground truthing paddocks, implementing an accurate and worthwhile soil sampling/testing program, formulating a fertiliser management plan based on the season and these variables. Additionally, and probably the major barrier to VRT adoption has been how to get a formulated VRT plan into seeders and spreaders, getting the machines to talk and how to obtain grain yield data to assess not only impact of current VRT program but to potentially adjust moving forward.

Through this project the assembled team have successfully expanded the VRT knowledge base through increased grower engagement on a range of levels which was the primary objective of this current investment. The project had entry level involvement for new growers which outlined the process of zoning their paddocks and producing representative soil test results and how differences in crop production related to these soil types. Implementation of fertiliser strip trials of different rates of inputs around their current practice (e.g. 50% lower and 50% higher) is a great visual of crop responses to applied nutrients across these zones. In 2025, following a tough 2024 for most, these responses to fertiliser inputs were minimal with soil nutrient banks enough to fulfill crop demand. This alone was a great demonstration of reducing risk when season breaks were late and crops were established on very low soil water buckets. We now have growers included in these series of VRT projects that are quite experienced in the VRT space and can effectively run their own VRT programs. More growers like this will help expand the story of VRT and improve the overall uptake. Importantly, many growers have progressed beyond individual trial strips and are now expanding VRT implementation across additional paddocks, demonstrating that adoption is continuing beyond the life of the project.

The project exceeded its original objective of supporting 15 growers to adopt Variable Rate Technology by expanding engagement beyond the original farmer groups into Bowhill,

Peake/Coomandook and Wunkar. Across the project, 63 growers participated in workshops, field days and one-on-one extension activities. Of these, 32 growers progressed to implementing fertiliser strip trials or whole-paddock Variable Rate Technology on their own farms, representing a 50% adoption rate among participating growers. This progression demonstrates that combining practical demonstrations with ongoing technical support gives growers the confidence to move from understanding VRT concepts to implementing them within their own farming businesses.

One of the most significant outcomes of this project, and preceding SA Drought Hub investments, has been the development of the **AgriSolve Easy VRT** platform. AgriSolve represents a sustained decision-support framework rather than a discrete project output, providing growers with a tool that can be applied across multiple seasons as Variable Rate Technology (VRT) adoption expands across farming enterprises. Based on project experience, AgriSolve is one of the few platforms that integrates both practical implementation processes and technical agronomic components required to support growers from initial VRT adoption through to more advanced precision agriculture applications.

The platform integrates paddock zoning, temporal NDVI imagery, soil characterisation, plant available water (PAW) estimation, rainfall analysis and fertiliser decision-support functions within a single system. Recent developments have enhanced functionality through the integration of local soil pit datasets with rainfall information to estimate PAW ("bucket fill"), yield potential and nitrogen requirements. For growers undertaking soil testing, the platform incorporates nitrogen and phosphorus decision-support tools based on current agronomic datasets and response relationships relevant to South Australian Mallee production systems. While the primary focus of this project has been optimisation of nitrogen and phosphorus inputs, the platform also facilitates identification of additional production constraints, including soil acidity and subsoil limitations, enabling targeted amelioration strategies to be implemented alongside fertiliser management.

AgriSolve has been developed through a co-design approach with participating growers and refined using on-farm data and operational feedback. Collaboration between Mallee Sustainable Farming (MSF) and project specialists has ensured that the platform addresses practical constraints associated with VRT implementation, providing a structured pathway from paddock zoning and soil testing through to fertiliser recommendations and generation of machinery-compatible prescription maps. Across the SA Drought Hub VRT projects, growers have benefited from access to specialist technical expertise and ongoing support, while MSF extension activities have contributed to addressing the current industry limitation in VRT capability. Continued development of grower and advisor capacity will be critical to improving fertiliser use efficiency, enhancing business resilience and increasing confidence in precision agriculture systems.

Although developed and validated within the South Australian Mallee, AgriSolve has applicability across a range of soil types and broadacre cropping regions throughout South Australia. This provides significant opportunities for further extension and adoption in environments where soil variability influences crop performance. Collectively, these projects and the continued development of AgriSolve have increased awareness and understanding of best-practice VRT and delivered a durable decision-support tool that will provide ongoing value to growers, advisors and industry beyond the duration of this project.

PROJECT BACKGROUND AND OBJECTIVES

The objective of this project was to support the widespread adoption of zoning and variable rate application practices across key farming regions in the South Australian Mallee. This was proposed to be achieved by building on the Easy VRT platform (Agrisolve) and using existing NDVI and nutrient decision tools. With co-investment from the Murraylands and Riverland Landscape Board to develop supporting extension resources and farmer learning materials, the project worked closely with growers across Murray Plains, Lowbank, Lameroo/Pinnaroo, Bowhill, Peake/Coomandook and Wunkar to deliver targeted training, technical support for Variable Rate Technology (VRT) implementation, and on-farm fertiliser test strip demonstrations. The project aimed to double the number of growers engaged in paddock-scale test strips, supported by 1:1 technical guidance. A package of practical tools and resources will be developed to help new users get started and promote adoption beyond the project timeline.

Mallee Sustainable Farming (MSF), in partnership with technical experts delivered a practical extension project across six priority regions of the South Australian Mallee:

- Murray Plains
- Lowbank
- Lameroo/Pinnaroo
- Bowhill
- Peake/ Coomandook
- Wunkar

The project objective was to target a further 15 farmers to engage in the project, map a selected paddock of interest, zone, soil test and implement a fertiliser test strip if applicable.
As a software platform the project also planned to build on two earlier phases of work that developed and tested the Easy VRT decision support platform and demonstrated the benefits of Variable Rate Technology (VRT) to South Australian growers. AgriSolve platform enables widespread, confident use of VRT techniques in real-world conditions. This project objective was to move slightly away from the previous models of intensively sampling focus paddocks. Instead, it will focus on broader farmer participation and practical, scalable skills. Farmers were supported to implement simple NDVI-based zoning, undertake soil testing**,** and establish on-farm fertiliser test strips to improve input efficiency and paddock performance. The emphasis on teaching growers how to implement and assess VRT techniques on their own farms using the tools already available, including the Easy VRT platform, NDVI imagery, and the N and P Excel calculators.

A key strength of this project was the collaborative support model developed between Mallee Sustainable Farming and the project specialists. Sean Mason provided expertise in soil fertility, nutrient management and soil test interpretation; Peter Treloar supported precision agriculture, mapping and machinery integration; Nathan Paech assisted with spatial data analysis, harvest interpretation and prescription mapping; while Chris McDonough provided practical extension

support, grower mentoring and led the ongoing development and ground-truthing of the AgriSolve platform with participating farmers. Together, this multidisciplinary team significantly reduced many of the barriers that have traditionally limited VRT adoption by providing growers with practical, ongoing technical support from planning through to implementation and evaluation.

By taking a practical, farmer-led approach, the project built a confident community of VRT users capable of implementing paddock zoning, soil testing and variable rate strategies with increasing independence. This collaborative approach has improved fertiliser use efficiency, strengthened grower confidence in managing seasonal risk, supported drought resilience in low rainfall farming systems, and created a network of growers who continue to share knowledge and encourage wider adoption of Variable Rate Technology across the South Australian Mallee.

METHODOLOGY

The project objective to support the expansion and adoption of variable rate technology started with preliminary workshops run prior to the 2025 growing season. From these workshops or farmer group, growers were asked to select a paddock of interest with typical soils zones and variability representative of their farm. These selected paddocks would ideally be sown to wheat during the 2025 season. Growers willing to participate and their associated paddocks were split between the services of Chris McDonough, Sean Mason, Pete Treloar and Nathan Paech.

There were two approaches for existing growers that participated in VRT projects and new growers that were on the early stages of their VRT journey. For new regions/grower involvement after paddock location Google Earth images through time and NDVI images relating to early growth stages (tillering of cereals, July/early August) were obtained and compared. Soil type x NDVI production zones were established, and GPS located in each paddock. Zones were kept to 4-5 depending on the variability observed. As the project team were aware that these zones would be ideally described by growth fertiliser strips ideally these sampling zones would line up with preferred sowing directions.

In established regions and high-level entrant VRT growers, paddocks were zoned based of broad soil types, soil sampled and tested and fertiliser strips implemented preferably across zones using AgriSolve platform.

Soil sampling occurred prior to 2025 sowing and covered 19 paddocks (growers) covering the three farmer groups and a total of 72 zones described. Soil sampling activities collected three depth profiles where possible at 0-10cm, 10-30cm, 30-50cm and samples were fully characterised for nutrition and potential constraints. Each paddock/grower received a soil testing results page to describe how soil types control current nutrient availability and expected crop responses to changing upfront fertiliser programs.

Prior to sowing growers were guided on how to set up fertiliser strip trials and were encouraged to trial a strip of 50% less their grower rate and 50% more than their grower rate for full paddock runs. It was basically left to the grower whether they would like to trial different upfront P inputs or varying N rates either upfront or in season.

Prior to harvest a reminder was sent to growers about reporting/recording grain yields across the strip trials and grower visits were made by Pete Treloar and Nathan Paech. After harvest the grain yield data was collated for tested paddock in the project. The grain yield data was assessed within each treatment for the full run but importantly split up into zones established earlier which were informed by Google Earth, NDVI, soil analysis.

Results were communicated to the growers in each region through a series of workshops prior to the 2026 season.

LOCATION

Please find below (table 1) location details of growers involved in the DN4_25_16 project highlighting the new grower engagement and associated region of either soil testing for implemented fertiliser strips. Latitude and Longitude have not been disclosed as some farmers made several changes to paddocks which only got passed onto Chris and Sean not MSF.

Table 1: Number of growers involved in the VRT project from previous years and those newly engaged under DN4_25_16. Grower names (shown in progress report) and precise paddock locations have not been shared.

Grower Number	Region	Soil test results	Fertiliser Strip Trial Results
1	Waikerie		
2	Waikerie		
3	Waikerie	Yes	
4	Wunkar		
5	Waikerie		
6	Wanbi	Yes	
7	Alawoona	Yes	
8	Geranium		
9	Lameroo		
10	Waikerie		
11	Murray Bridge		
12	Murray Plains	Yes	Yes
13	Murray Plains	Yes	
14	Lowbank		
15	Murray Plains	Yes	Yes
16	Murray Plains	Yes	Yes
17	Murray Plains	Yes	
18	Murray Plains	Yes	Yes
19	Murray Plains	Yes	
20	Loxton	Yes	
21	Loxton	Yes	
22	Loxton	Yes	
23	Bowhill	Yes	
24	Bowhill	Yes	Yes
25	Bowhill	Yes	
26	Bowhill	Yes	
27	Bowhill	Yes	
28	Peake	Yes	
29	Peake	Yes	
30	Coomandook	Yes	Yes
31	Lameroo		Yes
32	Pinnaroo	Yes 2024	Yes

New Engagement 2025
Previous Engagement

RESULTS

Soil sampling and testing exercise – Summary

Soil sampling based off the zonal approach continues to be highly valuable for focusing on where nutrient inputs are required to maximise return on that investment. Paddock zoning approaches in 2025 were either performed by combining Google Earth (soil type colour), NDVI (early season signatures) or physical soil descriptors and grain yield data. As a broad summary heavier texture soils with the ability to store or bank N had higher profile N values. Under these soil descriptors you will often find potential sub soil constraints which will also be presented in higher stored N due to lower production and removal. The value of VRT is simply presented by the Murray Plains data set for profile N with differences of 60 kg N/ha between flat/heavy areas and the more productive loams or low N retention sands. 60 kg N/ha equates to 130 kg Urea/ha with a price of $1200/t this difference equates to $150-160/ha. These differences across a paddock can also be presented by converting profile N to wheat yield potentials (40 kg N/t grain) with differences up to 1.5t/ha occurring. Soil P continues to be related to soil type with heavier soils and associated elevated PBI values presenting lower available P levels.

These trends can be extended to the newly tested Bowhill and Peake regions. While soil type changes were less varied and a general sandy nature across the regions, profile N was related to both the ability of the soil to retain N but also constraints. Constraints identified in these regions were subsoil salinity/boron but also soil acidity. Zonal approaches using NDVI data layers across different seasons and crop types have been powerful at identifying soil acidity and salinity.

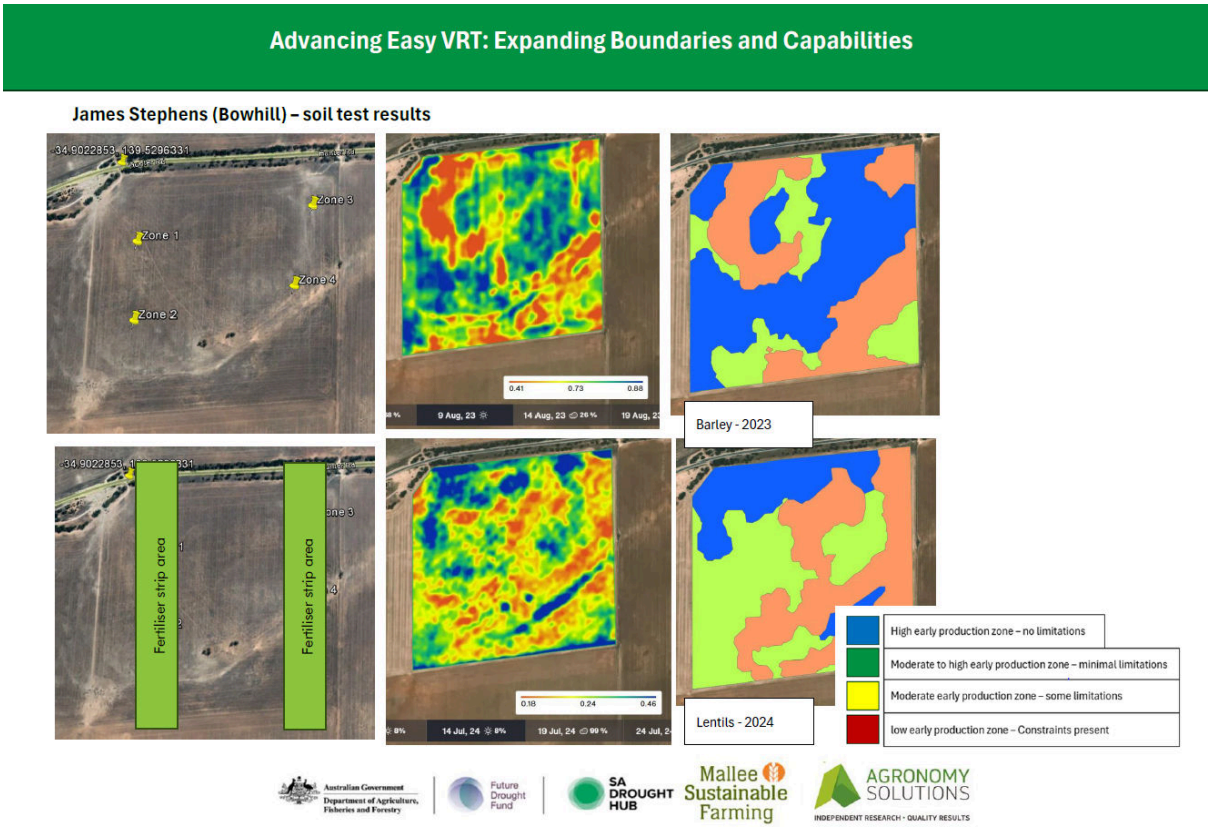
Table 2: Summary of soil profile N and soil P characteristics and availability for three more established VRT regions separated by soil type description.

Region	Zone	Profile N kg/ha	Wheat Yield Potential t/ha	Colwell P mg/kg	PBI	DGT-P µg/L
Murray Plains	Flat/Heavy	124	3.10	42	41	163
	Loam	72	1.80	31	43	103
	Midslope/Sandy loam	70	1.76	67	30	454
	Sand/Rise	62	1.54	22	16	167
Waikerie	Stone/Heavy	30	0.75	33	79	64
	Loam	34	0.85	15	18	51
	Sand	26	0.64	19	17	83
Loxton/Wanbi /Alawoona	Heavy	99	2.47	29	40	78
	Stone	31	0.77	23	62	33
	Loam	56	1.39	17	27	60
	Sand	31	0.78	15	13	109

Table 3: Summary of soil profile N and soil P characteristics and availability for newly engaged growers in Bowhill and Peake. Data has not been separated into soil type descriptors as most of them had either sand or loamy sand descriptors.

Region		Profile N kg/ha	Wheat Yield Potential t/ha	Colwell P mg/kg	PBI	DGT-P µg/L
Bowhill	Mean	67	1.67	25	28	115
	Max	140	3.49	42	81	291
	Min	17	0.43	16	11	15
Peake	Mean	64	1.60	25	17	131
	Max	103	2.58	42	25	423
	Min	21	0.53	17	11	61

Each grower had their respective sampling plan, soil test results, relationship with NDVI zones and interpretation information put into a report. This report outlined the preferred location of the fertiliser strip trials. An example of the VRT report is shown below.



2025 Soil test results from sampling points above

Zone	NDVI Zone	Data Farming	Sample Depth	pH CaCl2 pH units	Organic Carbon (W&B) % (40°C)	MIR - Aus Soil Texture	Moisture %	Profile Moisture mm	Profile N kg/ha	Colwell P mg/kg	PBI	DGT-P µg/L	Salinity EC 1:5 dS/m	Boron mg/kg
1	Low	Red	0-10	6.56	0.38	Sand		0.9	46	27	13	277	0.058	
			10-30	8.17	0.28	Sand	0.5						0.085	0.49
			30-40	8.16	0.28	Sand	0.3						0.082	0.47
2	High	Blue	0-10	7.84	0.82	Loamy sand	0.2	0.6	46	18	34	45	0.14	
			10-25	8.24	0.32	Sandy loam	0.5						0.087	0.64
4	Low	Red	0-10	8.08	0.63	Sand	0.1	0.1	50	17	16	94	0.12	
			10-20	8.18	0.7	Loamy sand							0.12	0.88
3	Low	Red	0-10	8.09	0.66	Loamy sand	0.5	2.4	90	22	81	15	0.18	
			10-30	8.18	1.04	Loam	1.9						0.13	1.4

Main observations from zones

Poor NDVI zones associated with.....Low N/ Low OC/ Sand – Zone 1, Low P/ Moderate P fixation (PBI) – Zone 3

Good NDVI zones have higher OC levels, bigger moisture buckets (texture), no constraints (to 30cm).

No significant constraints to sampling depths so worth feeding zones to yield potentials based off average rainfall.

Focus Nitrogen on low N zones (zone 1), and profitable soil types (zone 2), potentially save N on zone 3 until Phosphorus levels are addressed.

Replacement P will work on most zones apart from zone 2 which needs some capital build up to meet yield potentials

VRT Paddock Results and Analysis:

The very dry start to the 2025 season did reduce the ability of some growers to implement fertiliser strips trials due to the compacted sowing window, change in paddock crop type, or reduction in area of crop zone.

The 2025 MSF VRT project resulted in a measurable expansion of grower participation, spatial coverage, technical capability and the application of Variable Rate Technology (VRT) across the South Australian Mallee. The project utilised a structured, technically focused support model that enabled growers to implement key components of precision agriculture, including paddock zoning, targeted soil sampling and fertiliser strip trials. This approach facilitated the transition from conceptual understanding of VRT to practical, data-driven implementation at the paddock scale.

Chris McDonough provided technical support to 13 growers, while Sean Mason engaged with a further eight growers to extend existing VRT programs and support new adopters. Technical assistance included the development of management zones using spatial datasets, interpretation of soil test results, calibration of fertiliser strategies based on soil nutrient status and yield potential, and integration of these components into paddock-specific management plans.

Project consultant Nathan Paech collected and analysed harvest data from 11 growers across 32 paddocks. Spatial yield and protein datasets (where available) were processed and analysed in relation to defined soil zones and fertiliser treatment strips. This enabled quantification of crop response variability across soil types and management strategies under seasonal conditions. Notably, two growers demonstrated the capability to independently process and interpret their own spatial

harvest data, indicating an increase in technical proficiency and progression towards autonomous VRT implementation.

To complement the agronomic analysis, Chris McDonough incorporated fertiliser input costs and grain price data to generate gross margin assessments and phosphorus budgeting for each paddock. This economic analysis provided a quantitative framework for evaluating fertiliser response efficiency and return on investment, supporting informed decision-making for future nutrient management strategies.

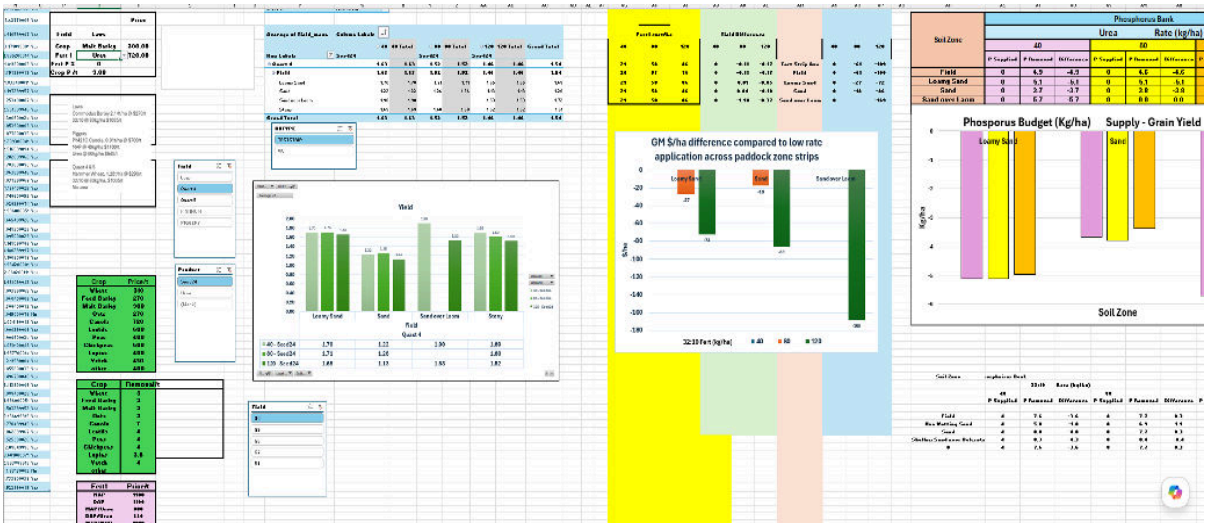
An example of a personalised report to each grower is shown below.

Pete Treloar was able to extract data for four paddocks, two in existing regions and two in the newly sampled areas. These results were reported at the pre seeding 2026 workshops.

Example of Chris McDonough data below.

The Pivot Tables for each farmer allows for the operator to easily click between paddocks and fertiliser applications to be presented with comparative figures and graphs, to quickly assess how responsive different soil types were to different fertiliser strategies last season, and whether it was economical to do so. This becomes very informative as to where higher or lower rates of fertiliser may be targeted in coming seasons.





This is providing important practical information towards how we can build this same analytical framework into the AGRISOLVE web-based tool, that will allow farmers to more easily analyse and adjust their ongoing VRT strategies for themselves.

The main learnings from last season were that:

- Due to the drought conditions generally there were little yield differences between high and low rate seeding fertiliser strips last season, except for a few areas and soils where plants were able to reach some deeper stored moisture from the previous year of summer.
- Generally, the low rainfall year with very little PAW at seeding (often negative) reduced yield potentials, so that nutrition was rarely the most limiting factor leading to negative gross margins for most standard to 50% higher fertiliser strips.
- The largest yield differences were consistently found between different soil types, this emphasises the importance of knowing and understanding the varying opportunity and risks associated with each soil type, particularly in late break seasons with low PAW.
- The few post Nitrogen strip results obtained generally lead to some yield advantages, but not everywhere, depending on paddock rotation and inherent soil fertility. These aligned well with pre-season soil sampling and measurement of profile N values.
- These are all factors that the AGRISOLVE program is making easily accessible for farmers to access, understand and utilise as it is being developed with the participating farmers.

The key developments in the AGRISOLVE program that this project has helped to influence and facilitate have been:

- The introduction of the average Aug-October NDVI imaging for each season back to 2017, which allows for much easier identification and drawing of key soil type boundaries.
- Easier zone drawing functions that eliminate the previous issues of overlapping polygons,
- The ability to save paddock maps and zone fertiliser and seeding rates into shape files that are more easily transferred directly into VRT machinery programs for paddock use,
- The ability to easily view from the existing local DEW soil pit images and data associated with that farm and choose a representative soil type for each paddock zone that has a graph image estimating Crop Lower Limit (CLL), Plant Available Water Capacity (PAWC) and PAW at the time of enquiry (linked to web based live localised rainfall data), leading to estimates of yield potentials and fertiliser recommendations based on potential decile rainfall outcomes for the season, with adjustments now made for soils exhibiting higher risk factors based on surface texture, rooting depth and PAWC.
- For those with soil test information there is built in the background (nearly fully functional) friendly Nitrogen and Phosphorus calculators that are highly detailed in nature, but all built in the background so confusion should be limited. This information in combination with soil type and water availability will be a very powerful tool for refining fertiliser inputs.

Further Outcomes:

The AGRISOLVE program is still being developed as a more complete farmer friendly VRT tool, it is being well received by farmers with its unique features and ease of use to map, assess and manage paddock zones. With continued work and support it is expected that all our existing and future VRT

farmers and agronomists will be using this tool to implement and improve their VRT management across their whole farms. It will be usable right across SA, although some input formulas and recommendations may need appropriate adaptations for higher rainfall zones.

The participatory approach of developing this tool with the farmers who are trying to best understand and apply VRT practically to their own farm operations, alongside the expert soils agronomists and data technologist involved, has meant that the final product should be just what the farmers need and can easily apply.

These projects activities and AGRISOLVE were presented at numerous Mallee farmer field days and meetings at Loxton, Paruna, Wunkar, Lowbank and Murray Plains and in 2025, as well as results at Waikerie, Mannum, Bow Hill and Lameroo in 2026 harvest meeting. This has directly led to further work with another 7 farmers in getting into VRT this season. All existing farmers are continuing to expand and improve their VRT activities because of this project.

CONCLUSION

Most growers understand the variability that exists within Mallee soil landscapes and the significant impact this has on soil water dynamics, crop productivity and nutrient availability. This variability has major implications for nutrient management and reinforces the importance of placing fertiliser where it is needed to maximise return on investment. However, the major hurdle for growers implementing Variable Rate Technology (VRT) has been knowing where to start—ground-truthing paddocks, undertaking representative soil sampling, interpreting soil test results, developing seasonal fertiliser strategies, and successfully integrating prescription maps into farm machinery.

Through this project, the assembled team has successfully expanded the VRT knowledge base through increased grower engagement, which was the primary objective of this investment. By taking a practical, farmer-led approach, the project has supported growers at all stages of the VRT journey. New participants were guided through paddock zoning, representative soil sampling and interpretation of soil test results to better understand how soil type variability influences nutrient availability and crop performance. Existing VRT growers continued to refine their management through additional paddock zoning, strip trials and data analysis, allowing them to build confidence and further develop their own VRT systems.

Implementation of fertiliser strip trials comparing 50% lower and 50% higher fertiliser rates than current grower practice provided a practical demonstration of crop responses to nutrient inputs across different soil zones. In 2025, following a tough 2024 for most growers, with limited rainfall and low plant available water, responses to fertiliser inputs were generally minimal, with existing soil nutrient banks sufficient to fulfil crop demand under reduced yield potential. These conditions reinforced one of the key principles of VRT—matching fertiliser inputs to seasonal opportunity. This alone was a strong demonstration of reducing financial risk when season breaks were late and crops were established on very low soil water buckets. Difficult seasons such as these often provide some of the clearest insights into where fertiliser inputs can be strategically reduced without compromising productivity.

A significant outcome of this project has been the development of grower confidence and capability. We now have growers involved in these VRT projects who are quite experienced in the VRT space and can effectively run their own VRT programs, including zoning, soil sampling, fertiliser strategies and harvest analysis. More growers like this will help expand the story of VRT within their local farming communities and improve overall uptake across the South Australian Mallee.

One of the most significant outcomes of this project, and the preceding SA Drought Hub investments, has been the continued development of the AgriSolve Easy VRT platform. From the project team's experience there is currently no other platform that combines the practical and technical components required to support growers from the beginning of the VRT journey through to advanced precision agriculture management. AgriSolve integrates historical NDVI imagery, paddock zoning, soil characterisation, plant available water estimation, rainfall analysis and fertiliser decision-support into a practical and accessible system. Recent developments linking soil profile information with local rainfall data allow estimation of soil water availability ("how full is my bucket"), yield potential and nitrogen requirements, while integrated nitrogen and phosphorus decision-support tools provide growers with increasingly accurate fertiliser recommendations based on South Australian Mallee

production systems. Although this project has focused primarily on optimising nitrogen and phosphorus inputs, it has also reinforced the importance of identifying other production constraints, including soil acidity and subsoil limitations, allowing growers to target amelioration strategies alongside nutrient management.

Importantly, AgriSolve has been developed alongside participating growers and refined through real on-farm experiences throughout this series of projects. The collaborative support model delivered by Mallee Sustainable Farming, together with Sean Mason, Chris McDonough, Peter Treloar and Nathan Paech, has been fundamental to reducing the barriers to VRT adoption. Practical, ongoing technical support has enabled growers to move beyond understanding VRT concepts to confidently implementing them within their own farming businesses. This project has demonstrated that successful adoption relies not only on sound agronomic science and digital decision-support tools, but also on trusted specialist support and continued engagement over multiple seasons.

Although developed and validated within the South Australian Mallee, AgriSolve is applicable across many soil types and broadacre cropping regions throughout South Australia, providing significant opportunities for future extension and adoption wherever soil variability influences crop performance. Collectively, these SA Drought Hub projects have increased awareness and adoption of best-practice VRT, strengthened grower capability, developed a practical decision-support platform with long-term value, and established a strong foundation for continued improvement in fertiliser use efficiency, farm profitability, business resilience and drought preparedness across South Australian grain production systems.

REFERENCES & PROJECT RESOURCES

A suite of extension resources has been developed to support ongoing adoption of Variable Rate Technology (VRT) by growers and advisors. These include factsheets, instructional videos, podcasts, workshop materials, case studies and the AgriSolve Easy VRT decision-support platform. Together, they provide practical guidance that complements the technical findings of this project and will support continued learning and implementation beyond the funding period. All resources are housed on the MSF website under the Demonstrating Soil Zone Mapping project page, ensuring they remain accessible to growers and advisors.

These resources were made possible through SA Drought Hub funding, with additional co-investment provided in the final year of the project by the Murraylands and Riverland Landscape Board. This collaborative investment has enabled the development of high-quality extension materials that provide an enduring knowledge base, supporting improved fertiliser management, increased grower capability and greater resilience across South Australian broadacre farming systems.

Note: A traditional reference list of cited publications has not been included, as this report primarily documents project activities, outcomes and extension resources rather than drawing extensively on external literature.

Resource	**Purpose**
Factsheets	Guide growers through zoning and soil sampling
Podcasts	Seasonal updates and technical learning
Farmer videos	Case studies demonstrating on-farm adoption
Workshops	Grower training and community of practice
Workshops	Grower & Industry training
Technical reports	Annual project findings and recommendations
AgriSolve Platform	Online VRT decision-support tool

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