

Map User Notes: Raspberries Suitability Map (Using Climate Futures Projections)

Summary:

The mapping aims to classify land suitable for growing Raspberries according to seven suitability classes: “1.0 Well suited”, “1.1 Well suited (with soil management)”, “2.0 Suitable”, “2.1 Suitable (with soil management)”, “3.0 Moderately suitable”, “3.1 Moderately suitable (with soil management)”, and “4.0 Unsuitable”. These are produced from a set of pre-determined rules in accordance to a suitability matrix (refer to page 3) developed from reviewing existing literature in conjunction with industry consultation and ground-truthing. They are based on soil and climatic influences on Raspberry production using data garnered from soil cores and temperature logger records collected from hundreds of site locations across the state. The mapping assumes water for crop irrigation is available and therefore not a limiting factor to production. Note that the mapping assumes an open field production environment and does not take into account the potential to install polytunnels or tabletop substrates.

[Climate Futures](#) projections were incorporated into the suitability mapping framework to assess projected changes to frost/heat risk severity and chill hours for years [2030](#) and [2050](#) (refer to [metadata](#) for more information). This compliments the current [Raspberries Suitability Map](#) developed as part of the ‘[Water for Profit](#)’ program which was based on recent historical climate observations (Refer [here](#) for more information).

How is suitability determined?

The overall suitability rating is determined using a most-limiting-factor approach, where the lowest rated parameter becomes the overall suitability rating. As an example, a location may possess the following characteristics:

<u>Soil/Climate parameter</u>	<u>Threshold</u>	<u>Rating</u>
Soil depth:	>30cm	(Well suited)
pH:	6-6.5	(Well suited)
Electrical conductivity (dS/m)	1-1.3	(Suitable)
Drainage:	Poor	(Unsuitable)
Stones:	<10%	(Well suited)
Slope:	<20%	(Well suited)
Frost risk:	<1/5 years	(Well suited)
Chill hours	>800	(Well suited)
Hot weather in summer	<1/5 years	(Well suited)
Overall rating:		4.0 Unsuitable

In this case, the overall suitability is classified as “4.0 Unsuitable” due to ‘*Poor (Unsuitable)*’ soil drainage therefore limiting suitability due to this classification. Alternatively, if for example, soil drainage were rated ‘*Excessively well drained (Well suited)*’, the overall rating would then revert to “2.0 Suitable”, due to the Electrical conductivity parameter 1-1.3cm (*Suitable*)’ now limiting the rating to this classification (refer to suitability matrix on page 3 for rule-set). A “1.0 Well suited” rating is achieved if all attributes are rated ‘Well suited’. Note that designated conservation/protection areas as well as existing urbanised/residential zones and major waterbodies were automatically classified as “4.0 Unsuitable”.

Improving suitability (with soil management)

In some circumstances, suitability ratings can be improved if measures are applied to mitigate against certain ‘soft’ limitations/constraints. Addressing these constraints (also known as ‘Manageable constraints’) using practises such as, for example, applying agricultural lime to counteract acidic soils, can result in a parcel of land becoming more suitable for a given suitability classification. As an example, a location may possess the following characteristics:

<u>Soil/Climate parameter</u>	<u>Threshold</u>	<u>Rating</u>
Soil depth:	>30cm	(Well suited)
pH:	5.5-6*	(Suitable)
Electrical conductivity (dS/m)	<1	(Well suited)
Drainage:	Excessively well drained	(Well suited)
Stones:	<10%	(Well suited)
Slope:	<20%	(Well suited)
Frost risk:	<1/5 years	(Well suited)
Chill hours	>800	(Well suited)
Hot weather in summer	<1/5 years	(Well suited)
Overall rating:		1.1 Well suited (with soil management)

In normal circumstances, the above rating would be determined as “2.0 Suitable” due to pH limiting suitability to this classification. However, in this case, the overall suitability is reclassified to “1.1 Well suited (with soil management)” because the low pH rating, on most occasions, can be readily mitigated (e.g. by applying agricultural lime to neutralise soil acidity) therefore rendering the land more suitable for production. In this regard, the following ‘Manageable constraints’ can be actively managed/mitigated to allow improved Raspberry growing conditions.

- Soil depth – Installation of raised soil beds can improve soil depth prior to planting.
- pH – Undertaking an active liming regime over several seasons can effectively reduce soil acidity (increase pH) over time (i.e. when pH <5.5). (refer: <http://dpiipwe.tas.gov.au/agriculture/land-management-and-soils/soil-management/soil-ph-liming>) Reducing soil pH for neutral to alkaline soils is managed by adding organic matter such as compost and manures to lower pH gradually over several seasons (i.e. when pH >6.5).
- Drainage – Installation of surface and sub-surface drainage lines can carry excess water off agricultural land and prevent water logging. (refer: <http://dpiipwe.tas.gov.au/agriculture/land-management-and-soils/soil-management/land-drainage>)
- Stones– Stone removal via machine and/or manual picking prior to planting can effectively improve the soil for crop production.

Each manageable constraint (as mentioned above) is denoted by the symbol * in the suitability matrix (page 3) to indicate where management of soil impediments ought to be considered to improve growing conditions and meet the corresponding suitability rating. Note that ‘Manageable constraints’ can be identified in the attribute table of the map layer itself on LISTmap (refer to example on page 5 to identify how constraints are recognised in LISTmap).

Supplementary information for managing soils:

- Soil management website (DPIPWE): <http://dpiipwe.tas.gov.au/agriculture/land-management-and-soils/soil-management>
- Information for soil management for Tasmanian farmers: <http://dpiipwe.tas.gov.au/Documents/Soil-Guide.pdf>
- Information for managing Tasmania’s cropping soils: <http://dpiipwe.tas.gov.au/Documents/Managing-Tasmanias-Cropping-Soils-2000.pdf>

Supplementary information for growing Raspberries:

- Raspberry Growing Factsheet: <http://dpiipwe.tas.gov.au/Documents/WfW-Raspberry-factsheet.pdf>

Suitability Rule Matrix - Raspberries

Rating	Soil depth	pH of top 15cm	Electrical conductivity (ECse) dS/m	Soil drainage	Stone abundance (>200mm diameter, top 15cm)	Slope (of land, % rise)	Frost risk Chance of having at least 1 day where Tmin <0°C at flowering (16 October to 31 January) <i>(using Climate Futures Projections)</i>	Chill hours 0 - 7 °C from May to August <i>(using Climate Futures Projections)</i>	Hot weather during summer Chance of having >10 days where Tmax >30°C from December to February <i>(using Climate Futures Projections)</i>
1.0 Well suited	>30cm	6.0 – 6.5	<1.0	Excessively well drained	<10%	0-20%	Occurs <1/5 years	>800	Occurs <1/5 years
1.1 Well suited (with soil management)	25-30cm*	5.5 - 6.0*, 6.5 – 7.0*	<1.0	Well drained*	10-20%*	0-20%	Occurs <1/5 years	>800	Occurs <1/5 years
2.0 Suitable	25-30cm	5.5 - 6.0, 6.5 – 7.0	1.0 – 1.3	Well drained	10-20%	0-20%	Occurs 1/5-2/5 years	600 - 800	Occurs 1/5-2/5 years
2.1 Suitable (with soil management)	20-25cm*	5.0 – 5.5*, 7.0 – 7.5*	1.0 – 1.3	Moderately well drained*	20-50%	0-20%	Occurs 1/5-2/5 years	600 - 800	Occurs 1/5-2/5 years
3.0 Moderately suitable	20-25cm	5.0 – 5.5, 7.0 – 7.5	1.0 – 1.3	Moderately well drained	20-50%	20-30%	Occurs 2/5-3/5 years	250 - 600	Occurs 2/5-3/5 years
3.1 Moderately suitable (with soil management)	15-20cm*	4.5 - 5.0*, 7.5 – 8.0*	1.3 – 1.8	Imperfectly drained*	20-50%*	20-30%	Occurs 2/5-3/5 years	250 - 600	Occurs 2/5-3/5 years
4.0 Unsuitable	<15cm	<4.5 or >8.0	>1.8	Poor, Very poorly drained	>50%	>30%	Occurs >3/5 years	<250	Occurs >3/5 years

Manageable constraints are denoted by the symbol *

Definitions of Suitability Classes (in relation to the suitability matrix)

1.0 Well suited: Land having no significant soil or climatic limitations to sustained production where risk of significant crop loss due to adverse conditions are unlikely.

1.1 Well suited (with soil management): Land having no significant soil or climatic limitations to sustained production where risk of significant crop loss due to adverse conditions are unlikely. However, minor soil impediments with regard to soil depth, pH, stones and drainage ought to be managed if land is to be well suited for sustained production.

2.0 Suitable: Land having only minor soil or climatic limitations that will not significantly reduce productivity where any risk of crop loss is possible, but inherently low.

2.1 Suitable (with soil management): Land having only minor soil or climatic limitations that will not significantly reduce productivity where any risk of crop loss is possible, but inherently low. However, soil impediments with regard to soil depth, pH, stones and drainage must be managed if land is to be suitable for sustained production. Failure to do so may result in an increased risk of crop loss.

3.0 Moderately suitable: Land having soil or climatic limitations that is likely to impact on sustained productivity where risk of significant crop loss is possible in some years.

3.1 Moderately suitable (with soil management): Land having soil or climatic limitations that is likely to impact on sustained productivity where risk of significant crop loss is possible in some years. Major soil impediments with regard to soil depth, pH, stones and/or drainage must be managed. Failure to do so may result in significant crop loss and would be considered marginal or even unsuitable for large-scale production if constraints were left unattended.

4.0 Unsuitable: Land having soil and climatic limitations that are too severe for sustained production and will so reduce benefits, or increase required inputs, that this expenditure may not justify. Risk of crop loss is high.

LISTmap instructions

The Raspberries suitability map is a digital layer that can be manually interrogated within [LISTmap](#). Any location can be enquired within Tasmania to provide location specific parameters pertaining to Raspberry suitability. To interrogate a location, simply click on any location whilst the Raspberries suitability layer is active in the table of contents panel and a window will appear listing important attributes. An example is given below:

The screenshot shows the LISTmap web application interface. A map of Tasmania is displayed with a red pin indicating a location. An 'Identify Results' window is open, showing the following data:

Feature	
User Notes	Raspberries.pdf
Overall Suitability Rating	3.1 Moderately suitable (with soil management)
Constraints	Drainage
Manageable Constraints	Drainage
Soil Depth (cm)	>30cm (Well suited)
pH (top 15cm)	5.5 - 6 (Suitable)
Electrical conductivity (ECse) dS/m	<1 (Well suited)
Soil Drainage	Imperfect (Marginally suitable)
Stone abundance (>200mm diameter, top 15cm)	<10% (Well suited)

POI: GDA94 MGA55 : 472383E, 5428766N

The legend on the right side of the interface shows the following suitability ratings:

- 1.0 Well suited
- 1.1 Well suited (with soil management)
- 2.0 Suitable
- 2.1 Suitable (with soil management)
- 3.0 Moderately suitable
- 3.1 Moderately suitable (with soil management)
- 4.0 Unsuitable

The window provides information such as the “Overall Suitability Rating” as well as other useful information including:

- ‘Constraints’ - provides a list of attributes that limits a classification to a particular suitability rating;
- ‘Manageable Constraints’ - provides a lists of soft limitation attributes than should be managed in order to meet the suitability rating (refer to page 1 & 2).

In addition, information pertaining to each soil and climate attribute (according to the classifications provided in the suitability matrix on page 3) are also provided and appear below the overall suitability rating and constraint fields (as shown in the example above). This allows users to ‘drill down’ and view site-specific information regarding soil and climate requirements that relate to Raspberry production for any point of interest in Tasmania.

Vulnerable soils

Listed within the suitability layer (below the individual soil/climate fields) are ratings pertaining to soil vulnerability hazards including:

- Sodicity (ratings of high, moderate, low, nil);
- Salinity (ratings of high, moderate, low, nil);
- Water Erosion (ratings of extreme, very high, high, moderate, low, very low, nil);
- Water Logging (ratings of extreme, very high, high, moderate, low, very low, nil); and
- Wind Erosion (ratings of high, moderate, low, nil).

Information in regards to managing vulnerable soils can be obtained here:

https://nrmdatalibrary.dpipwe.tas.gov.au/FactSheets/WfW/ListMapUserNotes/Vulnerable_soils.pdf

Note that vulnerable soils categories are complementary material to the mapping and does not contribute to the “Overall Suitability Rating”.

Flood risk

Also listed within the suitability layer are categories relating to risk of flood inundation, as provided by flood plain layer within the LIST Hydrography dataset

(http://listdata.thelist.tas.gov.au/public/LIST_Hydrographic_Information.pdf).

Ratings of 'High', 'Moderate' or 'Nil' are listed that correspond to 'Severe', 'Moderate' or 'Nil' flooding potential.

Note that flood risk categories are complementary material to the mapping and does not contribute to the "Overall Suitability Rating".

Additional Information

For information about using LISTmap, please consult the help document:

<http://listdata.thelist.tas.gov.au/public/outgoing/sif/listmaphelp.pdf>

For technical information relating to the dataset, please consult the [metadata](#).

For information relating to irrigation investment, please consult the Investing in Irrigation web-portal:

<http://dpipwe.tas.gov.au/agriculture/investing-in-irrigation>

Contact

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Caution and Disclaimer

The information and material in LISTmap (including the enterprise suitability map layer for Raspberries and accompanying soil and climate input datasets, i.e. "material") is based on computer modelling of the potential suitability of Raspberries to a given area and, as such, there are inherent uncertainties in the results. While every effort has been made to ensure the material is accurate, the Crown in Right of Tasmania ("Crown") provide no warranty, guarantee or representation that the material is accurate, complete, up to date, non-infringing or fit for a particular purpose. All suitability assessments are based upon the assumption that water for crop irrigation is available and therefore is not a limiting factor. Furthermore, the Crown expressly disclaim all and any legal liability and responsibility whatsoever arising from or connected with: (a) the accuracy, reliability, validity, currency or completeness of the material; (b) the consequences of anything done or omitted to be done by any person, either in whole or in part, in reliance of the material. The material does not take into account personal circumstances. The material is made available on the understanding that the Crown are not providing professional advice and that users of this material should undertake site-specific investigations and research and obtain appropriate professional advice relevant to their particular circumstances. The relevant maps that form part of the material have been prepared at 1:50,000 scale (landscape level). These maps consider only soil and climate constraints and do not take into account other parameters or any legislative, regulatory and/or policy requirements of Federal, State or Local Governments that apply to the land in question and/or which could affect the proposed land use or agricultural enterprise.