FINAL REPORT
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South East New South Wales Forestry Hub Inc.

Project 12: Mapping Plantation Potential

P12 SENSW-2023-012-A

31 January 2025

PREFACE

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The report contains the results of plantation suitability and capability modelling (plantation potential) on current non-forested freehold lands in the SEFH. The release of this report is subject to the terms of the Disclaimer provided on the following page.

We trust our report proves useful to you and we would be pleased to provide assistance to you again on future assignments.

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GLOSSARY OF TERMS

Term	Description
-	Minus
%	Percent
/a	Per annum
@	At
~	Approximately
+	Plus
<	Less than
<=	Less than or equal to
=	Equal
>	Greater than
>=	Greater than or equal to
'000 or K	Thousand(s)
AMSL	Above mean sea level
ANWE	Australian Natural Wood Exports
cm	centimetres
deg.	degrees
FCNSW	Forestry Corporation of New South Wales
ha	hectares
LGA	Local Government Authority or Area
m	metre
MAI	Mean annual increment
mm	millimetre
SCF	Southern Cross Forests
SEFH	South East New South Wales Forestry Hub Inc.
SMF	Snowy Mountains Forests

EXECUTIVE SUMMARY

The South East New South Wales Forestry Hub Inc. (SEFH) engaged Margules Groome Consulting Pty Ltd (Margules Groome) to assess the potential for new plantation development within the SEFH region. The study focused on mapping plantation suitability and capability across non-forested freehold lands, using physical, environmental, and land-use criteria. The objective was to provide a strategic overview of where plantation establishment—both hardwood and softwood for timber and carbon—could most likely succeed.

The modelling applied a two-stage process. First, biophysical suitability was assessed using elevation, slope, rainfall, and soil fertility. Second, availability was determined through exclusions such as native vegetation, existing plantations, land use or land zoning restrictions[1], and Crown land tenure. Combining these datasets produced a capability classification for plantation expansion.

The key findings of the project was that, of the SEFH's 4.67 million hectares (ha), ~1.17 million ha are considered capable of the establishment of viable commercial tree plantations in the SEFH region. Importantly, this includes ~158.7 thousand ha modelled as highly capable or capable of supporting commercial tree plantations (Table S-1). The results indicate significant opportunities for plantation expansion, though most land falls within the moderately capable class (Figure S-1).

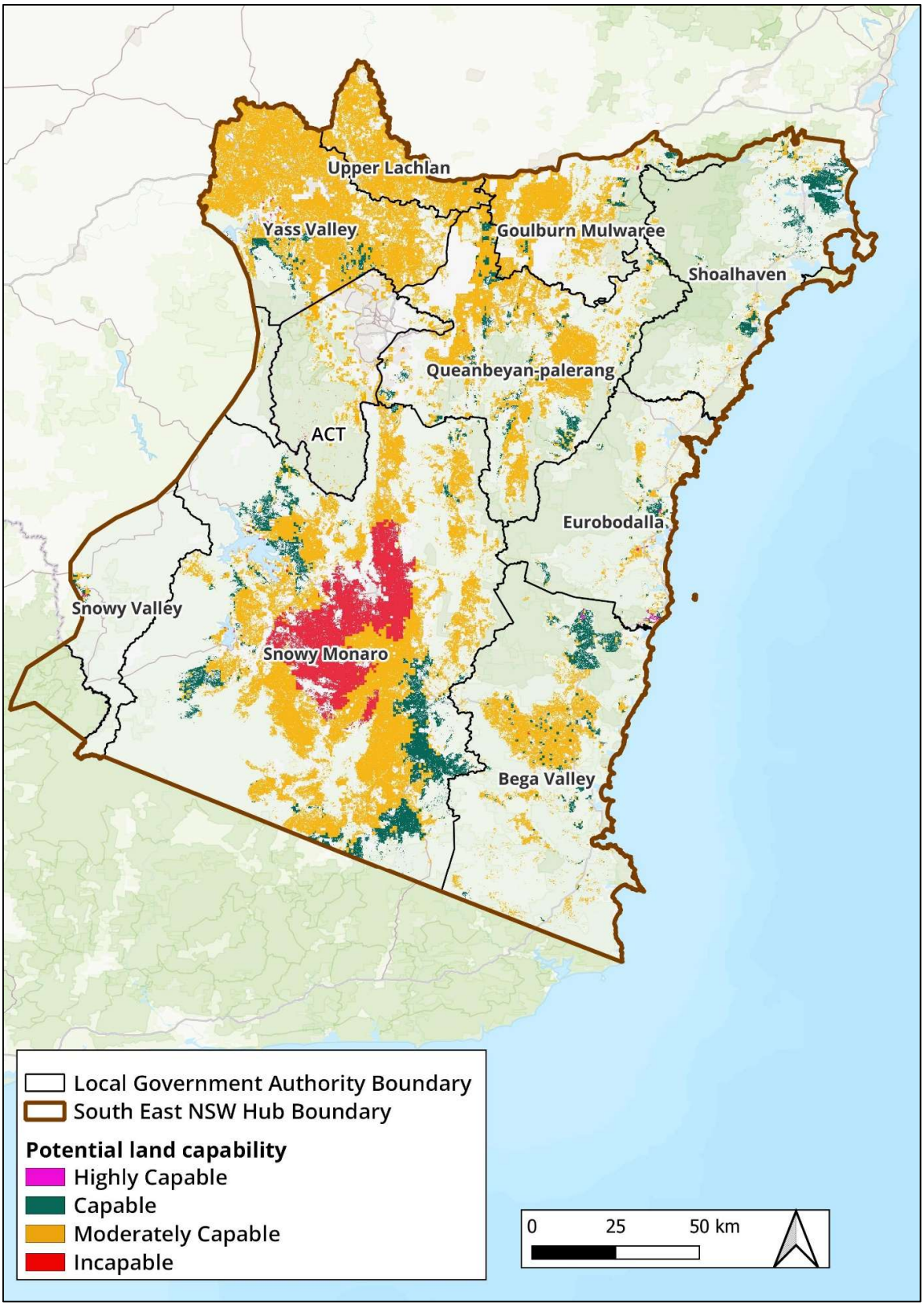
Table S-1:
Modelled Land Capability for Plantation Expansion in the SEFH

Local Government Authority (LGA)	Highly Capable (ha)	Capable (ha)	Moderately Capable (ha)	Incapable (ha)	Excluded Areas (ha)
Australian Capital Territory (ACT)	-	71.8	21 316.7	365.0	214 028.9
Eurobodalla Shire Council	1042.4	4 690.6	12 180.9	56.8	324 221.3
Bega Valley Shire Council	251.9	20 401.1	73 302.6	83.9	534 120.1
Snowy Monaro Regional Council	82.0	78 446.4	345 296.9	6 331.0	1 084 994.4
Queanbeyan-Palerang Regional Council	-	17 908.6	149 459.6	327.6	364 371.0
Goulburn Mulwaree Council	-	3 984.6	76 922.7	204.9	156 047.2
Upper Lachlan Shire Council	-	390.3	86 660.8	33.2	29 621.0
Snowy Valleys Council	-	1 261.3	2 022.4	204.8	232 426.4
Shoalhaven City Council	-	20 845.8	8 633.8	44.4	427 065.3
Yass Valley Council	-	9 366.4	231 032.8	1 055.7	130 570.1
Total	**1 376.2**	**157 366.8**	**1 006 829.3**	**8 707.3**	**3 497 465.7**

The outputs provide a strategic planning tool to identify areas of interest for further investigation by industry, investors, and landowners. They support the SEFH's role in promoting plantation development, guiding infrastructure planning, and fostering farm forestry opportunities. The maps and datasets will be made publicly available.

[1] Land-use and/or land zoning restrictions were assessed at a high level. Each LGA and the ACT may have local planning restrictions that prevent the establishment of plantations on otherwise capable land. This high-level analysis may not adequately cover these localised restrictions.

Figure S-1:
Modelled Plantation Potential in the SEFH



CONTENTS

1 INTRODUCTION

Margules Groome Consulting Pty Ltd (Margules Groome) has been engaged by the South East New South Wales Forestry Hub Inc. (SEFH) to undertake this project (P12-SENSW-2023-012-A, Project 12: Mapping Plantation Potential). The project maps the tree-growing potential on non-forested freehold lands in the SEFH region based on the suitability and capability of the land and environment. The aim is to provide guidance as to where in the region tree plantations for timber and carbon, either softwood or hardwood, would be most likely to succeed from a tree-growing perspective. The analysis does not consider the costs or logistics to market for the timber. This report summarises the methodology and approach undertaken to complete the project.

1.1 About the SEFH

The Australian Government developed the policy "*Growing A Better Australia—A Billion Trees for Jobs and Growth"* to help create the environment for significantly increasing new plantation forestry plantings and delivering confidence to our forestry-dependent communities that they may have a bright future.[2]

To support the delivery of the goal of a billion new plantation trees to meet our future needs for wood and fibre, and drive jobs and growth in rural industries and regional manufacturing, the Australian Government is focusing on:

- Driving plantation growth by creating Regional Forestry Hubs, focusing on existing softwood plantation and processing regions. The hubs will identify new plantation opportunities, ensuring the right trees are planted in the right places, add value to existing infrastructure and processing capability, and maximise community participation.
- Delivering the policy mechanisms and on-ground support within the hubs will give farmers the confidence to participate in profitable farm forestry ventures.
- Reducing barriers to forestry expansion and supporting planting more trees, with a strong focus on the hubs.
- Using our forestry resources smarter, to help industry extract greater value from our forest products.
- Growing community understanding of forestry, to build public support for sustainable forestry activities in Australia.
- A key component in expanding existing plantation forests and establishing new plantations is the creation of Regional Forestry Hubs across the country. These hubs work with industry, state and local governments, other key stakeholders, and the community to undertake assessments of the hubs' production forestry resources, processing capacity, infrastructure needs, and limitations.

[2] Department of Agriculture and Water Resources 2018, Growing a Better Australia – A Billion Trees for Jobs and Growth, Canberra.

The South East New South Wales Forestry Hub Inc. (the South East Forestry Hub, or SEFH) was established in 2022 and has received funding under the National Forest Industry Plan (the Plan), which has the overarching objectives of "better returns to business, more investment, more jobs and greater economic prosperity for Australia" and "improve the productivity and efficiency of Australia's forestry sector and support each region and its economy."

The key activities of the SEFH are:

- To support the development of the SEFH.
- Define the boundaries of the SEFH region.
- Undertake a strategic assessment of factors impacting on the forest growing and processing sectors in the SEFH region.
- Consult with the following sectors in undertaking assessments in the Hub:
  - Forest growers.
  - Processors.
  - Local Government.
  - Other groups as per the priority issues for the region (e.g., transport providers, training providers, etc.).
  - State and Commonwealth Government Agencies as appropriate.
- Undertake detailed assessments on the priorities (e.g., infrastructure) to determine the technical problems, needs, and opportunities for future progress of the forest and wood products industries.
- Based on the activities undertaken, report to the Commonwealth on the current state of the SEFH region's forest industries and factors limiting future growth.
- Make all material developed through this funding available to the Commonwealth, except for commercially sensitive or confidential material provided by third parties.

The SEFH priorities are:

- **Consultation** - to consult with a wide range of stakeholders and interested parties across the SEFH region to review and analyse the constraints that affect the productivity and efficiency of the forestry sector within the SEFH region.
- **Map Current Forest Resources** - undertake broad-scale mapping of the forest resources within the SEFH region by tenure and management. The aim is to improve the knowledge of the forest estate, including management objectives and the potential for timber production within the SEFH . This includes data on farm forestry and industrial plantations, as well as public and privately owned natural forests.
- **Future Forest Investment** - identify opportunities for future investment in forest resource development (both planted and natural forests) for multiple

outcomes, infrastructure, and technology, that will aid potential forest industry expansion.

- **Investment Business Case** - identify and support business cases for the investment in new infrastructure, such as roads, bridges, telecommunications and training facilities, thereby assisting the planning of the service industries that support forest management in the SEFH region.
- **Future Plantation Development** - determine the potential for future plantation expansion (softwood and hardwood) within appropriate transport distances and near other existing wood fibre sources. This could include mapping potential land availability for plantations and engaging with local government, farmers, indigenous communities, and other landowners to promote forest plantings.

The SEFH is overseen by a committee of local stakeholders charged with ensuring the Hub meets the Australian Government's objectives in the context of the south-east NSW forest industry.

1.2 Background to the Project

One of the SEFH key activities is to undertake detailed assessments on the priorities to determine the technical problems, needs, and opportunities for future progress of the (forest and wood products) industries. This project seeks to partially address two priorities:

- Identify opportunities for future investment in forest resource development that will aid potential forest industry expansion.
- To determine the potential for future plantation expansion (softwood and hardwood), including mapping potential land availability.

In that context, this project's rationale is to better understand the potential for plantation expansion based on biophysical, climate, and tenure constraints, and any planning and land zoning restrictions that might impact the potential development of new plantations. The project scope specifically requested the plantation capability mapping deliver maps and a report, which:

- Delineate the areas that have the suitability for new plantations within the SEFH boundary.
- Classify the potential capability of those areas to support plantations.
- Describe the methodology used.
- Report on the key findings.
- Calculates the area by capability classes.
- Differentiates total area and area by capability class within each local government area (LGA).
- Describes any specific impediments identified during the process, for example, the need to upgrade infrastructure to enable new plantation development.

2 METHODS AND MODELLING LOGIC

This section details the modelling methodology for developing plantation suitability and capability mapping outputs.

2.1 Modelling Approach

The datasets used are listed in Table 2-1. All available data were resampled to match the model's grid structure. Two approaches were applied:

- Binary exclusion modelling, where pixels were classified as either available or not.
- Limiting factor analysis, where each input parameter was assigned a rating from 1 (highest capability) to 5 (lowest capability).

For the limiting factor analysis, the overall result for a pixel was determined by its poorest rating (the highest number) among all parameters (refer to Table 2-3). This approach is practical when only limited datasets are available, but it is conservative because a single low-rated factor (from many) can significantly reduce the pixel's overall capability.

Table 2-1:
Model Input Parameters

Modelling Step	Input Dataset	Modelling Approach
Step 1	Elevation	Exclusion
	Slope	Category
	Soil fertility	Category
	Rainfall	Category
Step 2	Native vegetation	Exclusion
	Existing plantation estate	Exclusion
	Land zoning	Exclusion

2.2 Model Logic

The model logic for developing the plantation potential mapping is detailed below and summarised in Figure 2-1.

2.2.1 Step 1: Potential Land Suitability for Commercial Plantations

The first step was to determine what land was suitable to support commercial plantation development, independent of the land base availability. The importance of undertaking this step initially is that by modelling suitability across the entire region, a qualitative "sense check" was allowed against the existing plantation estate to determine whether the model settings were appropriate.

2.2.2 Step 2: Potential Land Availability for Commercial Plantations

The second step was to determine what land is potentially available to support the expansion of the plantation estate within the SEFH region boundary. This was

undertaken by determining which land is excluded, based on data inputs[3] (Table 2-2).

Table 2-2:
Source of Input data

Dataset	Source
Rainfall	https://data.gov.au
Slope	https://www.clw.csiro.au
Soil fertility	https://data.nsw.gov.au
Elevation	https://data.gov.au
Land-use, land zoning	https://www.planningportal.nsw.gov.au
Native vegetation	https://portal.spatial.nsw.gov.au

2.2.3 Step 3: Potential Land Capability for Commercial Plantations

The result was a spatial layer (map) showing what land within the SEFH region was capable of support a commercial plantation. This was based on combining the outputs of Steps 1 and 2.

2.2.4 Step 4: Potential Land Productivity for Commercial Plantations

A further step, not taken in this project, would be to assign indicative productivity classes by mean annual increment (MAI) bands to the land capability classes for commercial plantations. This step would likely be informed by yield data provided by existing plantation growers (i.e Forestry Corporation of NSW, FCNSW; Snowy Mountains Forests, SMF; Southern Cross Forests, SCF; and Australian Natural Wood Exports, ANWE), and consultation with professional foresters employing local knowledge. This stage of the analysis would also be species dependent, with the primary hardwood species planted in the region, (*Eucalyptus nitens*, *E. globulous*, *Corymbia maculata*, etc.), having different indicative MAI bands to the primary softwood plantation species planted in the region, *Pinus radiata* (radiata pine).

2.3 Model Inputs - Data Sets

Pre-processing of Data

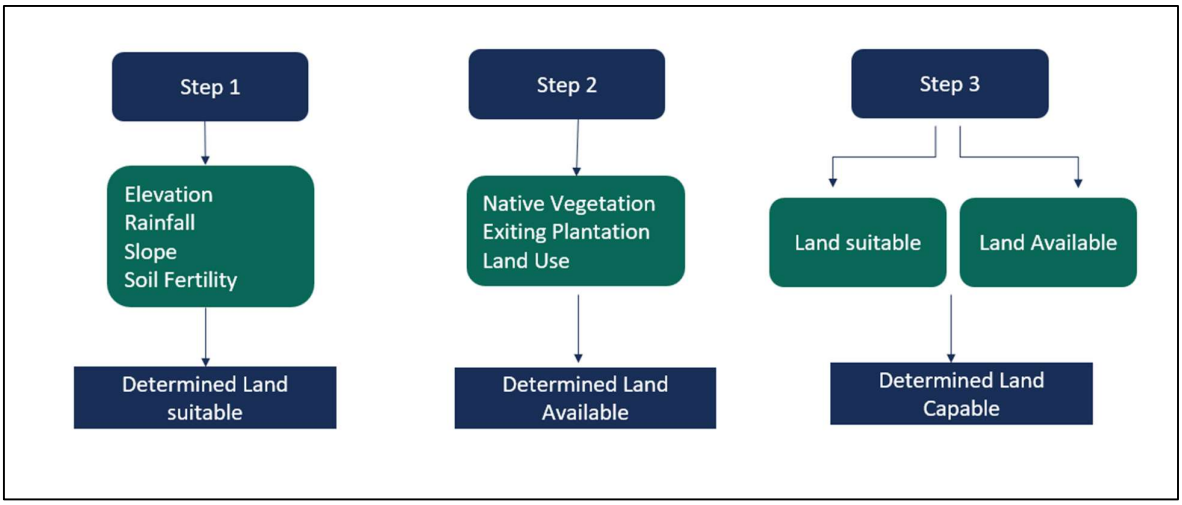
Before developing models, the following pre-processing actions were undertaken:

- Input data were re-projected into a common projected coordinate system (Projection: EPSG:4326 - WGS 84).
- Data were clipped to the SEFH boundary.
- Data were resampled into a raster grid format according to digital elevation (90 m x 90 m) and aligned to a common origin.

The input data were modelled to produce capability categories as outputs.

[3] Land-use and/or land zoning restrictions were assessed at a high level. Each LGA and the ACT may have local planning restrictions that prevent the establishment of plantations on otherwise capable land. This high-level analysis may not adequately cover these localised restrictions.

Figure 2-1:
Model Logic for the Plantation Potential Mapping Project



2.3.1 The Datasets and Modelling Application

For the final result, pixels were classified using binary land availability (available/not available) and a four-grade capability scale. Cells rated as having "no data" were excluded from modelling.

Table 2-3:
Plantation Capability Rating Codes Assigned in the Model

Rating Code	Rating Description
1	Highly capable
2	Capable
3	Moderately capable
4	Incapable
5	N/A

2.4 Modelling Steps

2.4.1 Step 1: Potential Land Suitability for Commercial Plantations

The input data layers for physical and environmental characteristics included in the modelling were combined to develop a plantation suitability layer (or land suitable to support plantation expansion regardless of land-use exclusions) based on the input categories shown in Table 2-4. The exclusions (already forested or Crown lands) were overlaid to produce a capability land layer for plantation expansion based on physical and environmental values in Step 2 (refer Section 2.4.2).

Table 2-4:
Input Categories Applied in the Model

	Capability			
Input Data	**Highly Capable**	**Capable**	**Moderately Capable**	**Incapable**
Elevation (m)	<1 300	<1 300	<1 300	>1 300
Soil Fertility ID	5	3 & 4	1 & 2	1 & 2
Rainfall (mm)	+900	700-900	550-700	<550
Slope (deg.)	0-26	0-36	0-56	+56

Elevation

Elevation is an inclusion/exclusion parameter whereby areas in the SEFH region with an elevation greater than 1 300 m above mean sea level (AMSL) were excluded as per Table 2-4 (refer Appendix 1).

Rainfall

Rainfall for the SEFH region is a category parameter (Table 2-4). Rainfall less than 550 mm/year is excluded (unsuitable for commercial tree plantation growing), and the remaining values are categorised (refer Appendix 1).

Slope

Land slope for the SEFH region is a category parameter (Table 2-4). Land with slopes greater than 56 degrees are excluded (unsuitable for commercial tree plantation growing), and the remaining values are categorised (refer Appendix 1).

Soil Fertility

The source soil fertility input data contained six (6) classes sourced from the NSW land and soil capability assessment scheme (State of NSW and Office of Environment and Heritage). This was modified to include not assessed land and water bodies (Table 2-5). The soil types used to define the Soil Fertility Classes are based on the Inherent Soil Fertility classes of the Great Soil Groups[4] (Appendix 1). Each class was assigned an input value for the model (Table 2-4).

[4] These are modified from Charman (1978) and defined in Department of Planning, Industry and Environment, 2020, Estimated Inherent Soil Fertility of NSW, Version 4, NSW Department of Planning, Industry and Environment, Parramatta. https://data.nsw.gov.au/search/dataset/ds-nsw-ckan-071729c0-a9d1-4320-a584-896d49894f20/details?q=inherent%20soil%20fertility
Charman, P.E.V. (ed.) (1978) *Soils of New South Wales: Their Characterisation, Classification and Conservation*. Technical Handbook No. 1, Soil Conservation Service of NSW, Sydney.

Table 2-5:
Grid Cell Value – Soil Fertility Classes in the Source Classification System

Soil Fertility ID	Category Parameter Value Range (Soil Fertility Class)
1	Low
2	Moderately low
3	Moderate
4	Moderately high
5	High
98	Not assessed
99	Water

2.4.2 Step 2: Potential Land Available for Commercial Plantations

Land Zoning

Land zoning is an inclusion/exclusion parameter. Table 2-6 presents the values applied based on the pixel condition. Land zones where commercial tree plantation development is possible under the NSW Planning Scheme are included as available.[3] Table 2-7 presents the category values incorporated into the model.

Table 2-6:
Grid Cell Values for NSW Planning Scheme Land Zoning Categories and Availability for Plantations

Grid Cell Value Description	Grid Cell Value Description
1	Business Development
2	Business Park
3	Commercial Core
4	Deferred Matter
5	Enterprise Corridor
6	Environmental Conservation
7	Environmental Living
8	Environmental Management
9	Forestry
10	General Industrial
11	General Residential
12	Heavy Industrial
13	Infrastructure
14	Large Lot Residential
15	Light Industrial
16	Local Centre
17	Low Density Residential
18	Medium Density Residential
19	Mixed Use
20	National Parks and Nature Reserves
21	Natural Waterways
22	Neighbourhood Centre
23	Primary Production
24	Primary Production Small Lots
25	Private Recreation
26	Public Recreation
27	Recreational Waterways
28	Rural Landscape
29	Special Activities
30	Tourist
31	Transition

Table 2-7:
Availability Rating Treatment by NSW Planning Scheme Land Zoning Filter

Rating Description	Grid Cell Value Filter
Highly capable	9, 14, 23, 24, 28
Capable	
Moderately capable	
Incapable	
N/A	1-8, 10-13, 15-22, 25-27, 29-32

Native Vegetation

Native vegetation is an inclusion/exclusion parameter. Table 2-8 presents the values applied based on attributes of that pixel. Table 2-9 presents the category values incorporated in the model.

Table 2-8:
Grid Cell Values for Native Vegetation and Availability for Plantations

Grid Cell Value	Type	Description	Input to Model
0	Not native	Not native vegetation	Include
1	Tree cover	Trees >2 m height	Exclude
2	Candidate native grasslands	Potential native grassland visually assessed from a single data 50 cm aerial image	Include
3	Forestry plantations	Softwood and hardwood plantations	Exclude
4	Water	All water bodies	Exclude
5	Tree cover matrix	Not woody pixels between native woodland trees woodland trees	Include

Table 2-9:
Availability Rating Based on Native Vegetation Filter

Rating Description	Grid Cell Value Filter
Highly capable	0, 2, 5
Capable	
Moderately capable	
Incapable	
N/A	1, 3, 4-5

Existing Plantation Estate

The existing commercial tree plantation estate is an exclusion parameter. Any currently mapped plantation is excluded.

2.4.3 Step 3: Potential Land Capability for Commercial Plantations

Land capability represents the combined assessment of land availability and suitability. For each pixel, the lowest-performing parameter determined the final capability class, ensuring that any limiting factor defined the overall classification. Plantation land capability, therefore, indicates the potential for expansion of the plantation estate under these constraints. The plantation land capability establishes the potential for expansion of the plantation estate.

3 RESULTS

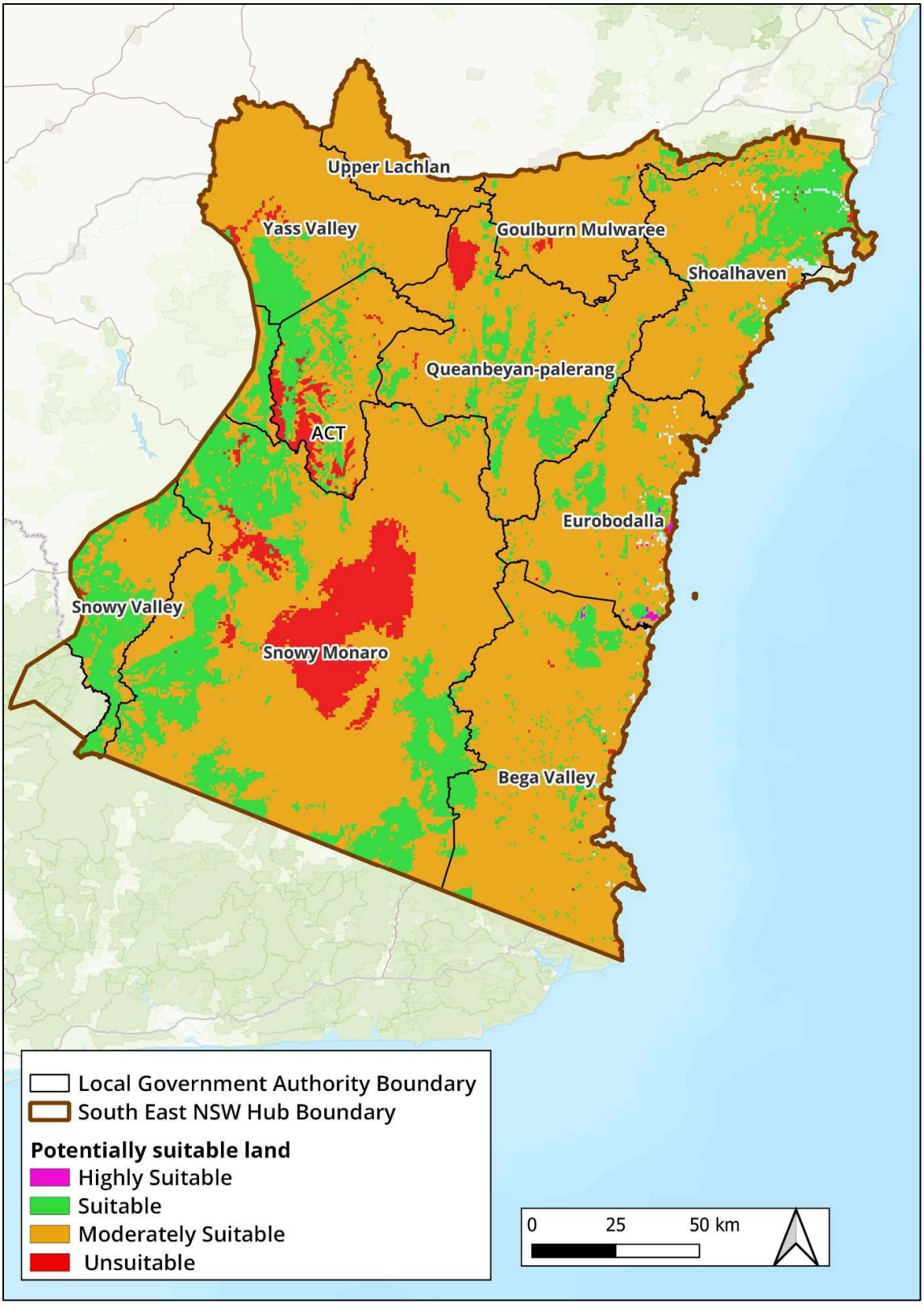
3.1 Step 1: Potentially Suitable Land for Plantation Expansion

Plantation suitability was based on the physical and environmental parameters: slope, elevation, soil fertility, and rainfall. Modelling identified 3 238.5 ha as highly suitable, 848 905.1 ha as suitable, 3 535 351.5 ha as moderately suitable and 284 250.2 ha as unsuitable (Table 3-1 and Figure 3-1).

Table 3-1:
Land Suitability for Plantation Establishment by LGA

LGA	Highly suitable (ha)	Suitable (ha)	Moderately suitable (ha)	Un-suitable (ha)
Australian Capital Territory (ACT)	-	59 808.5	142 482.3	33 491.6
Eurobodalla Shire Council	2 605.5	35 947.9	295 230.6	8 408.0
Bega Valley Shire Council	448.0	57 254.0	561 423.5	9 034.1
Snowy Monaro Regional Council	185.0	334 884.9	994 127.6	185 953.2
Queanbeyan-Palerang Regional Council	-	81 916.1	434 171.2	15 979.4
Goulburn Mulwaree Council	-	9 389.4	224 038.9	3 731.0
Upper Lachlan Shire Council	-	529.5	115 532.5	643.3
Snowy Valleys Council	-	118 982.3	114 655.9	2 276.6
Shoalhaven City Council	-	106 049.3	333 732.1	16 807.9
Yass Valley Council	-	44 143.0	319 956.9	7 925.2
Total	**3 238.5**	**848 905.1**	**3 535 351.5**	**284 250.2**

Figure 3-1:
Modelled Potential Land Suitability for Plantations in the SEFH



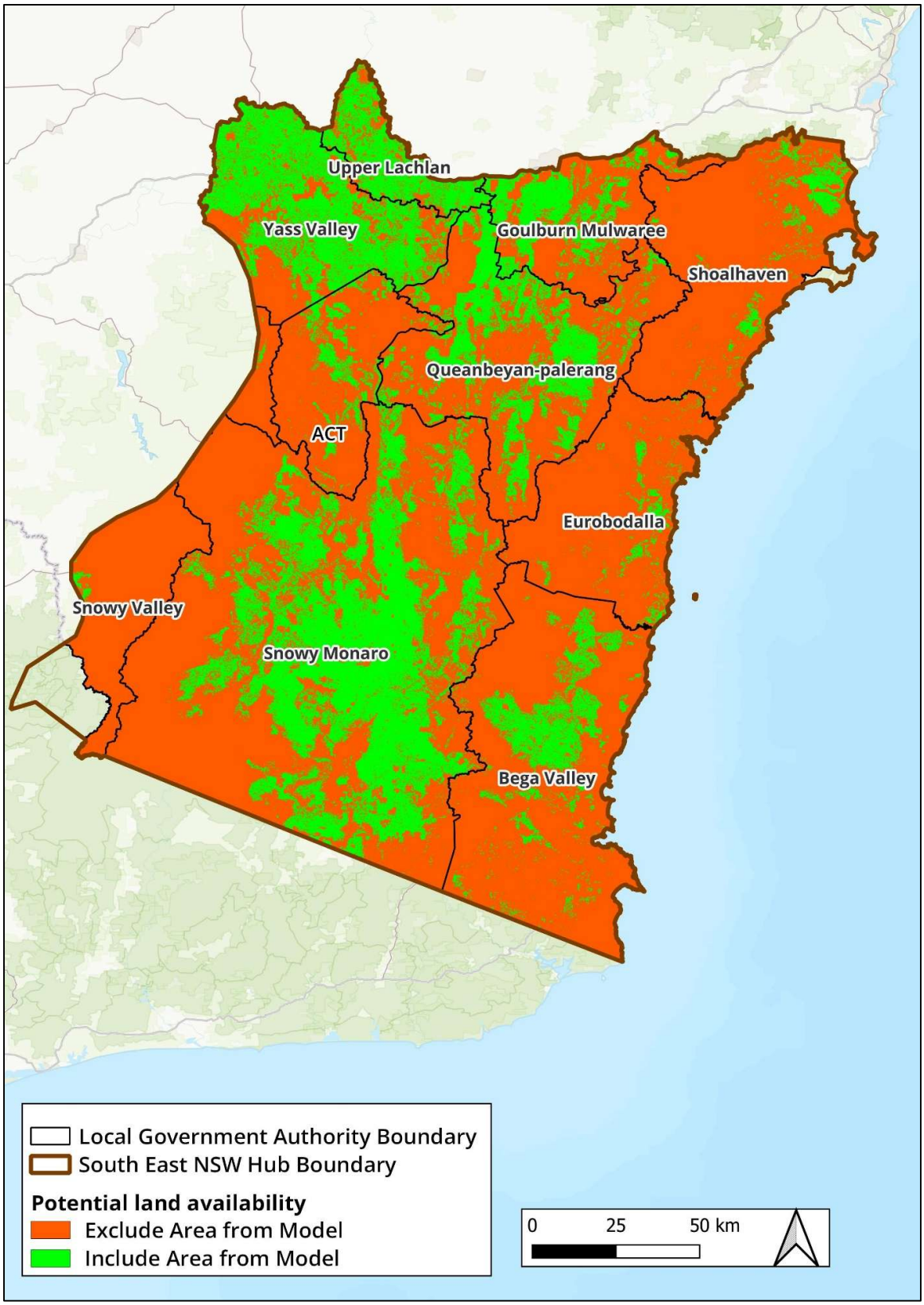
3.2 Step 2: Potentially Available Land for Plantation Expansion

The SEFH region comprises 4 671 745.3 ha of land, of which about 1 315 445.8 ha is potentially available based on the exclusion criteria applied (Table 3-2 and Figure 3-2). Land potentially available for plantation establishment was identified based on pre-determined exclusions. Exclusions were based on existing land uses, the presence of existing commercial tree plantations, and the presence of Crown land tenures (e.g. State Forest, National Park, etc.).

Table 3-2:
Potential Land Availability for Plantation Expansion by LGA

LGA	Included Areas (ha)	Excluded Areas (ha)
ACT	34 017.3	201 765.1
Eurobodalla Shire Council	18 805.8	323 386.1
Bega Valley Shire Council	95 349.2	532 810.4
Snowy Monaro Regional Council	549 542.0	965 608.7
Queanbeyan-Palerang Regional Council	170 281.3	361 785.5
Goulburn Mulwaree Council	81 548.6	155 610.8
Upper Lachlan Shire Council	87 208.0	29 497.3
Snowy Valleys Council	3 652.7	232 262.3
Shoalhaven City Council	32 603.5	423 985.8
Yass Valley Council	242 437.4	129 587.6
Total	**1 315 445.8**	**3 356 299.6**

Figure 3-2:
Modelled Excluded and Potential Land for Plantations in the SEFH



3.3 Step 3: Potential Land Capability for Commercial Plantations

Land capability for commercial tree plantation expansion was modelled by intersecting suitability and availability layers. That is, modelled suitability classification applicable to land modelled as potentially available for plantation expansion (1 165 572.3 ha) was assessed into an equivalent capability classification. For modelled available land, there were 1 376.2 ha modelled as highly capable, 157 366.8 ha as capable, 1 006 829.3ha as moderately capable, 8 707.3 ha was modelled as incapable, and 3 497 465.7 ha was excluded (Table 3-3 and Figure 3-3).

Table 3-3:
Modelled Land Capability for Plantation Expansion on Available Land in the SEFH

Local Government Authority	Highly Capable (ha)	Capable (ha)	Moderately Capable (ha)	Incapable (ha)	Excluded Areas (ha)
ACT	-	71.8	21 316.7	365.0	214 028.9
Eurobodalla Shire Council	1042.4	4 690.6	12 180.9	56.8	324 221.3
Bega Valley Shire Council	251.9	20 401.1	73 302.6	83.9	534 120.1
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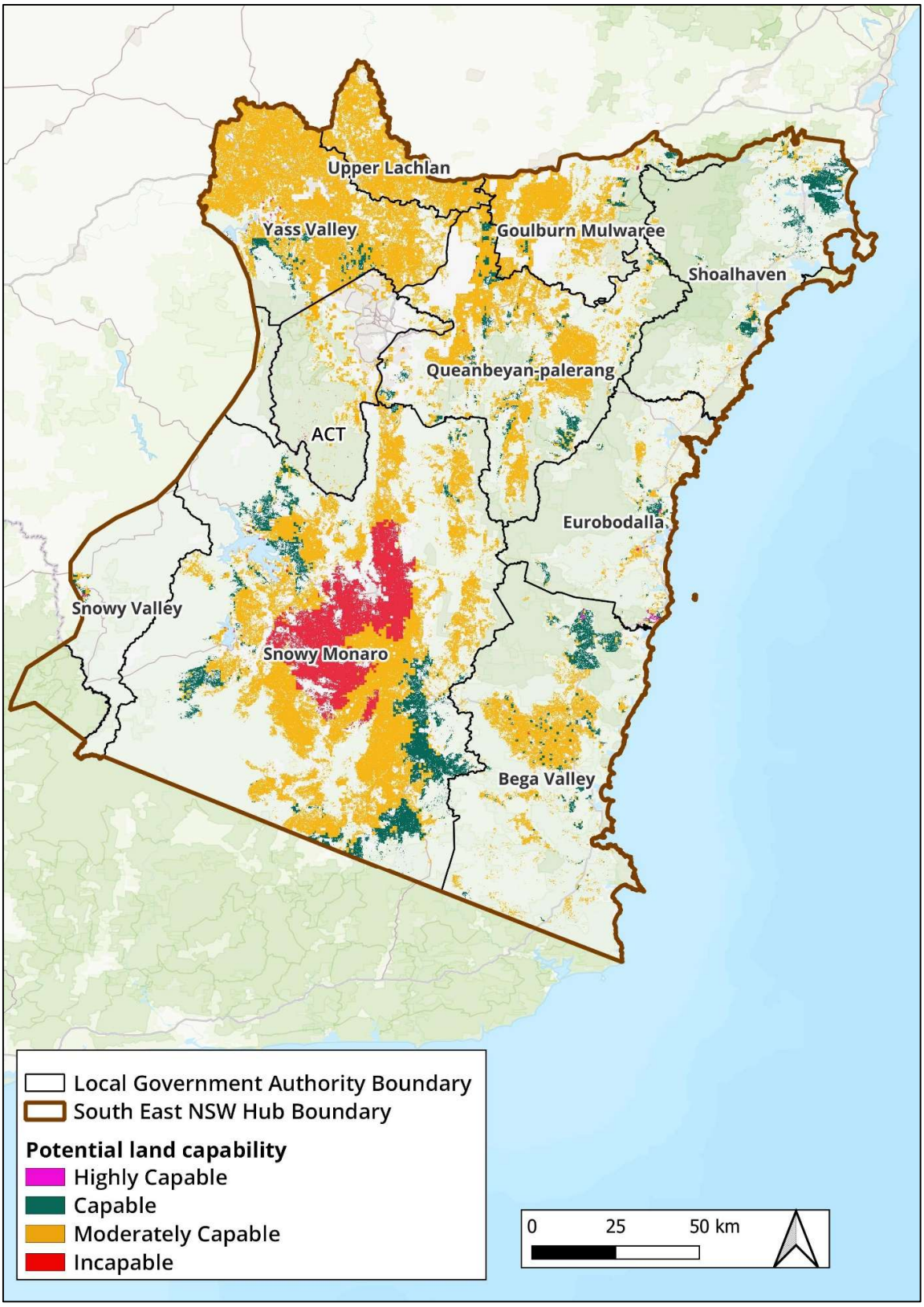
Total	**1 376.2**	**157 366.8**	**1 006 829.3**	**8 707.3**	**3 497 465.7**

Figure 3-3:
Modelled Plantation Potential on Available Land in the SEFH



4 DISCUSSION

4.1 Model Outputs

Plantation suitability and capability modelling has identified ~1.17 million ha of land capable of supporting the establishment of viable commercial tree plantations in the SEFH region. Importantly, this includes ~158.7 thousand ha modelled as highly capable of supporting commercial tree plantations.

4.2 Application of Plantation Potential Mapping

Intended Use

The specific intent of plantation capability mapping is to provide evidence (analysis and outputs) to support identifying focus areas (nodes) for potential plantation expansion. It is a high level, strategic tool intended to be used, combined with other modelling and information, to provide guidance for a wide range of stakeholders, including:

- The forest and wood products industry in the region.
- Potential plantation investors and landowners who may have an interest in plantation establishment in agricultural settings.

Report and Data Availability

The outputs from this modelled plantation capability mapping project will be made publicly available.

4.3 Limitations

Modelling Limitations

There are limitations associated with the suitability and capability modelling methods that are essential to recognise. First, while significant effort was applied to identify and incorporate soil fertility data into the capability model, requisite soil fertility data were unavailable with sufficient granularity or in appropriate formats. Consequently, any future correlation between capability and productivity modelling may be compromised, requiring alternative methods to represent it accurately. Second, as with capability modelling, there is robust anecdotal evidence to support the productivity classifications in the south of the SEFH region provided by existing plantation estates, but results to the north and west of the region are likely to be less reliable and could be underestimated. Finally, actual productivity data from the existing plantation estates would provide a firm basis to inform and confirm productivity modelling outputs if this analysis progresses to Step 4. However, due to understandable commercial sensitivities, these data may not be readily available from the larger forest growers in the region. These limitations can likely be addressed practically to improve the veracity of any productivity modelling outputs in future.

Comparison with the Existing Plantation Estate

A first logical step in undertaking a plantation capability mapping exercise for a specified region is to apply data from existing plantations to correlate (calibrate) the results of this project against known physical and environmental characteristics. Again, due to commercial sensitivities, plantation growers in the region did not provide data for the existing estate to support further enhancement of the capability mapping. However, consultation with professional foresters and other experts employing local knowledge would suggest that the commercial tree plantation capability mapping exercise for the SEFH region has provided a reasonably accurate spatial analysis to support tree plantation expansion.

Historic Plantation Capability Mapping

The second logical step is to determine whether previous work has been undertaken, which can inform further enhancement of the model outputs. In the SEFH region, suitability and capability projects have been undertaken since at least the 1990s. However, the availability of outputs from such projects is generally limited, as is the underlying input data. Therefore, this project could not use some historic works to support assumptions concerning input factors contributing to the capability of commercial tree plantations in the region.

Limiting Factor Model

Applying a limiting factor modelling approach to commercial tree plantation capability mapping means modelled outputs tend to be conservative.

Output Format

The model outputs are presented in raster format on a 90 m x 90 m grid. Model inputs vary in granularity; consequently, overall modelled outputs must be considered strategic rather than site-specific. Users should be aware of the strategic nature of the model because while it will be possible for a user to identify modelled capability outputs for a site, the caveats made on publicly available information must be noted. Hence, a party must rely on their own specific inquiries and site-specific characteristics to determine actual plantation capability for that site.

4.4 Potential Improvements and Future Development

Plantation Productivity Modelling

Undertake Step 4 outlined in this report to map the potential land productivity for commercial plantation development in the SEFH region. This step would be a precursor to presenting any financial models. This step would include the input of actual productivity (growth and yield) data from current plantation owners in the region to refine the outputs.

Financial Models

The SEFH has identified a potential project to develop simple financial models to guide landowners regarding potential returns from plantation establishment in the region. It is possible that these models could be linked to plantation capability or productivity mapping outputs to identify their location and access financial

guidance material relevant to their situation. However, the same caveats on publicly available information would need to be noted, and parties must rely on their own specific inquiries and site-specific characteristics to determine actual plantation capability and productivity for a site.

Understanding Potential Impacts of Climate Change

The likely impacts of climate change on the capability of land to support commercial tree plantations in Australia are still not well understood. It has been forecasted that different regions are likely to experience either positive or negative outcomes due to increased or decreased rainfall, temperature, and changes in seasonality. For example, Pinkard *et al* (2014)[5] identified that across key Victorian and NSW plantation regions, median likely plantation productivity for eucalypts and radiata pine will improve in some areas. There is value in the SEFH considering a more in-depth analysis of potential implications (positive and negative) of climate change for commercial tree plantations across the SEFH region. This should include consideration of alternative plantation species.

[5] Pinkard, L., Bruce, J., Battaglia, M., Matthews, S., Drew, D., Downes, G., Crawford, D. & Ottenschlaeger, M. (2014) *Adaptation Strategies to Manage Risk in Australia's Plantations*, Project No: PNC228-1011, Forest & Wood Products Australia.

5 APPENDIX 1 – MAPS

Figure 5-1:
Input – Elevation

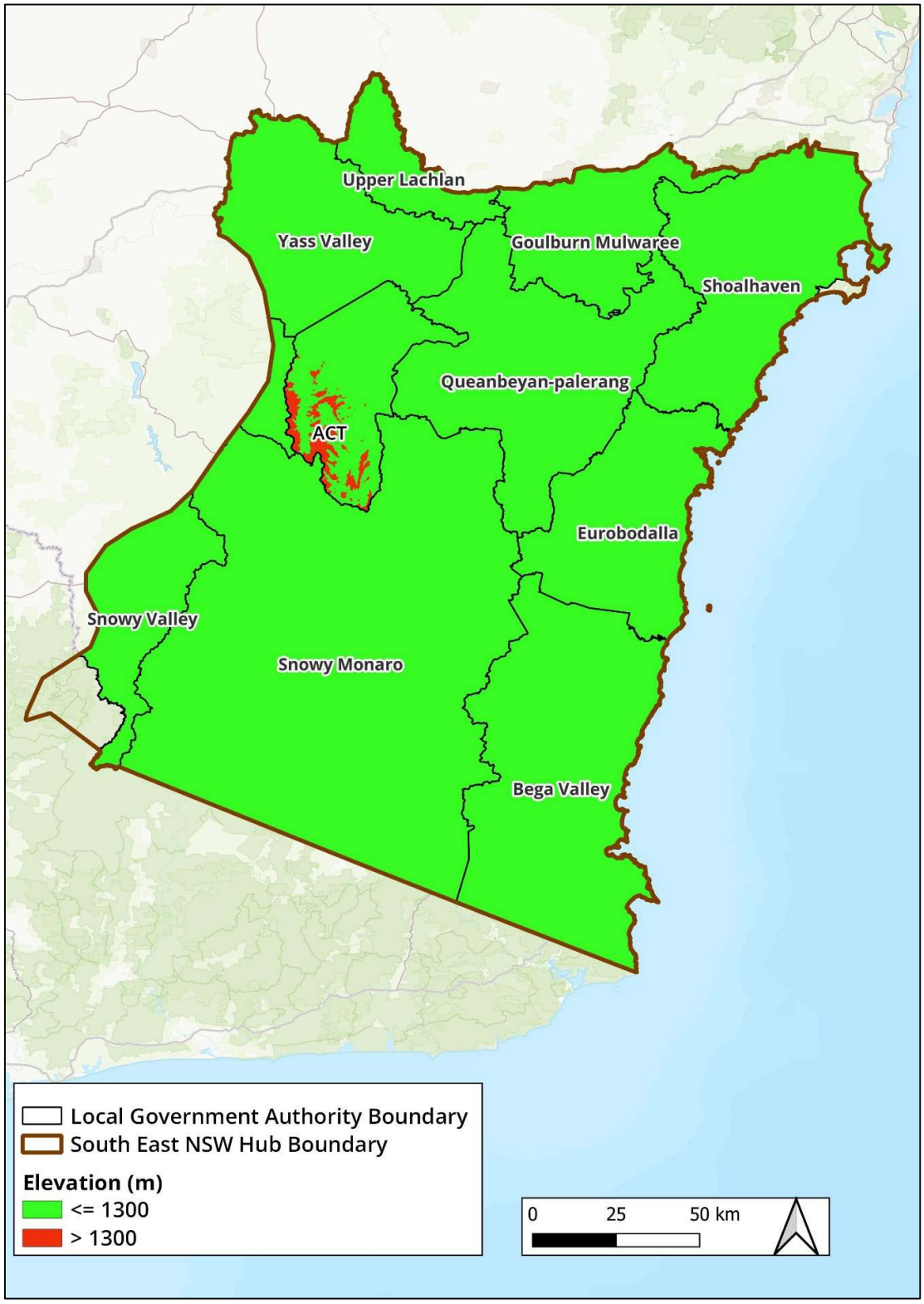


Figure 5-2:
Input – Rainfall

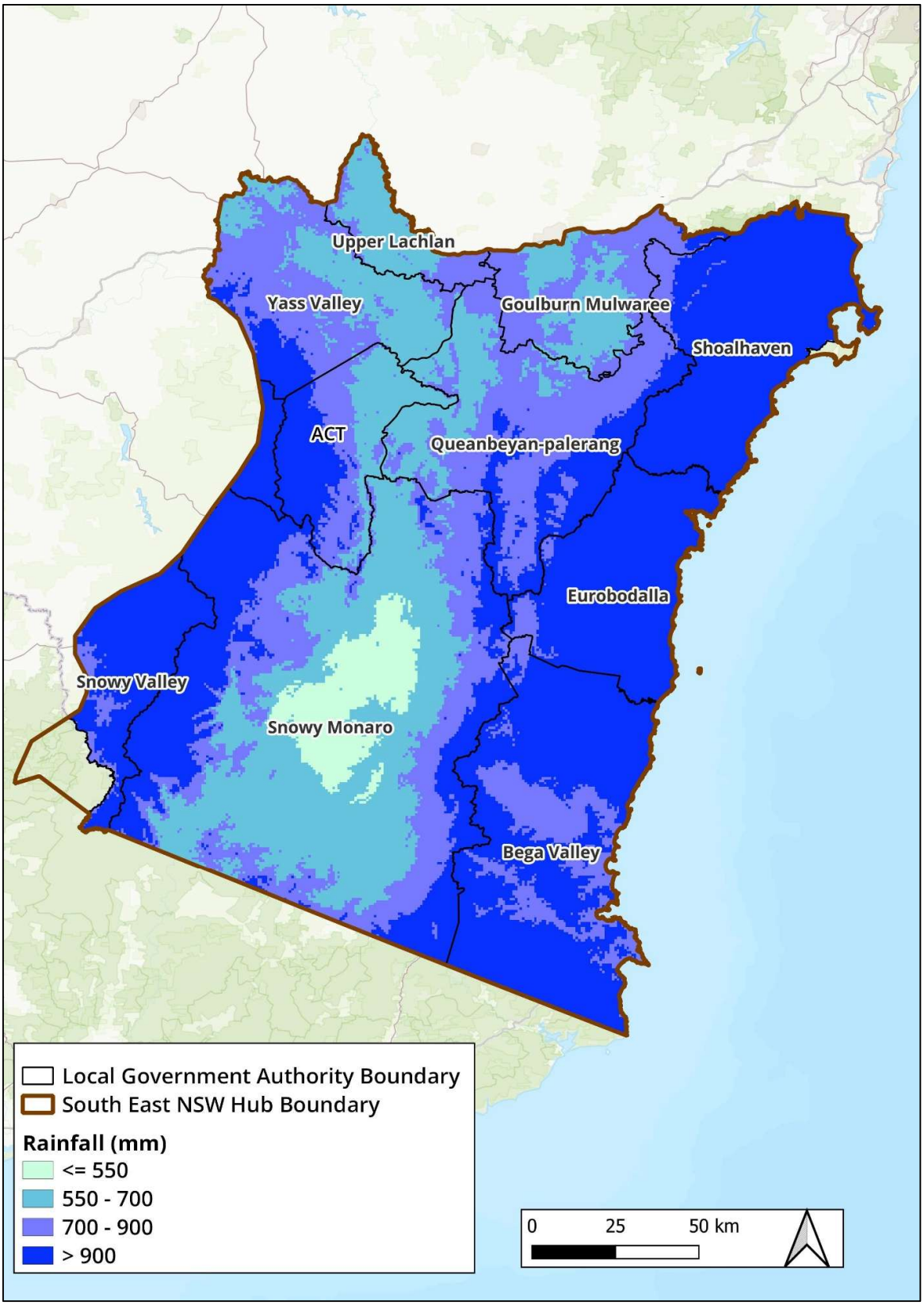


Figure 5-3:
Input – Slope

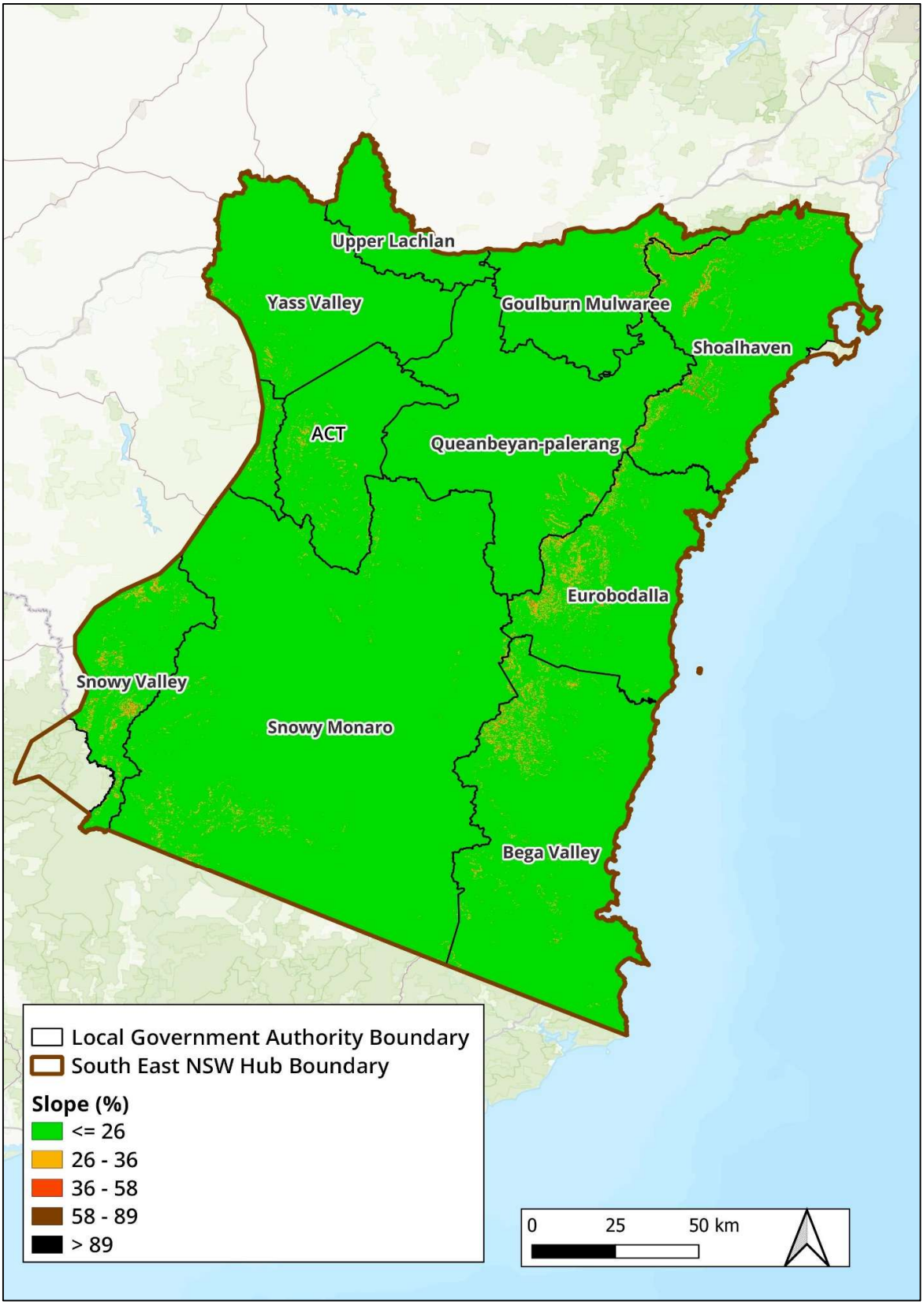
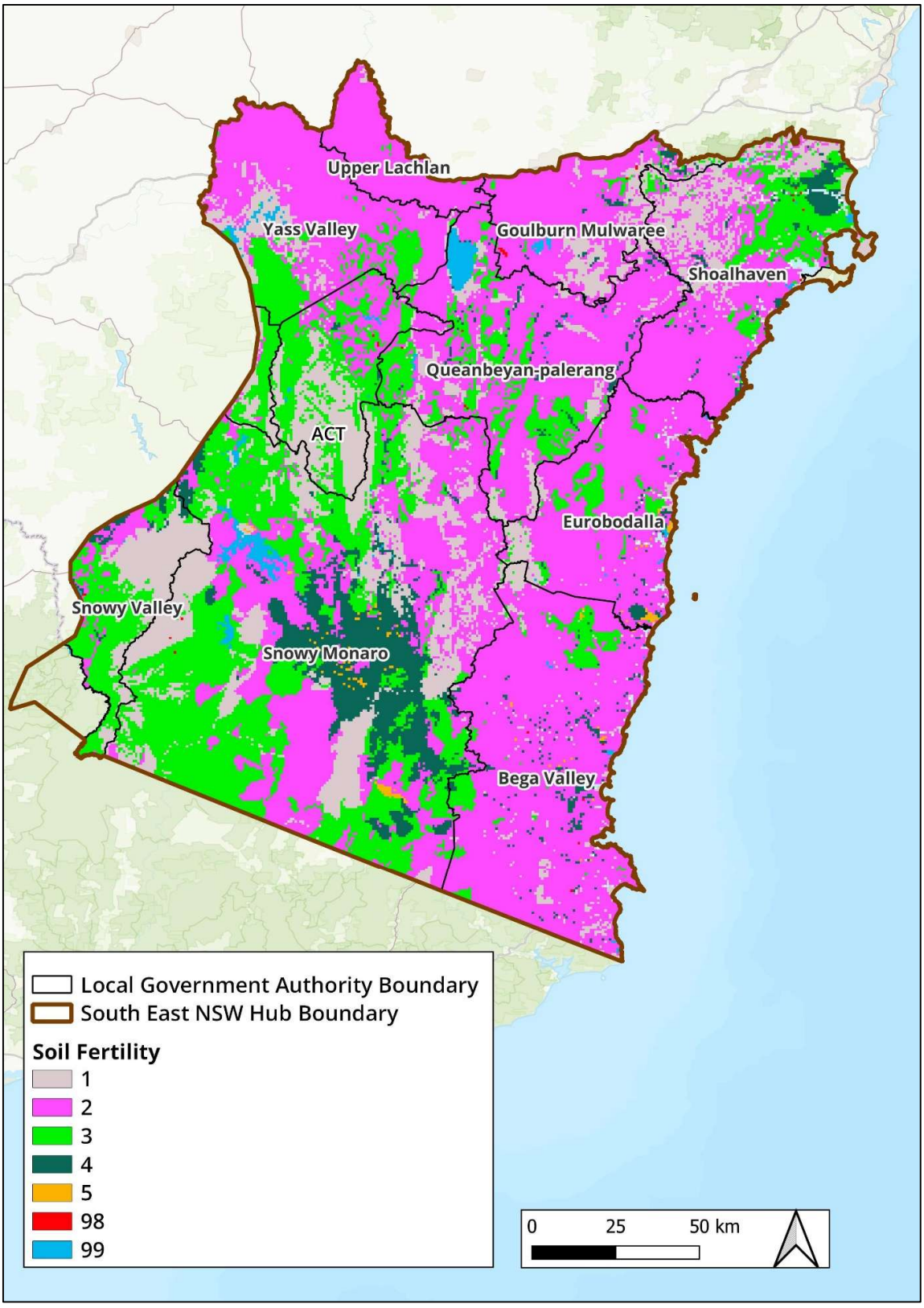


Figure 5-4:
Input - Soil Fertility Classification



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