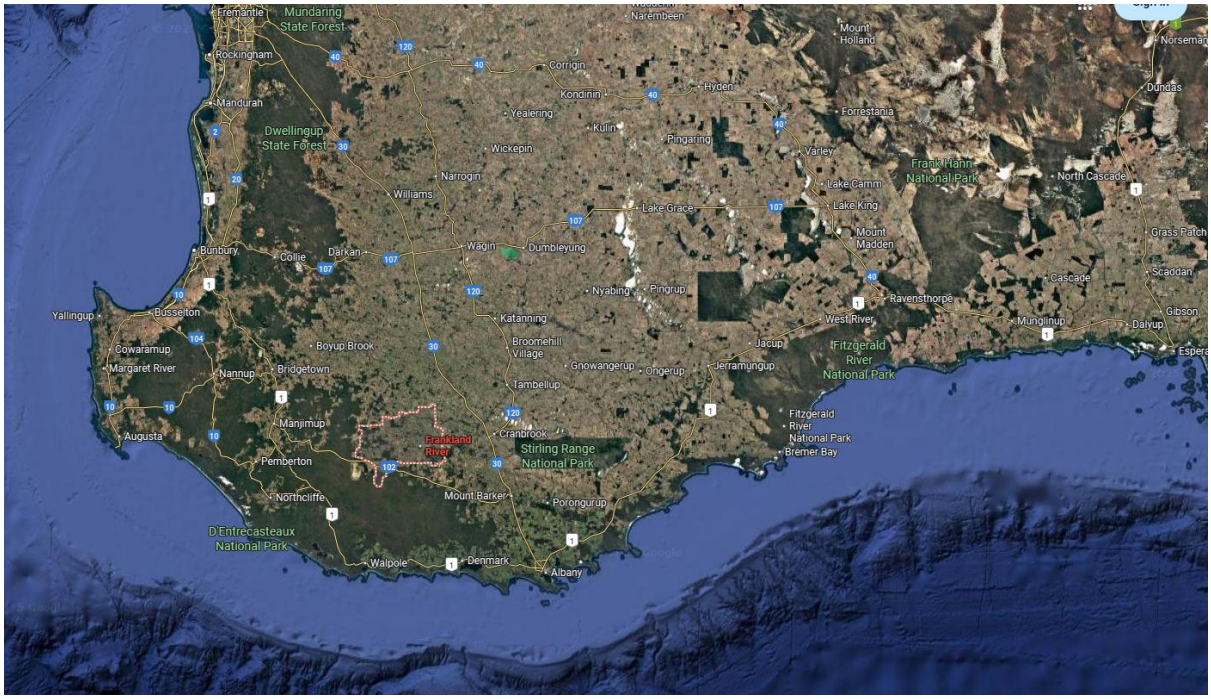
Review of Report of Local Environmental Benefits in relation of Proposed Pine Plantation, Lot 12667 (No. 7691) Muir Highway, Frankland River, prepared by Western Land and Water Consulting dated 14 November 2025.

These comments in response were prepared by Dr Jim Davies Managing Director Jim Davies & Associates Pty Ltd (trading as JDA Consultant Hydrologists) at the request of Shire of Cranbrook. The location of the Frankland River locality is shown in the google maps extract below, with Lot 12667 being just north of the Manjimup – Mount Barker Road (Muir Highway).



The report, as described in section headed Background, is “with respect to salinity, watercourses and water changes when comparing a pine plantation to a well-managed agricultural property”.

I note the word “salinity” as used the report refers to dryland salinity rather than irrigation induced salinity or primary salinity which existed before European settlement.

In my opinion the report is a well-presented summary of the South-west WA experience and research into dryland salinity since the 1980’s, including the significant contribution by the author.

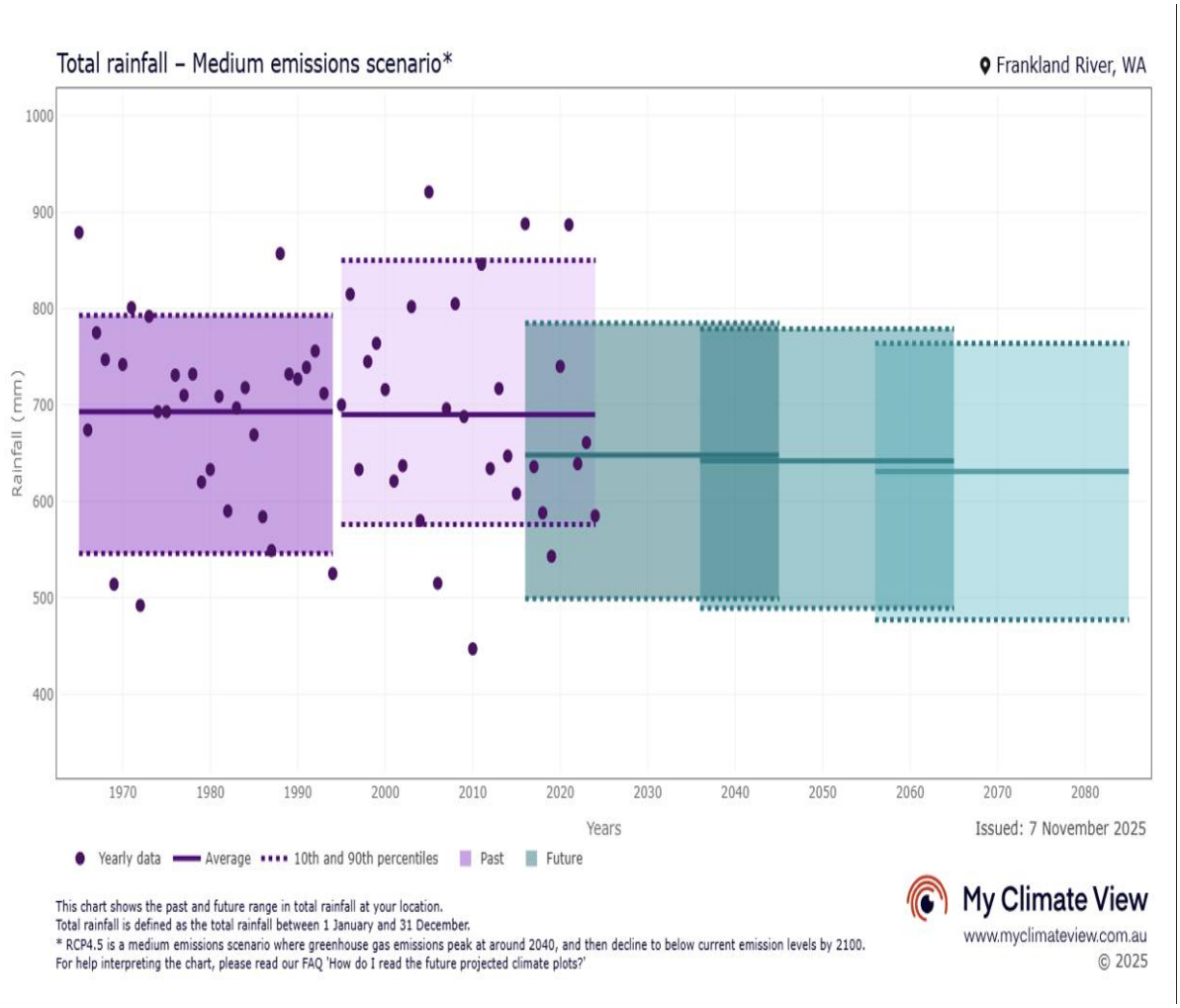
However, the report does not appear to apply the notable SW WA experience and research into dryland salinity into the future context, over the likely duration of the proposed pine plantation, particularly with respect to declining annual rainfall associated with climate change. The report states on p3 that annual rainfall for the periods 1965 to 1994 and 1995 to 2024 is unchanged at approx. 700 mm/yr. It is well documented that, in fact, there has been a reduction in annual rainfall in SW WA generally (including in the regional area of Lot 12667), since around 1975 (DoW. 2015, McFarlane et al 2020). The report is silent on this apparent contradiction.

The report uses My Climate View (MCV) to produce Figures 2&3 showing historical annual rainfall and annual average maximum temperature from 1965 for Lot 12667 location, labelled on the Figures as Frankland River.

The report does not make any use the option in MCV to project future annual rainfall or annual average maximum temperature to 2085.

I have used MCV with a Medium Global Emission Scenario (GES) based on RCP4.5 to produce these future projections in the figure below showing average annual rainfall for decades 2030's, 2050's and 2070's as reducing to 650, 644 and 633 mm/ýr (reductions of 7.1, 7.7 and 9.6%): with High RCP8.5 projections for these decades are lower again at 653, 580 and 561 mm/yr.

Taking 2050's as 25 years into the future, similar to the life of a pine plantation from establishment to harvest, the rainfall reduction from 700 to 644 mm/yr is 7.7 %. This figure is in good agreement with Figure 3.2 below from DoW(2105) of 10 % reduction from the 1961-1990 BoM baseline period (similar period to 1965-1994 used in MCV) for the median future climate scenario for the southwest part of SW WA. Dry future climate scenario on Figure 3.2 shows 10 to 20 % rainfall reduction from the 1961-1990 BoM baseline period.



In my opinion, with the projected reduced rainfall in future years this century, the water balance of Lot 12667 will be significantly changed – perhaps more so than by any change of land use from dryland agriculture to pine plantation. the change to the water balance will include reduced recharge of rainfall to the water table, of perhaps 15 % (double the reduction in rainfall) to the extent that groundwater levels if currently rising will tend to stabilise, and if currently stable will tend to decline under either land use.

The concern during my time as Salinity Research Officer with the Department of Agriculture in the 1980's about the rapidly expanding areas of agricultural land in SW WA being affected by dryland salinity, has now largely evaporated due to decreasing annual rainfall, and has been replaced by a growing concern about declining water resources.

Extracts from DoW (2015) are reproduced below in italics to demonstrate the view of DoW 10 years ago.

In response, the Department of Water developed a standard, comprehensive set of climate scenarios for the whole of WA. The aim of the project is to enable a consistent, methodical assessment of climate change for departmental modelling and impact assessment. These scenarios will be used in various aspects of departmental business, including:

- *Groundwater modelling to support allocation planning and to assess changes in groundwater recharge, flow and levels under a changing climate.*
- *Surface water and catchment modelling to support allocation planning.*
- *Assessment of the impacts of climate change on hydrological and nutrient modelling supporting water quality improvement planning.*
- *Modelling the impacts of climate change on integrated surface water and groundwater systems.*
- *Integrated water and land-use planning.*
- *Supply projections modelling associated with water supply planning.*

The South-west region has experienced a widely reported decline in rainfall over the last several decades (CSIRO & BoM 2007; IPCC 2007b; CSIRO 2009a; Hope & Ganter 2010; IOCI 2012). The reduced rainfall is a result of weakened and less frequent frontal systems, attributed to large-scale changes in southern hemisphere circulation patterns resulting from changes in global heat distribution (Frederiksen et al. 2012). The trend in rainfall decline is expected to continue, based on the climate projections from GCM results analysed as part of the SWWASY project (CSIRO 2009a).

South-west region

The message in the South-west is clear. All models and the selected scenarios show decreases in rainfall and increases in temperature that are consistent with already observed climate trends. This means that climate projections are useful and critical for precision around projections of our future climate and water availability.

South-west WA is widely reported as a region of the globe which is particularly sensitive to climate change. The drying trend projected by the GCMs is consistent with the results of previous studies and the trends observed in the region (CSIRO & BoM 2007; Charles et al. 2010; IOCI 2012).

Regional patterns of change

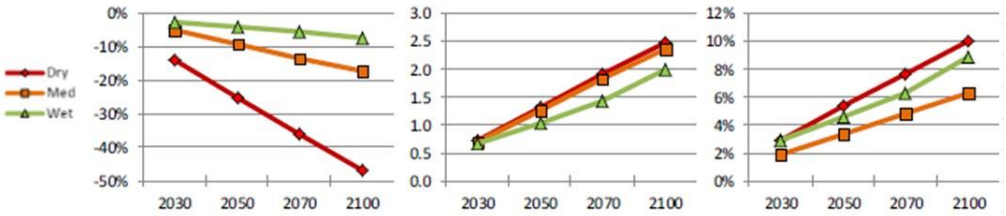
The gridded change in average annual rainfall for the South-west region is shown in Figure 3-2. The results indicate drying trends for all scenarios though the western part of the region shows greater rainfall reductions than the interior and southern coastline. Table 3-2 lists the annual rainfall, daily temperature and annual PET anomalies at multiple time horizons, and shows the climate trajectories for the region as a whole for the selected wet, median and dry scenarios. These changes are relative to a 1961-90 baseline.

The dry scenario indicates, for the region as a whole, a 14% decline in rainfall, a 0.7 degree Celsius temperature rise and a 3% increase in PET by 2030. The drying trend continues in the latter half of the century, with rainfall projected to be 25% less by 2050, and 47% less by 2100. The median scenario indicates a less pronounced drying trend, with a 5% reduction in rainfall by 2030 and 17% by 2100. Temperature is projected to rise by 2.4 degrees Celsius by 2100. The wet scenario results in only a 7% reduction in rainfall by 2100, and a 2.0 degree Celsius temperature rise. The wet scenario compared to the median scenario is associated with a larger reduction in relative humidity which results in a slightly larger rise in PET. In the west of the region, drying trends are more pronounced relative to the regional averages.

The annual rainfall anomalies for the South-west are comparable with those identified in the SWWASY PROJECT (CSIRO 2009a) for the equivalent spatial extent in terms of percentage change. For this study the 2030 projected annual rainfall for the dry scenario is similar to the observed average annual rainfall from the last decade in the Perth region.

Table 3-2: Regional rainfall, temperature and PET anomalies for the South-west region at 2030, 2050, 2070 and 2100 relative to 1961–90 baseline

	Mean annual rainfall anomaly (%)			Mean daily temp. anomaly (°C)			Mean annual PET anomaly (%)		
Year	Dry	Med	Wet	Dry	Med	Wet	Dry	Med	Wet
2030	-14%	-5%	-2%	0.7	0.7	0.7	3%	2%	3%
2050	-25%	-9%	-4%	1.3	1.3	1.0	5%	3%	5%
2070	-36%	-13%	-5%	1.9	1.8	1.4	8%	5%	6%
2100	-47%	-17%	-7%	2.5	2.4	2.0	10%	6%	9%



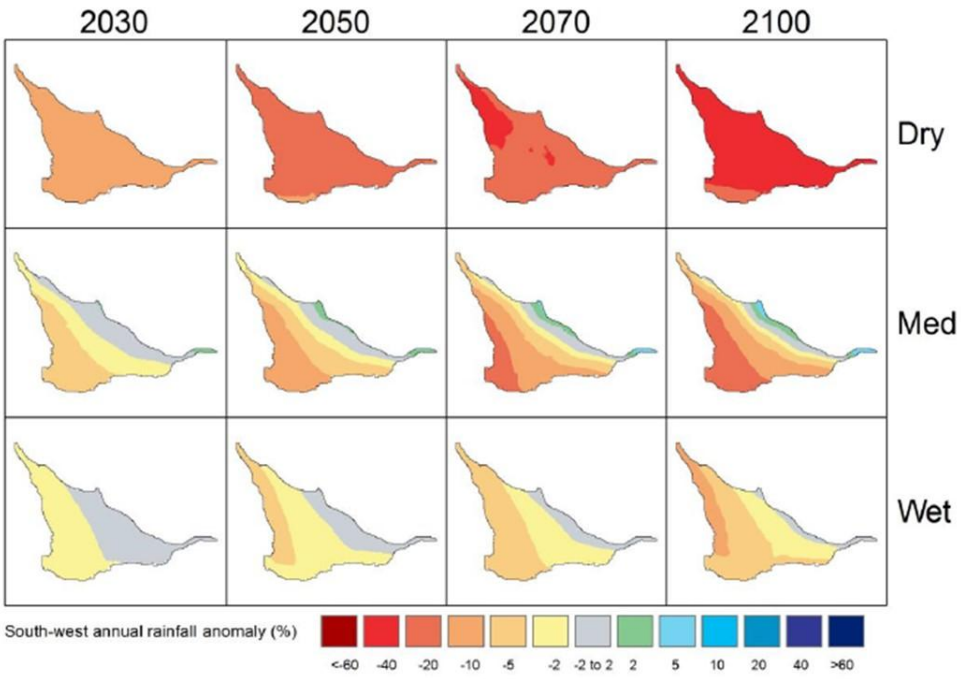


Figure 3-2: Change in average annual rainfall relative to the baseline period for South-west region for representative wet, median and dry scenarios at future time horizons

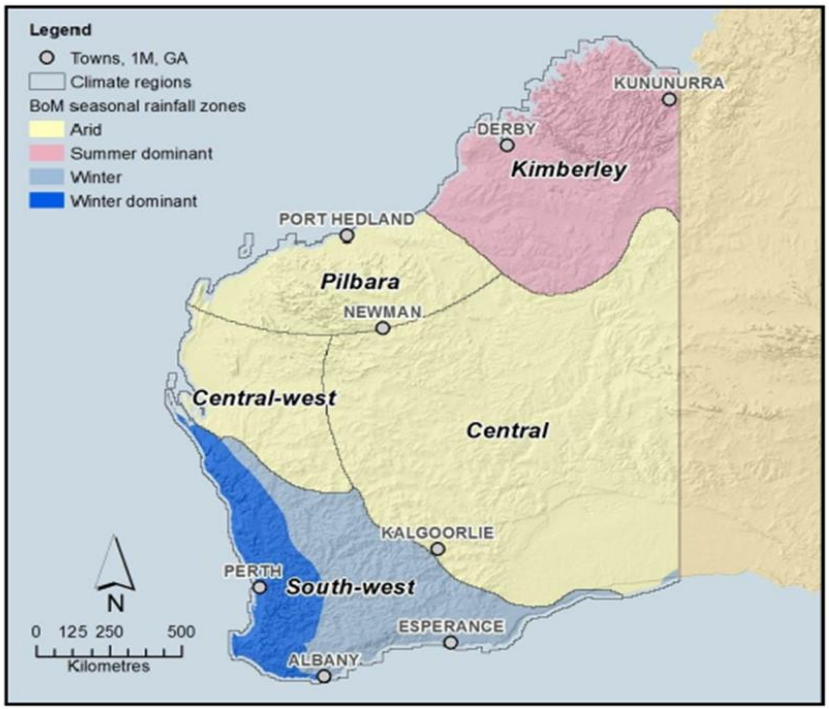


Figure 1-1: Seasonal rainfall zones of Australia (source BoM 1999) with the subdivisions used for this study

DWER (2024) states that it replaces DoW (2015). However, DWER (2024) does not provide a simple method to project rainfall changes in the future like that available in DoW (2015). Discussions with the Department of Water and Environmental Regulation (DWER) staff indicate that in SW WA the view is that rainfall will decrease in future by more than that presented in DoW (2015), pers. comm. Scott Wills DWER.

With respect to dryland salinity extent and risk of dryland salinity Figure 6 of the report, reproduced below, appears to be taken from one of p8 footnote references dated between 1989 and 1992. Again, the reduction in rainfall over the last 25 years means that Figure 6 is likely to be outdated and probably overestimates both the current and likely future extent of Salinity and the area at risk of dryland salinity.

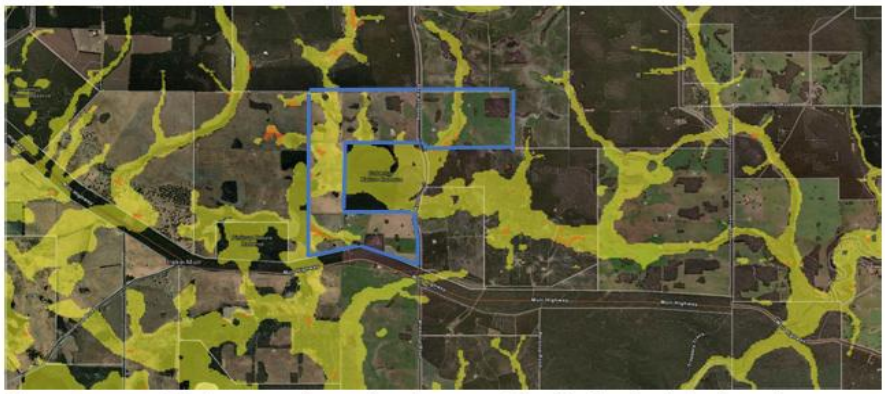


Figure 6 **Salinity extent (orange) and area at risk of dryland salinity (green), property outline (blue)**

Similarly, the report on p9 under heading "Inhibit any further increase in stream salinity", and again on p10 under the next heading "Reduced nutrient input to Cobertup Nature Reserve", data relied on is several decades old: I take the view that streamflow may well have already reduced or ceased altogether under current lower rainfall regimes, and will likely only reduce/cease altogether in future during the projected life of a plantation to say 2050.

On page 11, under the heading "Whether change to water table may have an impact on Cobertup Swamp" reference is made to the impact of a changing climate in the context of the complex interaction and impact on the Swamp: however the next paragraph refers again to a 1999 report and makes no further reference to what is meant by the phrase "the impact of a changing climate".

The penultimate paragraph refers to a surface water model which has not been described in the report, so the intended meaning is unclear.

SUMMARY

With climate change in 2025 being central to so many topics (especially around future land use, food production, water resources etc.), in my opinion the report falls short of proving a reliable projection for its terms of reference with respect to Lot 12667 land use over the next 25 year planning time horizon.

The report would have been more appropriate in an earlier stationary climate up to say 1975, with no long-term change in annual rainfall or temperature – the consensus view of 50 years ago.

Mr Jim Davies
Director/Senior Principal Hydrologist
JDA Consultant Hydrologist

REFERENCES

Department Of Water 2015. Selection of future climate projections for Western Australia. Water Science Technical Series Report No. 72.
McFarlane D, George R, Ruprecht J, Charles S, Hodgson, G. Runoff and Groundwater Responses to Climate Change in Southwest Australia. Journal of the Royal Society of the Royal Society of WA, 103, 9–27, 2020.
Department of Water and Environmental Regulation. Future Climate Projections for Water Management in Western Australia 2024.