

# QUEENSLAND CIVIL AND ADMINISTRATIVE TRIBUNAL

CITATION: *Knuth & Ors v Department of Natural Resources, Mines and Energy* [2020] QCAT 156

PARTIES: **BLAIR KNUTH**  
(first applicant)

**LENORE KNUTH**  
(second applicant)

**PHILLIP KNUTH**  
(third applicant)

v

**DEPARTMENT OF NATURAL RESOURCES,  
MINES AND ENERGY**  
(respondent)

APPLICATION NO/S: GAR228-18

MATTER TYPE: General administrative review matters

DELIVERED ON: 12 May 2020

HEARING DATE: 27, 28, 29 November 2019; 2, 3 December 2019

HEARD AT: Brisbane

DECISION OF: Member Howe

ORDERS:

- 1. The Property Map of Assessable Vegetation made by the Department of Natural Resources, Mines and Energy the subject of internal review is set aside.**
- 2. The correct and preferable Property Map of Assessable Vegetation is determined to be that appearing at page 12 of Exhibit 7 of the statement of evidence of Hans Dillewaard dated 14 June 2019 and comprising Exhibit 52.**

CATCHWORDS: ENVIRONMENT AND PLANNING – TREES AND VEGETATION – NATIVE VEGETATION – where landowners sought approval for a Property Map of Assessable Vegetation (PMAV) over their land – where the PMAV mapped large areas Category X - where the respondent department rejected the applicants’ PMAV – where the department drew a PMAV assessing most of the property as remnant vegetation – where there was historical evidence of timber cutting on the property – where the historical timber cutting did not extend across all the property – where the experts disagreed on evidence

of clearing on available imagery – where remnant vegetation found on adjacent areas was consistent with vegetation on the subject property – where there was significant variation of the structure of the vegetation across the regional ecosystem – where similar variation was found on the property - where the recommended methodology for assessment of vegetation as remnant vegetation considered – where the vegetation was determined to be remnant vegetation

*Vegetation Management Act 1999* (Qld), s 3, s 10, s 63B(1), s 20CA(3)(a)

*Leatch v National Parks and Wildlife Services* (1993) 81 LGERA 270

*Telstra Corp Ltd v Hornsby Shire Council* [2006] NSWLEC 133

#### APPEARANCES & REPRESENTATION:

Applicants: M Jonnson QC with D Purcell instructed by Preston Law  
Respondent: R Traves QC, with B Vass, instructed by In-house Legal

#### REASONS FOR DECISION

- [1] On 19 September 2017 the applicants applied to the Department of Natural Resources, Mines and Energy (the department) for the creation of a Property Map of Assessable Vegetation (PMAV) for the grazing property known as Burdekin Downs in North Queensland. As at the date of the application, most of Burdekin Downs was mapped as Category B vegetation. The applicants' PMAV proposed mapping a large part of the property (approximately 15,000 hectares) as Category X instead.
- [2] A PMAV maps the vegetation occurring in a particular area into applicable categories.
- [3] Category X is a residual category (other than Categories A, B, C or R) the broad effect of which is that vegetation clearing restrictions that would otherwise apply under the *Vegetation Management Act 1999* (Qld) (VMA), do not apply. Property owners are entitled to clear Category X land without any approval being necessary and to maintain the clearing on those areas.
- [4] For land to be categorised as Category X it must be demonstrated that the vegetation is non-remnant, and non-remnant due to causes other than natural causes such as fire or flood.
- [5] The department considered the applicants' draft PMAV. The department did not accept its base proposition that clearing had occurred on Burdekin Downs because of anthropogenic causes (man-made) and instead mapped a significant amount of the vegetation as high value regrowth (Category C) on Burdekin Downs.

- [6] The applicants sought internal review of the department's decision. The internal review decision set aside the original decision and substituted a new PMAV based on changes made to the VMA which came into effect during the course of the internal review process.
- [7] The effect of the amendments was to expand the types of land tenures on which regrowth vegetation was required to be treated as high value regrowth vegetation as defined under the VMA.
- [8] Under the VMA, if land is categorised as having high value regrowth, it cannot be mapped as Category X, unless the vegetation is not remnant due to causes other than burning, flooding or other natural events.<sup>1</sup> The department considered the amendments applied to the applicants' PMAV, though it appears that was not correct. The department decided the vegetation on Burdekin Downs was not remnant and there was no evidence that the cause of that was anthropogenic disturbance.
- [9] The applicants have brought this application in the tribunal to review the internal review decision.<sup>2</sup>
- [10] In preparing the matter to present to the tribunal, one of the department's experts developed yet another PMAV (Mr Dillewaard's PMAV). The department says this is the correct PMAV for Burdekin Downs. This PMAV maps most of the vegetation on Burdekin Downs as remnant vegetation (not regrowth) with only limited pockets of high value regrowth vegetation identified.
- [11] The tribunal's role is to produce the correct and preferable decision by way of a hearing on the merits.<sup>3</sup> The tribunal has been asked to decide the correct and preferable PMAV for Burdekin Downs.

### **The issues**

- [12] The expression 'remnant vegetation' is defined under the *Vegetation Management Act 1999 (Qld)* ('VMA') as vegetation:
- (a) that is—
    - (i) an endangered regional ecosystem; or
    - (ii) an of concern regional ecosystem; or
    - (iii) a least concern regional ecosystem; and
  - (b) forming the predominant canopy of the vegetation—
    - (i) covering more than 50% of the undisturbed predominant canopy; and
    - (ii) averaging more than 70% of the vegetation's undisturbed height; and

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<sup>1</sup> S 20CA(3)(a) VMA.

<sup>2</sup> S 63B(1) VMA.

<sup>3</sup> S 20 *Queensland Civil and Administrative Tribunal Act 2009* (Qld).

(iii) composed of species characteristic of the vegetation's undisturbed predominant canopy.<sup>4</sup>

- [13] The first issue for determination, and the significant issue addressed by the parties, is whether the vegetation<sup>5</sup> on Burdekin Downs has achieved remnant status. If it has then the cause of clearing, anthropogenic or otherwise, becomes irrelevant and the applicants cannot succeed with their PMAV.
- [14] If the answer to that question is no, then issue two falls for determination. If the vegetation has not achieved remnant status, is the vegetation high value regrowth vegetation due to natural causes or because of anthropogenic disturbance. If natural causes such as fire or drought or flooding, then regardless that it is not remnant vegetation, amendments to the VMA which were introduced during the internal review process apply to prohibit the vegetation being categorised as Category X on a PMAV.<sup>6</sup>

### **Matters of agreement between the parties**

- [15] The parties accept timber was harvested on Burdekin Downs in times past, however the extent and effect of that is disputed.
- [16] They agree there was clearing of vegetation at least in the eastern portion of Burdekin Downs from approximately 1896 until 1932.
- [17] The parties agree the area contains least concern regional ecosystems and therefore regrowth on Burdekin Downs is high value regrowth vegetation as defined under the VMA.
- [18] There are a number of regional ecosystems to be found on Burdekin Downs but the predominant vegetation is regional ecosystem 9.12.1a narrow leafed ironbark trees ('9.12.1a') and it is the assessment of 9.12.1a that will determine the outcome of the PMAV application.
- [19] There were four experts who gave evidence and all agree the text *Methodology for Surveying and Mapping Regional Ecosystems and Vegetation Communities in Queensland* ('Neldner') is the leading guide on the process for assessing the remnant status of vegetation.

### **State Policy and Neldner**

- [20] Sub-paragraph (a) of the definition of remnant vegetation in the Schedule to the VMA is satisfied. The parties agree Burdekin Downs contains least concern regional ecosystems.
- [21] It is sub-paragraph (b) of the definition that is contentious:

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<sup>4</sup> Schedule VMA.

<sup>5</sup> The vegetation at issue in the proceedings is that vegetation mapped Category X on the applicants' PMAV but generally mapped remnant on the final version PMAV.

<sup>6</sup> S 20CA(3)(a) VMA. The parties do not dispute that the amendments made to the VMA extending the effect of clearing to the applicants' tenure of Burdekin Downs apply in the review before the Tribunal. The limitation imposed by s 129 of the VMA on decisions of the chief executive requiring the chief executive to apply the law as in force before 8 March 2018 does not apply to the Tribunal and the Tribunal must apply the law in effect at the time of decision.

Remnant vegetation means vegetation –

...

(b) forming the predominant canopy of the vegetation—

- (i) covering more than 50% of the undisturbed predominant canopy; and
- (ii) averaging more than 70% of the vegetation’s undisturbed height; and
- (iii) composed of species characteristic of the vegetation’s undisturbed predominant canopy.

[22] ‘Undisturbed predominant canopy’ is further defined as the predominant canopy the vegetation normally has and ‘undisturbed height’ is defined as the height to which the vegetation normally grows.

[23] What constitutes normal height and canopy is not defined.

[24] By s 10 of the VMA the Minister must prepare a policy for vegetation management for the State (‘State Policy’). The State Policy must state outcomes for vegetation management and actions proposed to achieve the outcomes.<sup>7</sup> A State Policy has been prepared and it provides as relevant:<sup>8</sup>

#### 1 Purpose

... It provides a framework for decision making under the VMA including the following:

- Making and amending maps, including regulated vegetation management maps and property maps of assessable vegetation

#### 4.6 Property Maps of Assessable Vegetation

...

3. In assessing an application for a PMAV, an area will be assessed first for suitability as Category B, then for suitability for Category C, then for Category R. An area will not be made Category X if it is identified as remnant, or as high value regrowth using the Queensland Herbarium’s published methodology.<sup>6</sup>

<sup>6</sup> At the time of making of this Policy, the Queensland Herbarium’s published methodology is the “Survey and Mapping of Regional Ecosystems”.

[25] The current iteration of the Queensland Herbarium’s publication, Survey and Mapping of Regional Ecosystems, is version 5.0 (Neldner).<sup>9</sup>

[26] Section 3.3 in Neldner provides:

Vegetation is assessed as remnant unless there is evidence, from satellite imagery, SLATS woody cover and/or available aerial photographs and/or

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<sup>7</sup> S 10(2)(a) VMA.

<sup>8</sup> Exhibit 15 Current version 4.00, 21 June 2019.

<sup>9</sup> Ex 17.

available site data/observations, that there has been anthropogenic (caused by humans) clearing. Where there has been tree death caused by natural causes, e.g. drought death, fire, cyclone, storm or hail damage or insect or fungal attack, the vegetation is still regarded as remnant. Where there is evidence of anthropogenic clearing, the vegetation may still be classified as remnant if it is assessed as meeting the 50% cover, 70% height and characteristic species criteria. By studying satellite imagery and aerial photographs and comparing the pattern on the imagery with the extant vegetation in the field, Queensland Herbarium botanists, technicians and computer support officers (GIS) gain expertise in the recognition of remnant vegetation for different types of vegetation and regional ecosystems from the imagery and aerial photographs. This includes knowledge of the time it takes for a vegetation type to grow back to remnant status after clearing. For example, no eucalypt woodland or open forest vegetation types cleared in the last 20 years have met the remnant definition following on ground assessment. These vegetation types usually take 30 years to regain remnant status (Queensland Herbarium, unpublished data, March 2004).<sup>10</sup>

[27] The 50% cover/70% height requirement might therefore be considered a baseline assessment qualification of remnant vegetation.

[28] Neldner proceeds to describe a flow chart methodology for assessment entitled 'Flow chart showing assessment sequence for mapping vegetation cover' which sets out a series of staged questions:

Is there evidence of clearing on available imagery?

If no, remnant

If yes, is the area dominated by woody vegetation?<sup>11</sup>

If yes, is clearing visible on recent imagery, e.g. completely cleared in last 20 years in SEQ eucalypt woodland?

If yes, non-remnant

If no, is clearing history and imagery pattern similar to other areas that have been verified as non-remnant?

If yes, non-remnant

If no, is there evidence of clearing on the ground?

If no, remnant

If yes, does the area have 50% cover and 70% height and characteristic species compared to reference site?

If yes, remnant  
If no, non-remnant

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<sup>10</sup> Neldner page 30.

<sup>11</sup> If not, the VMA has no application.

- [29] According to Mr Dillewaard,<sup>12</sup> one of the experts for the department, given the extensive evidence of historical clearing produced by Mr Stanton,<sup>13</sup> an expert for the applicants, regardless that he considered there was no evidence of clearing on available imagery (Step 1 of the flow chart) and the vegetation should be classed as remnant, it was appropriate to go on to consider the other factors listed in the flow chart. He acknowledged the explanatory paragraph preceding the flow chart in Neldner clarified:

Vegetation is assessed as remnant unless there is evidence, from satellite imagery, SLATS woody cover and/or available aerial photographs and/or available site data/observations, that there has been anthropogenic (caused by humans) clearing.<sup>14</sup>

### **Historical tree clearing**

- [30] Before applying the Neldner methodology, it is appropriate to say something about the evidence of historical tree clearing on Burdekin Downs.
- [31] When the applicants' expert, Mr Stanton, applied on their behalf for the initial PMAV he contended there was historical evidence of an extended period of clearing of a large part of Burdekin Downs from the late nineteenth century through to the early 1930s. The clearing involved the selective harvesting of trees for the purpose of supplying fuel to a nearby municipal water-pumping station.
- [32] Mr Stanton maintains there are large areas of the vegetation that has never regrown to remnant status since then:

The complete lack of any mature trees (or remnants of mature trees) over large areas can only feasibly be attributed to the documented timber harvesting activities, while the repetitive droughting of regrowth saplings, coupled with grazing and fire (promoted by buffel grass) has prevented maturation of vegetation to a degree that it would form remnant vegetation.<sup>15</sup>

- [33] In the late nineteenth century, nearby Charters Towers was a busy town with some thousands of people living there. Water was essential and was supplied from the Burdekin River by a steam powered pumping station on the south bank approximately nine miles north of Charters Towers. The pumping station was on the river at the southern opposite the southernmost part of Burdekin Downs. Initially timber growing to the south of the Burdekin River had been harvested to stoke the boilers but then it became necessary to log timber on the northern side of the river, which meant on Burdekin Downs.
- [34] In aid of that a tramline was built on the north bank from the pumping station. Initially it extended for a distance of approximately 2½ miles<sup>16</sup> into Burdekin Downs in a north-west direction.<sup>17</sup> By 1907 the area served by the first tramline had

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<sup>12</sup> Principal Botanist, Queensland Herbarium.

<sup>13</sup> Consultant Ecologist.

<sup>14</sup> Neldner [3.3] page 30.

<sup>15</sup> Ex 5 page 63 concerning parcels 3BKN36, 4BKN105 and 6BKN804447 being those parcels closest to the area of the tramlines.

<sup>16</sup> A significant amount of evidence produced at hearing was historical records using imperial measurements. Those imperial measurements are retained in these reasons for decision.

<sup>17</sup> Ex 39 page 4.

been cut out.<sup>18</sup> The first tramline was removed and a new tramline built to another source of firewood three miles north-east of the north bank of the pumping station.

- [35] A third and final tramline was laid due north from the pumping station which ended at what is described as the timber cutters' camp, a distance of approximately six miles.
- [36] Logging using the tramlines ended in 1932.
- [37] The parties agree the areas surrounding the tramlines were heavily logged. What is in contention is firstly the area of Burdekin Downs affected by timber clearing associated with supplying timber to the pumping station. Putting these tram lines in perspective (and maintaining the imperial measurements used in the historical documents) Burdekin Downs extends for a distance of approximately 20 to 25 miles east to west. The historical records suggest the logging of timber extended no further than approximately 5½ miles from the timber cutters' camp located at the eastern part of the property.
- [38] Secondly the department contends, regardless of the historical tree clearing associated with the tramlines, that the vegetation has grown back to remnant status across all of Burdekin Downs. The applicants maintain it has not.
- [39] Mr Stanton estimated that 177,591 tonnes of firewood was harvested from Burdekin Downs during the 35 years from 1897 to 1932. Mr Stanton suggests, based on a merchantable timber volume of 9.6 tonnes/hectare, a total area of 18,499 hectares would have been cleared. He says that is consistent with his proposal that 15,795 hectares of Burdekin Downs has been left affected by anthropogenic disturbance attributable to the timber harvesting. He suggests the difference in those figures represents areas on Burdekin Downs where the vegetation has grown back to remnant status.<sup>19</sup>
- [40] The historical evidence is limited to logging associated with the tramway. The historical records show that by 1932 they had cut timber on Burdekin Downs within 5½ miles of the terminus of the tramline at the timber cutters' camp. Cutting within 5½ miles of the timber cutters' camp meant the timber cutting was therefore limited to the south-eastern portion of Burdekin Downs only. Mr Stanton conceded that initially he had mistakenly believed the timber cutting had occurred across the entirety of Burdekin Downs but subsequently understood that the historical logging was limited to approximately 5½ miles from the timber cutters' camp<sup>20</sup> which took it no further west than a waterway known as Three Mile Creek.
- [41] His timber quantity calculations are premised on his original admittedly mistaken view that the historical timber cutting had occurred across all of Burdekin Downs. It did not and his calculations are therefore of no assistance.

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<sup>18</sup> Ex 39 page 7.

<sup>19</sup> Ex 8 page 35 (page 291).

<sup>20</sup> T1-59 L2.

### **Neldner - Is there evidence of clearing on available imagery?**

- [42] Turning then to the Neldner methodology, it should be noted that whilst the experts observed the utility of the suggested flow chart in assessing the remnant status of vegetation, their answers to the questions raised in the flow chart diverged markedly.
- [43] The initial consideration, according to Neldner, is whether there is evidence of clearing on available imagery. If there is not, Neldner says the vegetation should be regarded as remnant.
- [44] The department maintains the available aerial photography, starting 1945,<sup>21</sup> shows no evidence of the historical logging that had occurred on Burdekin Downs. The applicants say otherwise.
- [45] Mr Stanton maintained that what was depicted in the 1945 imagery was evidence of prior broad and fine scale disturbance of vegetation across Burdekin Downs. This was important for Mr Stanton's position given he conceded none of the imagery after 1945 showed anthropological land disturbance. At hearing the following exchange occurred between Mr Stanton and senior counsel for the respondent:

(Mr Traves) I'm putting to you that in the aerial photography since 1945, by reference to that, you have not in your reports identified widespread and substantial anthropogenic interference?---Since 1945?

Since 1945?---No, I have not. No.

Correct. Now, so we – it comes down to what happened before the first aerial photograph?---That's right, yes.<sup>22</sup>

...

(Mr Traves) Is it right to say that your thesis in support of your PMAV depends upon the tribunal accepting substantial pre-1945 land disturbance by – caused by man?---Yes.

Right. Because you can't point to any substantial things which occurred after 1945?---No, I can't.<sup>23</sup>

- [46] He maintained however that he could see extensive evidence of clearing "... along linear boundaries, fence lines and that whole - even to the west of that property"<sup>24</sup> in the 1945 photographs.
- [47] Further, he added with reference to 1977 photography of the property, which Mr Dillewaard suggested depicted thinning of vegetation caused by drought:

... a lot of the death that I saw on the ground and in the aerial photos that Mr Dillawarde (sic) had referred to as drought, I saw evidence that humans had been interfering with that in terms of excess (sic) tracks, and on farms, graziers don't like timber. And to think that on a – an active cattle property

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<sup>21</sup> Available aerial photographic imagery 1945, 1964, 1977, 1986 and 1999.

<sup>22</sup> T1-49 L39 - T1-50 L5

<sup>23</sup> T1-50 L35

<sup>24</sup> T2-20 L18

that a farmer would not be managing his regrowth in terms of thinning, poisoning, burning, is in my opinion possibly a bit naïve.<sup>25</sup>

- [48] Despite that conjecture, Mr Stanton conceded that he could offer no evidence-based explanation for disturbance of those areas of Burdekin Downs not accessed by the timber cutters using the tramway.<sup>26</sup>
- [49] Mr Dillewaard said that he had examined the aerial photographs of Burdekin Downs taken in 1945 using a stereoscope creating the effect of a 3D image which revealed a landscape on Burdekin Downs very similar to adjacent areas (properties). The adjacent areas had never been timber harvested like Burdekin Downs. The height, cover and variation in density of the trees present on Burdekin Downs showed the same height, cover and variation of density as areas to the north, east and west of Burdekin Downs. Mr Dillewaard said it was extremely difficult to find boundary fences between Burdekin Downs and the adjacent properties.
- [50] The 1964 photographs reinforced his view he said. In his opinion they showed the vegetation communities on Burdekin Downs had regrown and achieved remnant status. It was only on close examination of the 1977 photographs that significant changes in the density of the vegetation became apparent, which he said correlated with a prolonged dry period of the early 1960s through to the 1970s.
- [51] Mr Dillewaard referred to photographs taken in 1977 and 1999 of that part of Burdekin Downs where the timber cutters' camp had been located. He said the photographs showed dense woody vegetation of a similar height and canopy cover to areas off Burdekin Downs that had not been timber harvested.<sup>27</sup> In his opinion the current vegetation structure on the property (described by another expert for the department, Dr Fensham,<sup>28</sup> as patchy) was more the result of natural vegetation dynamics than due to any historical timber harvesting.
- [52] Mr Dillewaard said he had looked at the photographs of Burdekin Downs from 1945 on for evidence of anthropogenic clearing but found none, save for small areas cleared for roads, homesteads, dams and the like. He took those areas into account (assessed and depicted them Category X) in making his PMAV.
- [53] He was aware of the historical tree harvesting on Burdekin Downs, but he had not been able to see any evidence of it in any of the photographs, including those taken in 1945.
- [54] Dr Fensham, the other expert for the department, agreed. Dr Fensham has particular expertise in drought death of trees, in particular the impact of drought death on eucalypt woodlands:

(Mr Traves) Now, you're familiar with those parts of Mr Dillewaard's report where he says, looking at the 1964 and 1970 historical photographs – sorry, '77 historical photographs, that there is there – there is there evidence, disturbance by reason of drought. You know what I'm talking about---Yep.

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<sup>25</sup> T1-52 L41-46

<sup>26</sup> T2-42 L36

<sup>27</sup> Ex 11 pages 7 – 10

<sup>28</sup> Principal Botanist Qld Herbarium, Associate Professor School of Biological Science.

And with your expertise in respect of drought and effect on forest, is it your belief that the damage of which he speaks was caused by the low rainfall which you depict in your figure 1---Well, that sixties period is – it doesn't have the extremes of some of the other droughts but it's a very protracted period of below annual rainfall and the death of trees is entirely consistent with the events we've documented in the nineties and the 2000s. The trees just give up when you turn the rainfall off for long periods of time.

Sorry, I'm looking at period between 1964 and 1977? ---It is consistent with – that dry period is consistent with the death of trees.<sup>29</sup>

- [55] Dr Williams,<sup>30</sup> an expert for the applicants, said he also followed Neldner and initially had looked to see if there was evidence of clearing on available imagery. He said he found it in the 1945 photographs. He found a clearing boundary which followed a water course or gully.<sup>31</sup> Below the gully the vegetation was quite open and sparse. Above the gully the vegetation was far denser.
- [56] Dr Williams primarily relied on this feature to support his contention that available imagery showed anthropogenic disturbance. His view was that the gully had been a natural feature boundary limiting the timber cutters access. They had cut up to the gully but not over it, and to him this was evidence of anthropogenic disturbance.
- [57] Dr Fensham also considered the 1945 aerial photographs. He found them particularly useful he said because they pre-dated clearing by bulldozers when clearing was done by axe and gangs of men within property boundaries. He said that sort of clearing was usually quite evident on old aerial photographs. He said that was not the case however with the 1945 photography of Burdekin Downs.
- [58] He concluded there was no evidence on available imagery of past clearing on the vast majority of Burdekin Downs. The only exception to that was such obvious man-made features as dams and roads.
- [59] He challenged Dr Williams evidence that the gully was an identifiable clearing boundary on the 1945 photographs. He considered the change in vegetation density across the gully was attributable to a natural change in the vegetation structure caused by geology rather than anthropogenic cause. He explained at hearing:

Well, it's not a straight line and it lines up with the geology, and we know that the geology has an important effect on vegetation structure actually through the mechanism of these droughts. What happens is that some of the soil types that have formed on different geologies having different amounts of clay, and the clay binds the moisture during drought and makes it less available than it would be on a sandy soil, and so what we tend to see is more open vegetation on the heavier clay – on the soils formed with a heavier clay, and the heavy clay soil's a product of the underlying geology.<sup>32</sup>

- [60] Mr Dillewaard agreed with Dr Fensham that it was a difference in soil and geology that accounted for different vegetation structure on one side of the gully compared to vegetation on the other.

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<sup>29</sup> T4-24 L45 – T4-25 L13

<sup>30</sup> PhD Vegetation Ecology.

<sup>31</sup> T2-L101 L17

<sup>32</sup> T4-27 L34-41

- [61] Dr Williams in turn challenged the evidence of Mr Dillewaard and Dr Fensham about the geology and soil type being responsible for the difference in vegetation density above and below the gully. He tendered a map of the geology of the areas on both sides of the gully which he said showed the intrusion of the granite geology above the gully across the gully into the more sparsely vegetated area below the creek for a distance of some 600 metres.<sup>33</sup>
- [62] He also tendered chart averages of the canopy height and canopy cover of 9.12.1a in granite areas compared with averages of canopy height and canopy cover in granodiorite areas<sup>34</sup> which he said revealed no significant difference between 9.12.1a occurring on granite as opposed to granodiorite geology.<sup>35</sup>
- [63] The chart averages however do not appear to be a comparison limited to the canopy height and canopy cover of 9.12.1a on both sides of the gully, which would probably have been instructive. What Dr Williams seems to have compared was vegetation across Burdekin Downs generally as it occurred on granite and granodiorite substrate. Further, the comparison was of trees he considered remnant on Burdekin Downs and trees he considered non-remnant.<sup>36</sup> Dr Williams adopted what is explained below as Mr Stanton's averaging process to assess remnant vegetation, which for the reasons also given below I reject. The usefulness of Dr Williams comparison chart of 9.12.1a on granite as opposed to granodiorite suffers in consequence.
- [64] Soil and geology are significant factors and appropriate considerations in mapping regional ecosystems. Neldner says as such:
- Vegetation coverages or maps are produced by the spatial extension of vegetation classification by using photo-patterns recognised on remotely sensed imagery, usually aerial photographs. As shown in Figure 1, the delineation of vegetation boundaries uses a number of factors, including the landform pattern and elements, substrate data (geology, soils), the reflectance from the aerial photography or satellite imagery, and importantly, the site data and field knowledge of the interpreter.<sup>37</sup>
- [65] Mr Dillewaard also produced soil and geology mapping<sup>38</sup> and those maps suggest an entirely different conclusion, namely that it is the change of geology that causes the change in vegetation at the gully.
- [66] Clearing occurred from the timber cutters' camp west through to approximately Three Mile Creek. The gully in question lies east of Three Mile Creek and west of the timber cutters' camp. That means the timber cutters cut beyond the gully claimed by Dr Williams to form a natural barrier to their activities.
- [67] I am not persuaded that the difference in vegetation density (and potential height and cover) to the west and east of the gully in question is evidence of anthropogenic clearing by timber cutters. I prefer Mr Dillewaard's and Dr Fensham's explanation

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<sup>33</sup> Ex 40

<sup>34</sup> Ex 41

<sup>35</sup> T2-85 L35

<sup>36</sup> T2-85 L31

<sup>37</sup> Neldner page 12

<sup>38</sup> Ex 45

that the difference in vegetation at the gully is due to the difference in soil and geology rather than the gully forming a natural barrier to clearing by man.

- [68] I should also note Mr Stanton claimed to see identifiable clearing in the 1945 imagery in the far west and north west of Burdekin Downs. He said there had been clearing of brigalow, gidgee and ironbark there. Mr Stanton maintained the denudation could not be explained by drought. Dr Williams agreed with Mr Stanton.
- [69] Mr Dillewaard did not disagree that there had been a loss of remnant status in those small areas at the far west and north west, and he said he had taken them into account and mapped them as high value regrowth areas in his PMAV.
- [70] Save for those limited areas mapped by Mr Dillewaard in his PMAV as high value regrowth, I conclude that the answer to Neldner's first test for assessment of remnant status should be answered in the negative. There is no evidence of clearing on available imagery. I prefer the evidence of Mr Dillewaard and Dr Fensham that any significant changes in the vegetation revealed in the 1977 photographs are more likely than not the result of drought than anthropogenic clearing.

**Neldner - Is clearing visible on recent imagery?**

- [71] There is no dispute that the answer is no. Mr Dillewaard identified some areas of anthropogenic clearing on recent imagery, both photographic and satellite,<sup>39</sup> but these were constructions such as roads, homesteads, dams and stock yards. He also identified some few limited areas of clearing of unknown cause and some areas that had been remnant but had lost that status and those areas he identified as areas of high value regrowth.

**Neldner – Do other areas of non-remnant vegetation bear similar clearing history and imagery patterns**

- [72] Though not strictly pursuing Neldner's 4<sup>th</sup> stage test which refers to comparison of areas of verified non-remnant vegetation, Mr Dillewaard said he compared the vegetation on Burdekin Downs with that on nearby properties possessing similar regional ecosystems, particularly to the north, east and west.<sup>40</sup> He said most of the land in and around Burdekin Downs had the same regional ecosystem as Burdekin Downs.<sup>41</sup> He said he saw very similar patterns of the vegetation possessing similar height and cover.
- [73] He produced very recent imagery taken in 2018<sup>42</sup> to support that assertion. The 2018 imagery showed the vegetated areas of Burdekin Downs with and without the property boundaries superimposed. The result is that Burdekin Downs merges as one

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<sup>39</sup> Ex 27 – such as Polygons 0, 60, 104, 135 and 155 identified as anthropogenic clearing on 1945 imagery - Polygons 113, 116, 169 identified as anthropogenic clearing on 1964 imagery - Polygons 2, 44, 46, 48, 55, 57, 59, 72, 85, 114, 120, 124 identified as anthropogenic clearing on 1977 imagery - Polygons 21, 3, 52, 64, 56, 122 identified as anthropogenic clearing on 1986 imagery - Polygons 6, 47, 50, 63, 118, 143 identified as anthropogenic clearing on 1999 imagery - Polygons 4, 62, 119 identified as anthropogenic clearing on 2005 imagery - Polygons 5, 115, 123, 125, 167 identified as anthropogenic clearing on 2012 imagery - Polygons 51, 121 identified as anthropogenic clearing on 2017 imagery.

<sup>40</sup> T3-60 L38

<sup>41</sup> T3-63 L35

<sup>42</sup> Ex 45

into the greater area. The vegetation across Burdekin Downs and on the surrounding properties north, east and west of Burdekin Downs seems uniform throughout.

- [74] Mr Dillewaard's further evidence was that there was also no difference to be seen in the vegetation in the south eastern corner of Burdekin Downs, where the historical timber cutting occurred, and those areas of the property to the west where there was no evidential history of cutting having occurred.
- [75] Dr Fensham also performed a comparison test. He addressed the patchiness of open areas in the eucalypt woodland on Burdekin Downs relative to similar environments in the adjacent region. He used satellite imagery to assess an area within 70 kilometres of Burdekin Downs with regional ecosystem 9.12.1a, an area he said which possessed a similar geology and climate including limited rainfall. He said in a statement of evidence:

The proportion of 200m x 200m cells that are less than 10% (woody cover) at Burdekin Downs on landzone 12 (acid igneous rocks including granodiorite) is 2.71% and in the surrounding landscape 2.70% (Figure 2). This indicates that the open areas in the ironbark woodlands on landzone 12 are typical of the variation within the remnant vegetation within the region, most of which has not been subject to historical timber harvesting. These open areas appear to represent natural variability within the regional ecosystem due to soil type and drought induced tree mortality.<sup>43</sup>

- [76] At hearing Dr Fensham clarified:

The nature of these ironbark forests in that part of the world is patchy. So they vary in density and I think that was captured by that statement of the surveyor's (sic), wasn't it? Lightly to thickly timbered. They're recognising that there's natural variation in those formations. And so the question – I think one of the key questions in this investigation is whether or not Burdekin Downs has a legacy of the timber harvesting from the first part of the twentieth century. And so if Burdekin Downs is more open as a result of clearing that happened in that period, we might expect to see that Burdekin Downs is indeed more open than across the region. So we set the region – we'd set an investigation – set about an investigation to look at that question by constraining satellite imagery to remnant vegetation. In other words, that hadn't been affected by – obviously affected by clearing. We constrained it to the geology which is consistent with the geology of Burdekin Downs. We constrained it to the rainfall zone which is consistent with Burdekin Downs. Obviously, if you go into higher rainfall areas, you'll find denser vegetation. And we constrained it to the vegetation type which is dominant on Burdekin Downs. And then we looked at every cell, the canopy cover of every cell and asked the question: is the canopy cover of this cell less than or greater than 10 per cent cover? Just a simple binary measure. And then we added up the proportion of those cells on Burdekin Downs and within the region which is consistent with the environment of Burdekin Downs, and we didn't make up the result, but I think down to .1 of a per cent we got the same proportion of cells that are less than 10 per cent cover in the broader region than on Burdekin Downs, and that would be consistent with a scenario where

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<sup>43</sup> Ex 6 page 171

whatever's affecting the patchiness in the structure of the vegetation of that community is consistent on Burdekin Downs as with the region at large.<sup>44</sup>

- [77] Dr Fensham said the adjacent areas he used to compare Burdekin Downs were currently mapped remnant vegetation. That was not challenged at hearing.<sup>45</sup>
- [78] Mr Dillewaard compared the height and cover measurements of the vegetation taken by Mr Stanton and Dr Williams and compared them with two CORVEG sites<sup>46</sup> located some 25 kilometres to the south west of Burdekin Downs and also Mr Dillewaard's own transect<sup>47</sup> sites taken on his visit to the property and he found the heights and cover measurements on Burdekin Downs within the range of variation found in the technical description. Further he found significant variation in the vegetation.<sup>48</sup>
- [79] He also used existing satellite imagery data to compare the variation of height of the predominant canopy on Burdekin Downs and that found in the Broken River sub-region within which Burdekin Downs is situate (absent the Burdekin Downs area). He found significant similarity in the variation in height of the predominant canopy between the comparison areas. He said the areas outside Burdekin Downs had no history of timber harvesting,<sup>49</sup> and there was no evidence at hearing to suggest otherwise.
- [80] Dr Fensham says the areas that Mr Stanton points to as areas resulting from past anthropogenic disturbance are merely low open woodland areas of 9.12.1a and consistent with the patchiness to be found in this regional ecosystem.<sup>50</sup>
- [81] Mr Stanton and Dr Williams did not make a similar comparison of the vegetation on Burdekin Downs with adjacent areas.

**Is there evidence of clearing on the ground? If yes, does the area have 50% cover and 70% height and characteristic species compared to a reference site?**

- [82] Neldner acknowledges the importance of site data and field knowledge in mapping.<sup>51</sup> Mr Dillewaard said in light of the evidence of historical timber harvesting on Burdekin Downs produced by Mr Stanton field assessment was warranted.<sup>52</sup> The applicants' experts place great weight on the site data generated from their field trips.

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<sup>44</sup> T4-25 L17-40

<sup>45</sup> T4-32 L30

<sup>46</sup> CORVEG data are measurements taken by Queensland Herbarium at representative sites for particular regional ecosystems which make up the technical data for those ecosystems.

<sup>47</sup> A method of calculating vegetation foliage cover, in this case canopy cover – 'Crown or line-intercept method (Greig-Smith 1964). A 50 m tape is laid down and the vertical projection onto the tape of the start and finish of each crown by species is recorded. A clinometer or vertical sighting tube may be used to ensure that the crown intercepts are vertically projected. The total length of crown is divided by the total length of the tape to give an estimate of percentage crown cover. In areas with low or more variable cover and the mean ground cover across each 50 m length is variable, more transects over a wider area may be required.' – Neldner at pages 78-79.

<sup>48</sup> Ex 7 page 19

<sup>49</sup> Exhibit 7 page 21

<sup>50</sup> Ex 6 page 170

<sup>51</sup> Neldner page 12

<sup>52</sup> T3-95 L32

- [83] Mr Stanton produced the applicants' initial PMAV application. In doing that he undertook an initial inspection at Burdekin Downs for two days in June 2017. Then he undertook two more extensive field trips of 12 days in total identifying 410 survey sites on the property. Of those, 186 were formal transect sites and the rest made at the end of the survey based on estimates only.
- [84] Mr Stanton concluded from his ground survey based on the transects and estimates that of the 270 square kilometres comprising Burdekin Downs '157.9 kilometres squared (sic) of that was indicative of non-remnant vegetation – that is, it didn't meet the structural criteria under the Vegetation Management Act, which is 70 per cent of the height of the original canopy and 50 percent of the original cover'.<sup>53</sup>
- [85] He said he found so many different structural variations of 9.12.1a on Burdekin Downs however that it was impossible to find a suitable reference site for each structural variation and therefore he adopted an averaging process:

... it's impossible to do so otherwise because there's so many different structural variations. That you – you can't – you can't find a suitable reference site for every structural variation, so what happens in that process of mapping? You accommodate recognition and variation in your mapping process and your inspection on the ground, and you assign your polygons according to what you see on the ground in terms of variation within a – within a regional ecosystem. ... Reference sites are considered the primary source of information, and under the guidance of the methodology produced by the Queensland Herbarium, you – if you can't find suitable reference sites, you use the technical descriptions. But they're always presented as an average. The other alternative is to use the bio-original benchmarks. They're presented as a median and you use those median heights to determine – as a basis for your assessment of non-remnant vegetation. And I'm not saying at all that those averages are going to meet the criteria for everything. You have to assess it on a site by site basis, but unless you use those averages, it becomes an impossible process to account for every single variation with an alternative reference site.<sup>54</sup>

- [86] Hence, because the task of accommodating all structural variations in 9.12.1a was too onerous, Mr Stanton calculated an average height and canopy cover to assess whether 9.12.1a was remnant or not. To that end he relied on three reference transects<sup>55</sup> which he thought showed minimal disturbance and were 'representative of what was on the ground prior to any anthropogenic disturbance'.<sup>56</sup>
- [87] He explained at hearing:

We recognised that there was variation in that, and because they – we had inferred there'd been no timber extraction, and there was a little bit of variation in the composition – like, some of the vegetation there has more bloodwood in it than ironbark, and ironbark is typically taller. So we reduced those thresholds accordingly to 14 metres height and 20 – and 40 per cent cover. And then we applied our 70 per cent, 50 per cent rule to those thresholds to encompass what variation there was on the ground. And we

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<sup>53</sup> T1-35 L13-16

<sup>54</sup> T1-37 L 25-45

<sup>55</sup> Ex 1(a) page 86

<sup>56</sup> T1-35 L18-20

arrived at a height for remnant vegetation at 10 metres and a canopy cover of 20 per cent. Where we inspected on the ground and did formalised transects and identified disturbed vegetation that met those thresholds, we classified it as non-remnant vegetation. Where it was higher than those thresholds, we classified it as remnant vegetation....<sup>57</sup>

- [88] Mr Stanton agreed that the methodology for determining remnant status set out in Neldner was standard and appropriate.<sup>58</sup> He also agreed that Neldner gave no support to his approach of averaging height and canopy cover and then applying a discount factor to assess the remnant status of vegetation.<sup>59</sup>
- [89] Dr Williams supported Mr Stanton's averaging approach.
- [90] Mr Dillewaard however was very much critical of it. He said it failed to recognise the diverse variations possible in 9.12.1a. In some areas 9.12.1a occurred as heavily timbered land whilst in other areas it occurred as open or low open woodland. He thought the transects Mr Stanton relied on were flawed because they failed to represent the full variation of the structural attributes for the various regional ecosystems found on Burdekin Downs.<sup>60</sup>
- [91] Mr Dillewaard's assessment of remnant status instead relied on existing technical data descriptions of 9.12.1a. The technical data had been collected from across the larger geographic range of the ecosystem which meant it included variations due to climatic, geological and other factors.
- [92] The technical data for 9.12.1a shows 45% of 9.12.1a is dense enough to be described as woodland, 45% not so dense and appropriately described as open woodland and the remaining 9% found growing sparsely as low open woodland.<sup>61</sup> The height of the trees across 9.12.1a correspondingly had a range of seven to 18 metres in height and crown cover percentages varying from .6% to 46.5%. The technical data was derived from measurements taken at 22 sites across the regional ecosystem.
- [93] Neldner sets out what the expressions woodland, open woodland and low open woodland mean. A woodland has trees standing between ten to 30 metres in height and sparse crown cover of 20 to 50%. In open woodland the trees will stand ten to 30 metres high and have very sparse crown cover of less than 20%. In low open woodland the trees will be between two to 10 metres high and again contain very sparse crown cover of less than 20%.<sup>62</sup>
- [94] Mr Stanton's averaging process effectively excluded from consideration as remnant all areas of vegetation where the trees were 10 metres or less in height and had 20% or less crown cover<sup>63</sup> without considering whether they occurred in the landscape as low open woodland despite that being within the range of the technical data.

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<sup>57</sup> T1-35 L30-40

<sup>58</sup> T1-51 L 10

<sup>59</sup> T2-53 L35 - T2-54 L12

<sup>60</sup> Ex 7 page 15

<sup>61</sup> Ex 7 page 40 – strangely, the figures given only add to 99%.

<sup>62</sup> Neldner page 98 table 28.

<sup>63</sup> These were the exclusionary figures – he said “Where we inspected on the ground and did formalised transects and identified disturbed vegetation that met those thresholds, we classified it as non-remnant vegetation.”

- [95] Similarly the formula excluded from remnant status areas of vegetation where the height was 10 metres or the canopy cover less than 20% even though this could constitute 9.12.1 remnant vegetation occurring in an open woodland setting, again within the scope of the technical data for remnant 9.12.1a.
- [96] Mr Stanton's methodology is flawed if Burdekin Downs contains areas of 9.12.1a occurring as open woodland or low open woodland where the height was 10 metres or less or canopy cover less than 20% or both.
- [97] Burdekin Downs is a large property. Mr Stanton said it was 270 square kilometres in area. I have already concluded that different geology or soils was responsible for the different stem and cover density of vegetation on opposite sides of one gully on the property. Old survey mapping recorded the occurrence of 'open forest' on Burdekin Downs<sup>64</sup> although it is not clear whether that equates to the concept of open woodland as defined in Neldner.
- [98] But in any case Mr Stanton agreed with counsel that Burdekin Downs contains low open woodland and open woodland when it was put to him that his averaging process was flawed:

(Mr Traves) You're (sic) adoption of 20 per cent as the canopy cover to be applied to the ecosystem means that, by definition, all open woodland and all low open woodland on Burdekin Downs is excluded from remnant status?---Yes.

Now, that – now, the whole intent of the determination of remnant status -- -?---Yes.

-- - it (sic) to capture the different variants within the regional ecosystem. Correct?---Yes. Yes.

But, by definition, the approach that you've adopted and, for that matter, Mr (sic) Williams has adopted, by necessity, excludes what is apparently, looking at appendix 3, some 54 per cent of the sample representative sites of the regional ecosystem?---I'm surprised it's not more, to be honest. But, as we demonstrated before, these are quite different communities. They're much taller. They're more open. They're – they don't have 99 stems per hectare. They have 26 or between 20 and 30, and they're different ecosystems. So to -- -

So they're more open. They're more open?---No. No, they're not more open. They've got bigger crowns. No. You're missing (sic) up the difference between stem density and canopy cover, which are two totally different things.

But you don't contend, do you, that Burdekin Downs does not contain or [indistinct] remnant status contain open woodland or low open woodland?---And -- -

No, just answer the question. It does, doesn't it?---It does. Yes.

And yet, by your definition, all of that would be excluded from the status of remnant vegetation?---Where it is disturbed – where it has been logged. That it my contention because I can show you extensive areas where there are (sic)

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<sup>64</sup> Ex 26 with the notation at the foot of the document "Scale 2 m to 1 inch".

open woodland that have been mapped as remnant vegetation, and we have encompassed [indistinct] that structural variation. And it's on a – it's based on the disturbance we see on the aerial photographs and on the ground, and one thing I can say, Honourable Member, that if you set your benchmark at the lowest value it's impossible to assess what is happening at the upper extremity, and if the upper extremity is the dominant expression of a regional ecosystem on this property, which I believe it to be – and that is based also on the account of the timber assessment that I did and the representative sites – you cannot assess whether those structural variations meet remnant. You will exclude – you will exclude – you cannot get remnant vegetation at all if you use the lowest site value as the basis. Everything that you see on Burdekin Downs will be remnant. So it's – it's not possible.<sup>65</sup>

[99] According to the technical data, 45% of 9.12.1a occurs as open woodland and another 9% as low open woodland. Mr Stanton's threshold requirement of more than 20% canopy cover for remnant 9.12.1a could possibly exclude 54% of remnant 9.12.1a growing on Burdekin Downs in landscapes of open or low open woodland.<sup>66</sup>

[100] Mr Stanton responded to this criticism by claiming technical descriptions should not be used to determine remnant status. He relied for that contention on a statement made in an introductory paragraph to a publication entitled *Regional Ecosystem Technical Descriptions for the Einsleigh Uplands* (Addicott et al 2012):

Technical descriptions include the attributes: tree canopy height and cover and native plant species composition of the predominant layer, which are used to assess the remnant status of vegetation under the *Vegetation Management Act 1999*. However, as technical descriptions reflect the full range in structure and floristic composition across the climatic, natural disturbance and geographic range of the regional ecosystem, local reference sites should be used where possible (Neldner et al. 2012 section 3.3.1).<sup>67</sup>

[101] This statement does not support Mr Stanton's claim that technical data descriptions should not be used to determine remnant status. What the Addicott statement says is that local reference sites should be used where possible to take into account any climatic, natural disturbance and geographic differences found in the area of the vegetation being assessed. But it says nothing about situations where, on a large property, potentially varied climatic, natural disturbance or geographic differences occur or where local reference sites are not available. It was precisely because Mr Stanton found the task of obtaining suitable reference sites on the property to assess the multitude of variations in 9.12.1a present an "impossible process"<sup>68</sup> that he adopted his averaging method:

Reference sites are considered the primary source of information, and under the guidance of the methodology produced by the Queensland Herbarium, you – if you can't find suitable reference sites, you use the technical descriptions. But they're always presented as an average. The other alternative is to use the bio-original benchmarks. They're presented as a median, and you use those median heights to determine – as a basis for your assessment of non-remnant vegetation. And I'm not saying at all that those averages are going to meet the

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<sup>65</sup> T2-56 L34 – T2 57 L26

<sup>66</sup> T1-87 L9

<sup>67</sup> Ex 13 [14]

<sup>68</sup> T1-37 L44

criteria for everything. You have to assess it on a site by site basis, but unless you use those averages, it becomes an impossible process to account for every single variation with an alternative reference site.<sup>69</sup>

[102] In Mr Stanton's own words, if one cannot find suitable reference sites one uses the technical descriptions.

[103] The Addicott extract relied on by Mr Stanton in turn cites Neldner, and Neldner does not say technical descriptions should not be used to assess remnant vegetation. Item 3.3.1 of Neldner referred to in the Addicott extract is missing from the current version of Neldner.<sup>70</sup> However the current version says this about reference sites:

#### Reference sites

Reference sites are required to determine remnant/non-remnant status in cases where there is evidence of clearing of the predominant canopy and it is not obvious that the 50% of cover and 70% of height and characteristic species definition (section 2.3.4) is met. Reference sites are selected by choosing areas that represent the vegetation that would normally be present at the site. Sites are generally chosen where there is no evidence of clearing of the predominant canopy evident on the aerial photograph archive or in the field.

The normal canopy height (and cover and species) may vary within regional ecosystems according to environmental conditions. Therefore reference sites should occur as close as possible to the area to be assessed and have similar environmental conditions, such as the same vegetation community and climate (same subregion), landscape conditions (soil, slope, position in the landscape, geology etc.) and natural disturbance (cyclone impacts or fire history). For this reason, field measurements of the height, canopy cover and species composition of the area of interest are compared, where possible, to measurements from a local reference area, i.e. a nearby area of comparable vegetation that is known to be remnant, such as a road reserve.

Where it is not possible to find an appropriate local reference site, the median height and canopy cover values may be obtained from published Queensland Herbarium Regional Ecosystem technical descriptions, CORVEG sites, published benchmark descriptions or other published descriptions for the relevant regional ecosystem. In general the closer the CORVEG site or published description is to the physical situation of the area of interest, the more valuable it is as an indicator of its normal predominant canopy.

[104] Mr Stanton's averaging method potentially removes those areas of 9.12.1a occurring as open woodland and low woodland from contention as remnant vegetation on Burdekin Downs. I conclude his averaging methodology is thereby fatally flawed and is not capable of accurately assessing the remnant status of 9.12.1a on Burdekin Down. That means in turn his PMAV is not acceptable.

[105] Mr Dillewaard also saw extensive variation in the vegetation cover across Burdekin Downs and said the variation needed to be incorporated in any assessment of remnant status. He found a similar degree of variation in the vegetation on Burdekin Downs as described in the technical data.<sup>71</sup> He found the same variation within

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<sup>69</sup> T1-37 L36-45

<sup>70</sup> Ex 17

<sup>71</sup> Ex 7 page 23

9.12.1a on Burdekin Downs occurring in surrounding areas. He employed a number of other analysis tools to reach that conclusion, namely SCARF data (satellite image analysis of height and cover) and FPC (foliage projective cover).<sup>72</sup>

- [106] I accept Mr Dillewaard was entitled to rely on the technical data on the basis noted by Mr Stanton, namely the significant variation found in 9.12.1a making identification of individual reference sites for the variations in 9.12.1a almost impossible.
- [107] But in Mr Dillewaard doing so, he earned criticism from Dr Williams, who said Mr Dillewaard's failure to set a structural threshold for any component regional ecosystem facilitated him identifying every structural variant of woodland present on Burdekin Downs as remnant vegetation.<sup>73</sup> I understand what Dr Williams was complaining about was that despite his stated recognition of the significant variation in 9.12.1a on Burdekin Downs, Mr Dillewaard himself failed to identify in his assessment those areas of 9.12.1a occurring in the landscape as woodland, as open woodland or low open woodland.
- [108] Both parties tendered a significant volume of material in this matter. Understanding the mass of material generated by the experts may have been greatly enhanced had the experts met in conclave prior to hearing. It is unclear why that did not occur.
- [109] Mr Dillewaard presented the fruit of his labours by creating his PMAV in electronic form.<sup>74</sup> That electronic evidence proved elusive to access by the Tribunal and all the relevant material in electronic form was subsequently directed to be presented in hard copy.
- [110] The hard copy material shows Mr Dillewaard's PMAV comprised 172 polygons (discrete mapping areas). Each polygon contained detailed information about the regional ecosystem found in the polygon: the remnant status of the vegetation observed through available photographic imagery (1945, 1964, 1977, 1986, 1999 and 2017), its status according to satellite imagery (2005, 2012), its shape and its area. There was no information however about the vegetation within each polygon occurring as low open woodland, open woodland or woodland.
- [111] Dr Williams' criticism has some merit. Mr Dillewaard's methodology is valid but his assessment broad brush.

### **The evidence supporting remnant status**

- [112] The averaging process adopted by Mr Stanton and Dr Williams is flawed and the flaw fatal. Mr Stanton's PMAV is drawn based on his averaging methodology and is not acceptable.
- [113] I accept that the variation (or in Dr Fensham's words, patchiness) of 9.12.1a occurring on Burdekin Downs is significant such that the location of suitable local reference sites is, repeating the words of Mr Stanton, an impossible task.

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<sup>72</sup> T4-15 L40 – T4-16 L6

<sup>73</sup> Ex 13 [71]

<sup>74</sup> Ex 27

[114] I have also accepted that Mr Dillewaard's approach using the technical data was available in these circumstances but his assessment of 9.12.1a across the variable landscapes of low open woodland, open woodland and woodland was broad brush.

[115] It must be recognised however that the assessment of remnant vegetation is far from a precise science. The definition of remnant vegetation requires consideration of such nebulous concepts as the predominant canopy the vegetation normally has, and the height to which the vegetation normally grows. Neldner says this about those concepts:

The undisturbed predominant canopy, for vegetation, is defined in the VMA as the predominant canopy the vegetation normally has, while the undisturbed height, for vegetation, means the height to which the vegetation normally grows. Sites that have not been cleared are considered to support normal vegetation and are therefore classified as remnant. Where there is evidence of clearing and it is not obvious that the site meets the above criteria the site is assessed against normal vegetation or a reference site (section 3.3).<sup>75</sup>

[116] What normal vegetation means is also potentially problematic:

The normal canopy height (and cover and species) may vary within regional ecosystems according to environmental conditions.<sup>76</sup>

[117] The Act sets a threshold qualification for remnant vegetation (50% cover 70% height) but not much more. It does not set out the methodology appropriate to determine that remnant status. The State Policy provides some guidance about that:

In assessing an application for a PMAV, an area will be assessed first for suitability as Category B, then for suitability for Category C, then for Category R. An area will not be made Category X if it is identified as remnant, or as high value regrowth using the Queensland Herbarium's published methodology.<sup>77</sup>

[118] According to the State Policy, an area identified as remnant or high value regrowth using Neldner cannot be made Category X.

[119] The historical timber cutting relied on by Mr Stanton took place more than 80 years ago, and Neldner states that eucalypt woodland or open forest vegetation types usually regain remnant status after 30 years.<sup>78</sup> The historical logging associated with the tramlines extended no further than Three Mile Creek to the west of the timber cutters' camp. That means the timber cutting was limited to the eastern portion of the property. There is no evidence of it having extended through the central or western portions.

[120] Save for those limited areas mapped by Mr Dillewaard in his PMAV as high value regrowth, I have found that there is no evidence of clearing on available imagery of Burdekin Downs.

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<sup>75</sup> Neldner page 20

<sup>76</sup> Neldner page 33

<sup>77</sup> Ibid [4.6.3]

<sup>78</sup> Neldner page 30 [3.3] – Neldner does not clarify, nor did the parties during hearing, whether the eucalypt woodland occurring in low open or open woodland landscapes required similar time.

- [121] With respect to the eastern portion a survey map made about 1941 shows the area accessed by the last tramway. The survey is dated nine years after logging along the tramways finished. The surveyor noted on the survey *thick ironbark, gum, bloodwood, ironwood, oak, ash ....*<sup>79</sup>
- [122] Another survey map of land adjacent to the tramline made in 1965 refers to *moderately to thickly timbered with ironbark, gum, bloodwood and sandalwood dense forest, tea-tree, rubber vines etc.*<sup>80</sup>
- [123] Mr Dillewaard's evidence was that the vegetation was consistent in appearance across Burdekin Downs from 1945 based on the photographic imagery. That additionally suggests that the cleared areas in the eastern portion returned to remnant status by 1945. There is no evidence to challenge the remnant status of the western portion other than the initial assertion of Mr Stanton, subsequently withdrawn, that the historical clearing of timber extended across the entirety of the property.
- [124] Mr Stanton's case was compromised from outset on the mistaken belief that historical clearing occurred across the entire property. He subsequently recognised that error but could offer no historical evidence of anthropogenic disturbance in those areas of Burdekin Downs west of where the timber cutters cut using the tramway.<sup>81</sup>
- [125] He conceded that during his site visits he recognised the variability of 9.12.1a on Burdekin Downs. Despite that concession he attributed lower stem and canopy density where it occurred to evidence of past clearing without an evidentiary basis for doing so<sup>82</sup> and without serious consideration to the possibility that it occurred as an aspect of the variability of 9.12.1a or natural disturbance consequent on drought as proposed by Mr Dillewaard.
- [126] I accept Dr Fensham has particular expertise on the subject of the effect of drought in eucalypt woodlands. He said he had published approximately 30 papers on the subject. Indeed, his first paper concerned the Charters Towers area where he was working in the 1990s when he witnessed one such drought event.
- [127] Dr Fensham agreed with Mr Dillewaard's observations that the photographs taken in 1977 when compared to 1964 showed evidence of drought death on Burdekin Downs. He said there was a very extended period of low rainfall from 1961 to 1971, an entire decade.
- [128] He said in a statement of evidence that Burdekin Downs is in the dry tropics which is characterised by wet summers and droughts which can occur in any season over multiple years. The structure of ironbark woodlands in the dry tropics changes as a result of mortality during drought and growth and recruitment of new trees during wet periods. There are substantial fluctuations in the density of live trees relating to rainfall fluctuations.<sup>83</sup> I accept his evidence about this.

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<sup>79</sup> Ex 26 plan BKN44

<sup>80</sup> Ex 26 BKN86

<sup>81</sup> T2-42 L36

<sup>82</sup> T1-52 L41 – T1-53 L2

<sup>83</sup> Ex 6 page 173

- [129] He concurred with Mr Dillewaard that the woodlands on Burdekin Downs had recovered to remnant status.<sup>84</sup>
- [130] Dr Williams ascribed the high density of trees smaller in height with a lower crown cover compared to trees in “uncleared areas” as evidence of past tree clearing<sup>85</sup> without truly addressing the fact that evidence of historical timber clearing was limited to the eastern portion of Burdekin Downs.
- [131] Nor did Dr Williams address the 9.12.1a variability factor where it occurred as low open or open woodland. He said there were some dead trees in a few locales, but they were in the range of seven to nine metres in height with a few 10 or 11 metres. From that he concluded the dead trees were “well below the typical size of the larger trees in the remnant reference sites, which is 15m.” He concluded from that that there was no evidence that drought caused the death of large trees creating non-remnant vegetation.<sup>86</sup>
- [132] Dr Williams said he found evidence of past tree clearing on the property, but apart from the matter of clearing at the gully, it was limited to artefacts found associated with the old tramway and therefore limited to the eastern portion of the property only.<sup>87</sup>
- [133] Neither Mr Stanton nor Dr Williams compared the photographic imagery of the vegetation on Burdekin Downs with the vegetation on adjacent properties. Dr Williams considered it irrelevant to look beyond the boundaries of Burdekin Downs:

(Mr Traves) I put to you that available imagery from 1945 to the present, a period of approximately 75 years, shows a consistent vegetative cover typical of that for remnant regional ecosystems occurring in an area that has, at various times, been affected by natural disturbances. Do you agree with that?---Consistent with vegetation cover typical of that in remnant ecosystems – no.

...

I suggest to you that you have not compared – and it’s correct to say – similar patterns on the imagery on adjacent properties. You’ve not looked beyond Burdekin Downs to compare the vegetation pattern with those properties? ---I didn’t for this particular project because I’m looking at the areas within a localised area so that I can reduce the variation that is recognised across the large bioregion. And I’m purposely looking at comparisons of undisturbed remnant areas that are very local to the disturbed areas. You really need to compare local areas, like sites to like sites.

But there’s no reason why the local area would finish at the property boundary, is there? ---It is preferred to do that.

There is no reason why the local boundary would finish at the property boundary – the local area would finish at the property boundary, is there? ---Well, as I said, I simply looked at the aerial

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<sup>84</sup> Ex 6 page 173

<sup>85</sup> Ex 9 [11]

<sup>86</sup> Ex 9 [28]

<sup>87</sup> T3-18 L36

Answer my question, please. Is there a reason why the ? ---No, there's not.<sup>88</sup>

- [134] Dr Williams said Neldner required remnant reference sites "... as close as possible – preferably on the same property."<sup>89</sup> The difficulty with this proposition in the case at hand is the elusiveness of relevant reference sites on Burdekin Downs given the variability of 9.12.1a.
- [135] Mr Dillewaard found a similar degree of variation of the vegetation on Burdekin Downs as that described in the technical data.<sup>90</sup> He found the variation within 9.12.1a on Burdekin Downs occurring in surrounding areas to the property using SCARF data and FPC.
- [136] Dr Fensham supported Mr Dillewaard's assessment. He similarly examined the surrounding areas and compared them to Burdekin Downs and concluded Burdekin Downs displayed the same features of 9.12.1a.

### **Disposition**

- [137] Where the evidence given by Mr Stanton and Dr Williams differs from that of Mr Dillewaard and Dr Fensham, I prefer the evidence of the latter experts.
- [138] I have found there is no evidence of anthropogenic clearing having occurred in the western and central portions of Burdekin Downs and that available imagery shows the areas have contained remnant vegetation since 1945. Save for some minor areas where Gidgee and Bloodwood have been cleared, I find the only disturbance to the vegetation depicted on imagery has been caused by drought.
- [139] I consider significant weight should be given to the comparison exercises performed by Dr Fensham and Mr Dillewaard comparing remnant vegetation on adjacent areas with the vegetation on Burdekin Downs. I accept the vegetation in the surrounding areas is mapped remnant and it is generally 9.12.1a. I determine that in respect of the central and western portions of Burdekin Downs, the 9.12.1a vegetation should be assessed as remnant. This finding accords with and is supported by the Neldner methodology.
- [140] In respect of the eastern portion of the property, this is the only part of the property where there is historical evidence of anthropogenic clearing which was timber cutting associated with a pumping station on the Burdekin River. That disturbance ended in 1932. I find the vegetation bears like values to that of the western and central portions and as with those other areas the available imagery shows the vegetation as remnant since 1945. Any disturbance to the remnant vegetation other than clearly anthropogenic clearing associated such as roads and dams I conclude has been the result of drought.
- [141] I have accepted that Mr Dillewaard's reliance on technical data as the basis of his assessment was appropriate in the circumstances of the complex variability of 9.12.1a. Mr Dillewaard did not explain why he did not further categorise the remnant 9.12.1a into the various woodland landscapes. He understood the significance. One suspects the patchiness described by Dr Fensham is a particular

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<sup>88</sup> T2-97 L14 – L45

<sup>89</sup> T2-98 L18

<sup>90</sup> Ex 7 page 23

complexity associated with 9.12.1a precluding accurate further categorisation. Alternatively such further categorisation required extensive consideration of such things as soils and geology which, like Mr Stanton with his reference sites, made the task difficult if not impossible.

[142] I conclude however that the further categorisation of 9.12.1a into particular woodland landscapes is not necessary. As with the western and central portions, the evidence available supports a finding that 9.12.1a occurring in the eastern portion of Burdekin Downs is similarly remnant. Again, this finding accords with and is supported by Neldner.

[143] Mr Stanton's PMAV is rejected for the reasons given. The PMAVs drawn by the departmental officers prior to Mr Dillewaard's PMAV failed to consider the variability of remnant 9.12.1a within various landscapes and in consequence are also not the preferred mapping.

### **The precautionary principle**

[144] For the sake of completeness I should address the precautionary principle.

[145] As part of achieving the purposes of the VMA set out in s 3 of the VMA it provides:

(2) The purpose is achieved mainly by providing for ...

(d) a framework for decision making that, in achieving this Act's purpose in relation to subsection (1)(a) to (e), applies the precautionary principle that lack of full scientific certainty should not be used as a reason for postponing a measure to prevent degradation of the environment if there are threats of serious or irreversible environmental damage....

[146] Mr Jonnson submits that s 3(2)(d) of the VMA, the precautionary principle is not a separate and distinct factor or consideration but rather a statement that the decision framework of the VMA applies the precautionary principle. If one remains faithful to the decision framework prescribed by the VMA, including s 20C, then in making a decision one will be deemed to have applied the precautionary principle in making the decision. Further, in making that decision that will accommodate the innate or inherent scientific uncertainty in underlying variables.<sup>91</sup>

[147] I do not entirely agree. The State Policy for Vegetation Management is prepared in accordance with s 10 of the VMA. Amongst other things it states it provides a framework for decision making under the VMA including making and amending property maps of assessable vegetation (PMAVs). It says that regulation of vegetation clearing is needed to prevent the loss of biodiversity. It refers to the application of the precautionary principle in decision making.

[148] Section 10 of the VMA provides that the State Policy must state outcomes for vegetation management and also "actions proposed to achieve the outcomes". In the State Policy under the heading 'Actions proposed to achieve outcomes' it provides:

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<sup>91</sup> Applicant's closing submissions, [88].

In assessing applications for a PMAV, have regard to the best available scientific knowledge and the precautionary principle, and apply approved operational policies and guidelines.<sup>92</sup>

[149] It is clear that the precautionary principle is not simply an objective of the Act but an active factor to be taken into account in assessing PMAV applications, along with operational policies and Neldner.

[150] There have been a number of decisions explaining the scope and application of the precautionary principle. In *Telstra Corp Ltd v Hornsby Shire Council* the Land and Environment Court of NSW said:<sup>93</sup>

128 The application of the precautionary principle and the concomitant need to take precautionary measures is triggered by the satisfaction of two conditions precedent or thresholds: a threat of serious or irreversible environmental damage and scientific uncertainty as to the environmental damage. These conditions or thresholds are cumulative. Once both of these conditions or thresholds are satisfied, a precautionary measure may be taken to avert the anticipated threat of environmental damage, but it should be proportionate: N de Sadeleer, *Environmental Principles: From Political Slogans to Legal Rules*, Oxford University Press, 2005 at p. 155.

...

140 The second condition precedent required to trigger the application of the precautionary principle and the necessity to take precautionary measures is that there be “a lack of full scientific certainty”. The uncertainty is as to the nature and scope of the threat of environmental damage: *Leatch v National Parks and Wildlife Services* (1993) 81 LGERA 270 at 282.<sup>94</sup>

[151] In *Leatch v National Parks and Wildlife Services* Stein J said:<sup>95</sup>

Its premise is that where uncertainty or ignorance exists concerning the nature or scope of environmental harm (whether this follows from policies, decisions or activities), decision-makers should be cautious.<sup>96</sup>

[152] Mr Traves suggested the precautionary principle should be considered in making the decision about the best PMAV for the property, and I agree. However he does not say what threat of environmental harm triggers it here. Mr Traves conceded simply categorising vegetation as Category X is not degradation of the environment.

[153] I have considered the precautionary principle but conclude it has no application to the issues in dispute here.

### Orders

[154] The PMAV made by the department the subject of internal review should be set aside.

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<sup>92</sup> [4.6.4].

<sup>93</sup> [2006] NSWLEC 133.

<sup>94</sup> *Ibid* [128], [140].

<sup>95</sup> (1993) 81 LGERA 270.

<sup>96</sup> *Ibid* 282.

[155] The correct and preferable PMAV is Mr Dillewaard's PMAV appearing at page 12 of his statement of evidence of 14 June 2019 (Exhibit 7) and comprising Exhibit 52.