Thompson has been too generalised in assigning a land suitability class 4 to red and yellow earth and podzolics developed on strongly weathered deposits. Thompson does not appear to consider climate, and soil moisture recharge in assigning suitability classes. Thompson incorrectly bases his financial modelling largely on his assignment of land suitability classes which, in my opinion, are flawed, and inconsistent with previous studies on similar soils, in lower rainfall environs than Olive Vale in far north Queensland. Thompson's review is entirely desktop and no field inspection of the subject land has been undertaken as part of his review.

Pinnacle Pocket Consulting

Response to Independent Review of Olive Vale Fairview Station (Natural Resource Review) conducted by W.P. Thompson of Land Resource Assessment and Management prepared for Department of State Development, Queensland Government

Peter Spies (B. App. Sci. Rur. Tech (Hons)

TABLE OF CONTENTS

INDEX OF TABLES

Summary

To inform debate around High Value Agriculture, Peter Spies, the consultant who prepared the Olive Vale Application for High-Value Agriculture, has prepared a response to the W.P. (Bill) Thompson review (*Independent Review: Olive Vale Fairview Station Natural Resource Review*).

Thompson has been too generalised in assigning a land suitability class 4 to red and yellow earth and podzolics developed on strongly weathered deposits. Thompson does not appear to consider climate, and soil moisture recharge in assigning suitability classes. Thompson incorrectly bases his financial modelling largely on his assignment of land suitability classes which, in my opinion, are flawed, and inconsistent with previous studies on similar soils, in lower rainfall environs than Olive Vale in far north Queensland.

If Thompson's methodology and assumptions was correct, then that would call into question at least five studies, that are published by DNRM/DPI in the north, and a number of authors and fellow soils scientists.

The report prepared by W.P (Bill) Thompson of Land Resource Assessment and Management Pty. Ltd. is selective in what it has taken from the Land suitability and financial viability reports prepared for the Olive Vale Proposal.

Thompson did not consider the methodology behind the consultant's mapping of Olive Vale and the frequency of soil sampling. Thompson assumes that the sites taken, were over the entire property, not the 50,000Ha initially chosen by the applicant.

Introduction

What Thompson offers, is an opinion on his desk based review of Olive Vale. No field inspection of the subject land has been undertaken as part of this review. No attempt was made by Thompson to contact the consultant who prepared the Olive Vale Report, to better understand and query methodology.

The review timeframe is questionable. It is my opinion, that a proper review of assessment processes could not have occurred, between the period 4May and 31 May 2015. The original story regarding clearing at Olive Vale, by the ABC news on 4 May - http://www.cairnspost.com.au/news/cairns/cape-york-farmer-forges-ahead-with-tree-clearing-plan-of-olive-vale-fairview/story-fnjpusyw-1227388691719 It was reported by the Wilderness Society. In response to questions from the ABC, deputy premier Jackie Trad has ordered an investigation into the decision. "*The allegations into the clearing [of nearly 32,000 hectares] of land on Olive Vale Station while the caretaker conventions were in place, is a matter of great concern to me*," she said. "*Given the serious issues raised, I have instructed the Director General to investigate the allegations as a matter of priority*."

Thompson had completed his "review" by 31 May so it hit the next sitting of parliament. http://www.cairnspost.com.au/news/cairns/cape-york-farmer-forges-ahead-with-tree-clearing-plan-of-olive-vale-fairview/story-fnjpusyw-1227388691719

Now it took Olive Vale's consultant at least five (5) months to do the survey and write report… soil tests etc.

Thompson's assumptions are not consistent with at least 5 other studies in Far North Queensland.

Whilst this author accepts Thompson's qualifications and experience. I consider his review of this application, as peer review and will take some comments on board. However, some of his methodology in this assessment is questionable and, in my opinion, draws some wrong conclusions. Thompson states "*Land Suitability frameworks have a superficially simple structure, but can be quite complex in the way they are applied and interpreted. Mis allocation of suitability are not unusual as a result.* Thompson is correct in this statement. It is not unusual for soil scientists to disagree and the profession is not considered an exact science. Each soil scientist must look at the combination of factors that combine to assign a soil land class. An important one is climate. In the Olive Vale assessment I also reviewed the closest land surveys conducted in similar environments. Those being:-

- *Cape York Peninsula Land Use Strategy (CYPLUS) Soil Survey and Agricultural Suitability of Cape York Peninsula* (Biggs and Philip 1995);
- *Soils and Agricultural Land Suitability of the Gilbert River Area; Chadshunt to Mt Sircom*. (Enderlin, Neil G. 2000); and
- *Soil survey of the Mareeba-Dimbulah irrigation area, Far North Queensland – MDIA* (Enderlin 1997)

Thompson, in his assigning of certain land classes to certain soil types did not take into account climate and regular soil water recharge of certain soil types given climate. His report is also not consistent with the assigning of suitability to certain soils (i.e. "Kimba") by Andrew Biggs in the CYPLUS study and noting the work of Enderlin on similar soil types in the Mareeba-Dimbulah Irrigation Area and Gilbert River Study.

Since the Olive Vale/Fairview application (on subsequent applications this year), I have doubled the number of sites and ensured a better geographic spread of sites, on the recommendation of DNRM. This has been a constantly evolving process, by the Department, over the last two years as their processes became better defined. I see the Thompson review as part of that, but it is critical in its nature of the Olive Vale application, based on some assumptions made by the author. There appears to be no fact checking behind these assumptions. At the time of the Olive Vale/Fairview application we were working to the minimum required number of sites at 1 site per 400Ha for 1:100,000 scale mapping using the free survey method. This was accepted by the Department at the time on large projects in largely uniform landscapes.

Thompson must appreciate that these new areas offer potentially new cropping areas where innovative, new and accepted conservation farming practices, such as zero tillage, can be employed. Such higher and more reliable rainfall zones will offer both challenges and opportunity, but there must be room for innovation. It is my opinion,

that development could be phased, and this is proposed in the case of Olive Vale. However, the laws do allow for approval of the full project 'up front'. Distrust in future Governments, and change in policy, have been a dis-incentive for the idea of phasing development. Experience, and dealings with Landholders and Investors of large scale development, has indicated to me that they are only prepared to invest at scale where there is certainty of approval. Certainty is required to attract investment. Olive Vale may be a new frontier, and crops are being successfully grown on similar soils in areas where there is less rainfall reliability.

This project also proposes to establish a feedlot and finish cattle for both domestic, and export markets via the ports of Townsville and Weipa. It is a catalytic project in an area where unemployment is high and there is little economic opportunity. This fits in with the Northern Australia White paper.

The report prepared by W.P (Bill) Thompson of Land Resource Assessment and Management Pty. Ltd. is selective in what it has taken from the Land suitability and financial viability reports prepared for the Olive Vale Proposal by Peter Spies of Pinnacle Pocket Consulting.

Climate, and soil moisture recharge, needs to be considered in assigning Land suitability classes, this does not appear to be considered in the Thompson review. Certainly it has not been detailed.

The Olive Vale application report/s met with the published Guidelines for land suitability and Financial Viability (see Attachment 1). Otherwise they would not have been accepted by the Department and would have straight away gone back to the applicant's consultant requesting more information by way of Information Request (IR).

There are some aspects, particularly around the financial modelling and number of sites sampled, that will use in future reporting. There is always room for continuous improvement, as what the Government wants is defined… their policy seems to be changing on this, and has been for two years since HVA came in.

The author was not consulted on his report, Thompson did not ask the applicant's consultant on methodology, and as far as I can see did not consult similar surveys previously conducted by DNRM.

Land suitability and scale

Thompson has made the assumption "*that the applicants land suitability assessment report uses the CYPLUS soils framework. That work mapped the soils of Cape York at a scale equivalent to 1:250,000*". Thompson is incorrect here as we utilised the soils descriptions of CYPLUS, to be consistent in terminology, but then re-mapped those soils at 1:100,000 scale. In preparing his figures for the report, Thompson makes the assumption that all of the sites were across the whole property of 140,658 ha – via GIS calculation for Applicant data set. He assumes a Site Density of 1 site per 736 ha.

The actual intensity of sampling was 1 site per 400Ha, which is considered acceptable for 1:100,000 scale mapping (see Table 1).

Table 1. Land Resource Maps, Scale of Map Area per Ground Observation, Minimum Area depicted on Map

SCALE OF MAP	AREA PER GROUND OBSERVATION	MINIMUM AREA DEPICTED ON MAP
1:50,000	25 – 100ha	5ha
1:100,000	100 – 400ha	20ha
1:250,000	625 – 2500ha	125ha
1:500,000	2500 – 10000ha	500ha

Source: Gunn *et al*. (1988)

Thompson states the following "(The) *Applicant supplied to QDNRM land suitability mapping of the whole of Fairview and Olivevale holdings which contains a land suitability code and a map unit code. These data sets were translated to MapInfo format and the land suitability data was updated to the soils mapping for the cleared region. During this process, the soil codes were intentionally not updated. The number of sites inside within the proposed cleared area was then counted".*

Thompson has only counted sites inside the proposed clearing area when he derived his mapping scale of 1:250,000. Had Thompson contacted the author he would have learnt that only the areas indicated by the applicant to the consultant were surveyed (not the whole property), the required number of sites were sampled. Methodology was to survey enough sites across the areas of potential suitability, with the final chemical test results to confirm whether the main risk, Sodicity (ESP) may be an issue at depth. Some areas were omitted (mapped out). Furthermore, other areas that had soil test sites and a number with chemical tests were omitted on other factors from the final clearing plan, even though they were made up of the larger soil polygon. Land suitability is not the only consideration. Reasons for omitting such areas were other considerations within the Vegetation Management Framework, which Thompson does not appear to have considered, such as potential habitat, connectivity and Of Concern ecosystems. Some of these sites were also eliminated on slope, not soil suitability. Vehicular access for a soil corer is also an issue in such surveys, and this is well-acknowledged. A number of the sites, which may be just outside of the final 'proposed areas of development', can also be included in overall soils mapping.

When one considers that 140 sites were taken across approximately 50,000Ha of the property, this falls within the range of 1:100,000 mapping and within Land suitability guidelines. Sites, found just externally to the proposed areas, but on same mapped soil type could have but were not used in Thompson's calculations.

Not all soil sites are required to be within the final approved area for mapping purposes, so Thompson's rationale in calculations he made here do not appear correct.

The final approved area, following DNRM inspection in early December 2014, after submission of the applicant's reports was 31,965Ha, not 33,054Ha. This area was omitted on basis of mapped sub-dominant Of Concern regional ecosystems.

Thompson is also incorrect that the original CYPLUS mapping is 1:250,000 scale. It may have been published at 1:250,000 scale, but by the CYPLUS author (Biggs) own admission in this project. He described the soils of approximately 132,500 km2 of mainland. The aim of this exercise was 1:250 000 scale mapping, but the final scale was approximately 1:900,000 based on the criteria of one site/cm2 of map area. The author states "*Access limitations required extrapolation of interpretations over large areas, particularly in the central west. The 19 weeks of field work in which 905 sites were described was predominantly vehicle-based and during the dry season. Consequently, the hardsetting nature of some soils restricted the depth to which they were augered*". Only 40 sites had detailed chemical analyses. I am not attacking this body of work, which is a good reference point, merely demonstrating that original QDPIF/QDNRM crop suitability information that Thompson has quoted in his Land suitability compliance assessment on page 19 can then be called into question, when there are acknowledged scale errors within CYPLUS.

The applicant consultant's assessment was a category 4 assessment because existing CYPLUS mapping was not good enough. Interestingly, most of the areas ranked as suited to Cropping by QDPI soils mapping program for CYPLUS are, in fact, unsuitable due to being predominantly wetter *Melaleuca* Regional ecosystems and more dispersive (higher ESP) soils under Box (*Eucalyptus chlorophylla*) trees.Once again, this demonstrates the scale errors presented by the existing DNRM (former DPI) mapping – which are acknowledged by the CYPLUS author, but Thompson has used in an his criticism of the Olive Vale application.

The Olive Vale assessment was one of re-mapping the CYPLUS soils at property scale to ensure consistent terminology of soils (rather than labelling them "soil A", "soil B" etc.).

We utilised 140 sites across Olive Vale/Fairview, predominantly in the chosen areas, and conducted full chemical analysis on 76 of these (I know I said 70 sites in the report, but, in fact it was 76 when recounting the soils tests we actually did 76, listed sites A to BU on attached sheet. There were another 51 sites used as observation sites to verify extent of soils and aid in mapping (total sites within GIS dataset 191). I dropped unsuitable sites out of the final 'to clear' areas based mainly on sodicity (ESP). I was working to a required number of sites at 1 site per 400Ha for 1:100,000 scale mapping. This was accepted by the Department at the time on large projects in largely uniform landscapes. This is acceptable methodology.

Thompson appears to not consider the methodology or process behind the Olive Vale application. This could have been avoided if he contacted the author as a part of the review. The original Olive Vale application could have undertaken some better explanation of methodology, so that the reviewer would better understand that methodology. It would have been advantageous for Mr Thompson to contact the applicant's consultant so that they had that opportunity to discuss the methodology and reasoning behind sampling and assigning land classes. Thompson does note "*there are significant sections in the central, northern and western sections of the area nominated for clearing which have no sites located within them at all. The reasons for this are not explained in the report*". That is because it had been sufficiently mapped, and enough tests conducted, to determine fertility of those soil types and whether there were any issues with salinity or sodicity. It then became a

process of mapping extent. Access by vehicles, in uncleared country without tracks with a soil corer is always an issue.

Climate and comparisons to the assigning of land classifications to similar soils mapped in other studies in far North Queensland.

Thompson, in his assigning of certain land classes to certain soil types did not take into account climate and regular soil water recharge of certain soil types given climate. Thompson bases much of his argument on soil suitability classes on low soil moisture supply of three soils – Clark, Emma and Kimba. Thompson states "*Emma, Kimba, Clark, Batavia and Myall are red and yellow earth and podzolics developed on strongly weathered deposits. These soils comprise approximately 20% of Cape York. These types of soils are common throughout Queensland – including many coastal areas in the 800 to 1200 mm rainfall zones. They are rarely used for rainfed grain cropping in Queensland, however, they are used for cane where supplementary irrigation is available*". Thompson's comments may be appropriate in drier regions with greater rainfall variability in Queensland like the Darling Downs, Central Queensland and Maranoa, but are not necessarily applicable in the reliable rainfall areas of the seasonally wet tropics.

This is a far too generalised statement. Thompson then he goes to rule out in his review (assign land class 4 suitability) these soil types based on this argument. He has not considered other factors such as soil depth, wetness, soil physical condition etc.

Thompson states "*Sorghum, which is the main crop proposed for the development, a soil water storage of at least 80 mm is required for a soil to be considered suitable*". Even using Thompson's methodology here on soil moisture storage, why has he included the soil types "Myall" (with a 100-140mm/m (M2), and "Batavia" with a 80-100 mm/m soil moisture storage (M3). Thompson appears inconsistent with his own methodology.

It appears, that Thompson did not make the connection with climate which is detailed in the original report. Olive Vale receives, on average, between 1000-1100mm. The Land suitability report states "*Up to 82% of rainfall is on average concentrated in the November to April period. In the absence of irrigation, the 'growing season' is confined to the summer period (see Table 2, Figure 1). At least four 'humid' months occur during the summer months suggesting that, on average, moisture would be available for crop growth. Temperatures in excess of 35°C are common in summer but 40°C is rarely exceeded. Minimums lower than 10°C have occurred, but are extremely rare and frost does not occur (Figure 1, 2). Variability is as important an attribute of rainfall as its seasonality. Various indices have been used in Australia to describe variability. Variability over the continent can be mapped using the ratio of the 90-10 percentile range to the median. Variability index (VI) = 90 percentile-10 percentile. Laura has a variability index of 0.724. However, 90% of year's rainfall exceeds 672mm*". These values fall within the zone of moderate variability for Australia (0.75-1.00) and are similar to the variability range found in the eastern Australian wheat belt.

The applicant's consultant, Peter Spies, is consistent with DNRM/DPI soils studies in the Mareeba-Dimbulah study, CYPLUS suitability and Gilbert River studies (now 3 studies).

Comparison to CYPLUS suitability

Biggs and Philip (1995), the authors of the CYPLUS report, assigned suitability of some of these, or similar soils to these, such as "Weipa", "Kimba", "Batavia" and "Myall" in the Weipa hinterland area to the growing of sorghum and maize (see Appendix 2). Thompson's statement regarding suitability of the soils Emma, Kimba, Clark, Batavia and Myall is inconsistent with the previous study conducted by DNRM / DPI and the authors Biggs and Philip (1995).

Comparison to MDIA Study

Similarly, soils in the Department of Natural Resources and Mines Soil Fact Sheets Mareeba–Dimbulah Irrigation Area (Enderlin 1997) 1:25,000 scale – soil types *Sorenson* (a brown kandosol that has been given mainly minor (class 2) and some moderate (class 3) limitations). It has similar characteristics to the soil mapped in the original report as "Clark"; similarly *Walsh* - Red to Brown Kandosol, Dermosol or Chromosol. *Aunt* - Leptic Tenosol, Grey/Yellow-brown Chromosol; *Cobra* - Red Kandosol, some Chromosols (similar to the soils I remapped as "Emma" and "Kimba"); and surprisingly *Mulligan*, a Yellow Chromosol which is considered suitable by Enderlin as suitable for a range of land uses with moderate (class 3) and some minor (class 2) limitations: Cashew, Longan, Lychee, Mango, Heavy Vegetables, Maize, Navy Bean, Peanut, Salad Vegetables, Sorghum, Sugar Cane, Tea Tree, and Tobacco. These soils are all listed as being suitable for crops Maize, Navy Bean, Peanut, Sorghum and Sugar Cane.

Once again, Thompson's statement and assumptions in assigning a Land suitability class of 4 is not-consistent with the Mareeba–Dimbulah Irrigation Area (Enderlin 1997) study that assigned land suitability classes of 3 and even 2 on similar soil types.

Comparison to the assigning of land suitability classes in Gilbert River studies.

The Gilbert River study area is located in a lower rainfall zone to that of Olive Vale, with a higher rainfall variability (730 – 770mm). The soils mapped under the *Soils and Agricultural Land Suitability of the Gilbert River Area; Chadshunt to Mt Sircom* 1:100,000 scale. Unpub Enderlin, Neil G. (2000) include:

Pleasant – a very deep, uniform and gradational brown, apedal loamy soil (Brown Kandosol) was given class 3 suitability to rainfed forage sorghum;
Venture - Very deep, gradational, red to brown, pedal clay loam and clay soils (ASC Red-Brown Dermosol – considered by Enderlin (2000) to be class 3 for rainfed grain sorghum and class 2 for rainfed forage sorghum.
Gulfroad – very deep soils with moderate to thick loamy A horizons over structured red clays (Red Chromosol, very deep) found in elevated positions on level to gently undulating plains and rises. It is a residual soils derived from Tertiary - Quaternary alluvium and is firm to hard setting. Assigned largely class 2 for rainfed forage sorghum and class 3 for rainfed grain sorghum production.

Boretrack - Deep to very deep soils with medium thickness loam to clay loam A horizons overlying structured, mottled, yellow-brown clays Classification: ASC:Yellow/Brown Kandosol and Chromosol. Assigned class 3 for forage sorghum when I was assessing Forest Home application. This soil has affinities with soils Batavia and Clark under my assessment and CYPLUS study.
Bullseye – is a deep to very deep soil with medium thickness loam to clay loams overlying, mottled, yellow-brown clay loams and clays. ASC: Yellow/Brown Kandosols and Chromosols. It is a residual soil formed derived from colluvium. Surface Soil Condition is Firm to hard setting. Was given class 3 for rainfed forage sorghum by Enderlin at "Prestwood".
Brandyhat – very deep soils with thick to very thick loamy A horizons over apedal red clay loams and clays. ASC is a Red Chromosol. The landform where these soils are found are elevated level to gently undulating plains, rises and low hills. Residual soils derived from Tertiary - Quaternary alluvium. Brandyhat was given a class 3 for rainfed forage sorghum by Enderlin at "Prestwood".
Lynch - Deep to very deep soils with medium thickness loam to clay loams overlying, mottled, yellow-brown clay loams and clays. Classification: ASC: Yellow/Brown Kandosols and Chromosols. Residual soils formed derived from colluvium and Tertiary and older sedimentary rock. This soil has similar qualities with "Clark" and was assigned a land suitability class 3 for rainfed forage sorghum by Enderlin at Forest Home.

Land suitability classes also change with chosen crop. Thompson refers to grain cropping on page 11. This proposal is for forage sorghum for green chop, maize, grain sorghum, dryland upland rice and soybean. The following was stated up front in the Olive Vale report "*Olive Vale Pastoral intend to undertake clearing for broadacre cropping of rain-grown forage sorghum for green chop, maize, grain sorghum, dryland upland rice and soybean as part of the Olive Vale/Fairview Operations plan. Initially, grain and forage sorghum and maize will be stored on farm and silage pits will be established to allow earlier turn-off of meatworks cattle and getting heifers up to breeding weight (340kg+) earlier. Later it is envisaged other crops will be grown, with greater farming expertise, such as soybean and dryland upland rice. However, initial farming will be rain-grown sorghum for green chop, maize and grain sorghum…. Suitability for sugarcane has been considered, but will not be grown unless irrigation water is made available to supplement summer rainfall for the dry period from April until November*".

<u>Comparison to findings in Flinders and Gilbert Agricultural Resource Assessment (FGARA) study.</u>

From the FGARA study the following "*The downstream alluvial landscape in the Gilbert River floodplain is broader with less relief and is more dissected by overflow channels than the upstream alluvium. These differences in landscape features point to contrasting hydrological conditions and flood characteristics between the upper and downstream alluvial landscapes. Outwards from the sandy, gravelly stream channels are floodplains of soils displaying indications of periods of waterlogging – mottling, darker colours and segregations. <u>Mottled Brown Dermosols</u>, <u>mottled Grey Chromosols</u> and a <u>mottled Yellow Kandosol</u> occupy the Gilbert River floodplains*".

These soil types have been mapped as class 3 under the FGARA survey conducted by CSIRO (2013).

If Thompson's methodology for assessing the Olive Vale application was applied to similar soil types within the FGARA study, it would call into question that study as well as the Olive Vale assessment. Thompson is too broad in his assessment that red and yellow earth and podzolics developed on strongly weathered deposits are unsuitable and therefore should be considered class 4.

The assigning of land suitability classifications for rainfed forage and grain sorghum by the applicant's consultant is consistent with previous studies across Far North Queensland.

An Assessment of Agricultural Potential of Soils in the Gulf Region, North Queensland

Wilson and Philip (1999) state the following "*A number of soils with agricultural potential exist. The Gilbert River area generally has a good potential for agricultural development. The alluvial soils (Mills) and earths (Mundy, Searly and Pit) appear to be best suited. They are located close to the main river channel and have few limitations other than those associated with their landscape position".*

Mundy - Very deep, gradational yellow earths, with neutral reaction trend. Australian Soil Classification is a Yellow Kandosol (Great Soil Group: Yellow Earth). Runoff is low, due to a high infiltration rate. These soils are highly permeable and experience no inundation. Plant Available Water Holding Capacity: Surface poor with moderate below 35cm. The soil surface condition is soft. These soils are potentially good agricultural soils. Surface textures are sandy so moisture regimes need to be monitored closely. There is a possibility of minor gully erosion.

Mills - Very deep, uniform, brown alluvial fine sandy loams, with a neutral reaction trend. Its Australian Soil Classification is a brown Tenosol (Great Soil Group: Alluvial Soil). Runoff is low, due to high infiltration rate. These soils are moderately to highly permeable and inundation may be experienced in some areas annually, other areas frequently. There is nil microrelief. Plant Available Water Holding Capacity: Moderate available moisture range.
Soil Surface Condition: Firm. These soils are suitable for agriculture however, there is a potential for the surface to be hard setting when cultivated. In some areas there may be some landscape complexity with the presence of small depressions. There may be some management implications relating to soil moisture levels as these soils are well drained.

Pit - Deep, uniform to occasionally gradational, red earthy sands, clayey at depth, with a neutral reaction trend. Its Australian Soil Classification is a Red Tenosol (Great Soil Group: Red Earthy Sand). Runoff is generally low due to high infiltration and these soils are highly permeable and experience no inundation. Plant Available Water Holding Capacity is low to moderate. Soil Surface Condition is Firm. These soils are of reasonable agricultural potential. There is presence of minor sheet erosion in some areas that indicates some erosion potential which may impact on management practices.

Table 2: Limitations and Suitability – Row Crops (cotton, maize, sorghum, soybeans) for soils from *An Assessment of Agricultural Potential of Soils in the Gulf Region, North Queensland*

Soil / Soil Landscape	Soil Drainage	Plant Avail. Water	Soil Physical Condition	Soil Chemical Condition	Soil Erosion Hazard	Adverse Site Factors	SUITABILITY CLASS (1-3)
Mundy	1	1	1	1	1	1	1
Mills	1	1	1	1	1 (b)	1	1
Pit	1	1	1	1	1	1	1

Degree of severity of limitation – 1 = nil or minor, 2 = moderate, 3 = high (severe)
Suitability Class – 1 = suitable with nil to minor limitations, 2 = suitable with moderate limitations, 3 = unsuitable (g) = gravel or segregations, Erosion Risk: (b) = 2-5% slope,

The point with reference to this survey, though at broader scale, is that soils with a high infiltration rate and low soil moisture supply were considered agriculturally suitable. Not all soil scientists will agree in the assignment of suitability, but Thompson's report has been far too generalised in its assumptions, and in making these statements he is inconsistent with at least 5 surveys conducted in far north Queensland.

Areas to be cleared and cropped

Thompson states on page 6 of his report the following "*Page 34 of the land suitability report lists 14 RE's with a total area of 53,300 ha on the property. Of this area, 21229 ha or 40% is indicated as being included in the area to be cleared. The applicant soil survey covered 146, 658 ha*".

Page 34 of the Land suitability report which in Table 1, Column 5 (The RE's proposed to be developed as mapped) add up to 33,027.92Ha, not 53,300 as stated by Thompson. The soil survey did not cover the entire area of Olive Vale/Fairview as Thompson states, but approximately 50,000Ha of the property.

Thompson's statement here is factually incorrect.

Financial Analysis

Thompson is correct in stating "*Clarification from the applicant would have allowed the confusion about the time line for clearing to be resolved and until that was resolved the remainder of the compliance test would be premature. If a 10 year clearing program is correct, then the Financial Analysis as presented is simply wrong*".

The financial model used was an "up-front cost" model, even though the intention is for the Development to be staged over a ten (10) year period. Thompson makes a valid point in that I did not "phase" the financials, over a ten (10) years period. I did them as an 'up front' situation with a payback period. Possibly this should have been addressed at the pre-lodgement meeting and before undertaking the 22A test, but the

need to see a phasing over ten (10) years was probably not seen as crucial to the determination of overall viability. The Department did not request further information on the financials. The assumptions and market rationale for the Olive vale modelling was included in that financial report. DNRM also had this when making their assessment. When it comes to financial viability for a project in the guidelines for Financial Viability the following "*This business plan does not need to be provided with the clearing application however to ensure this obligation is met, a signed statement must be provided by the suitably qualified person, accompanying the development plan, outlining how they meet the suitably qualified person requirements and certifying that a business plan has been prepared in accordance with these guidelines and the proposal is likely to be financially viable. The business plan must be retained and made available in the event that your application is audited".*

In the case of Olive Vale, the financial plan was provided up front to the Department of State Development for the 22A determination. This met with the requirements for the financial viability business plan, as determined by the assessing Departmental Officers, and followed the Business plan report format template provided by the Department.

Whilst Thompson makes some valid points around how the financial modelling was conducted for Olive Vale, the Financial report did clearly show viability of the said project, based on current commodity values at that time and costs. To have presented a ten (10) year staged development would still result in a viable outcome.

Thompson makes the assumption then of financial viability through his estimate of Land suitability – which the model dependant on. Therein lays the main difference in the two authors' opinion of Financial Viability. Thompson underestimates the area of suitability, based on his rationale of soil moisture storage.

To be fair to the original submission, any combination of crops could be used for the modelling – the main aim is to demonstrate viability. Whilst Thompson may attack the figures used for rice, that being a yield of 7 t/ha at an on farm price of $350/t. If we then utilise the same methodology for rice at a lower yield of 4.5T/Ha, we still get a gross margin with a positive return of $204/Ha.

If the financial analysis is changed within the model, to include some of Thompson's recommendations (i.e. 10% of area as non-cultivation area), 11,900Ha of grain sorghum and 16,900Ha for forage sorghum for baling and ensiling we achieve a Net Present value (NPV) of $174,820,918, an internal rate of return (IRR) of 42.60% and a payback period of under 5 years due to the higher gross margin for baled forage sorghum. With this alternative, a conservative sorghum yield of 2.2T/Ha was used, delivering a low gross margin of $45/Ha (factoring in fertiliser rates of 250kg/Ha and Superphosphate of 150 kg/ha for grain sorghum). Forage sorghum yield was based on 15T/Ha of dry matter (60 X 250Kg large bales per Ha) and a price per bale of $40. This delivered a gross margin of $2,400 for forage sorghum. 200Kg/Ha of DAP and 50Kg/Ha of CK55 was used in this gross margin.

What this shows is that even if the cropping mix is changed, allowable within the permit, the project is still viable. Rice was not the highest value commodity on a gross

margin per hectare basis, forage sorghum was, so by changing the analysis, even with conservative yields, we can achieve a better return.

The Guidelines for land suitability and Financial Viability, as published by the Department (see Attachment 1) state on page 12 the following "*The time point at which the IRR is to be calculated should be set on time frames commensurate with investment return periods for various enterprise types as set out in Table (3).*

Table (3): Investment periods

Development type	***Investment period***
Dry land cereal cropping	*5 years*
Irrigated broadacre cropping	*7 years*
Perennial horticulture	*10 years*

The IRR outcomes should not provide an absolute test of likely financial viability. Assessors may apply expert knowledge and discretion in making conclusions with respect to potential financial viability. For example, conclusions based on an on-balance assessment of various factors including whether the cropping activities represent a good economic use of the land may be acceptable.

The use of sensitivity analysis may also be acceptable for marginal assessments. As an example, a marginal assessment could be presented on outcomes based for instance, a 5 per cent higher price for production.

The best available information should be provided for all assessments. This information may include items such as crop prices, yields and development costs".

Sensitivity analysis of grain sorghum was included within the initial Olive Vale financial report.

In the preparation of the Olive Vale Financial plan, DAFF were consulted on methodology and advised on current prices for commodities and likely yields. For example, rice was based on the Burdekin where it is grown on similar soils. This methodology was the same methodology used for DAFF analysis in the Gilbert and Flinders River Irrigation precincts.

Forage sorghum for baling and ensiling purposes was considered by the Chief Executive as a high value crop. Certainly returns from forage sorghum, when baled, compare more than favourably with grain sorghum. There are emerging markets for compressed bales to countries, particularly in the Middle East. Saudi Arabia, whose phasing out of wheat production subsidies, has turned it into a major importer of the grain. Saudi is also becoming a major buyer of forage too, in a drive to further conserve scarce water resources.

Thompson is also incorrect with his assigning sorghum price. He states at the time of his report (note some 9 months after the Olive Vale report so may be difference in pricing) the following "At the time of the preparation (May 2015) of this review, sorghum price delivered to Emerald was $241/Tonne". Thompson does not consider the price of sorghum delivered Tablelands. Grain sorghum costs around $120/tonne to freight from Emerald. This would make Thompson's figure delivered ex-Tablelands

$361/tonne. The Olive Vale application used a conservative figure farm gate of $300/tonne.

With the size of the project, Mr Ryan has the ability to reduce cost structures on inputs such as fertiliser and fuel, especially with their background in petroleum distribution. This would not have been considered in Thompson's review, but economies of scale do have a large positive impact on gross margin by reducing cost structures.

In discussion with the applicant, when preparing the financials, the following was considered:-

- staffing, labourer and Machinery operators cost up to 30% lower as there is no other local industry to compete with (i.e. Coal and Gas). Workforce is ready and waiting at Laura, Hopevale and Cooktown. Equipment such as bulldozers are at a lower cost for the same reason.
- Earthmoving machinery can be purchased cheaply, with the downturn in mining, with two (2) Komatsu 375's purchased for $130,000 due to downturn in mining. These two (2) machines were not used for 18 months previously. Twelve (12) months earlier these machines would have cost approx. $250,000 each. The problem being, with most purchasers, being the cost to shift them. It cost the Ryan's $40,000 to shift both of them.
- The Ryan's also own their own transport and prime movers, as they were previously in the fuel distribution business, owning and starting Choice petroleum.
- Currently, due to low interest rates, there is cheap Agricultural machinery in the marketplace, as interest rates are very low and finance is available (almost to 0% by dealers) for purchase of new machinery. This has created a dearth of secondhand agricultural machinery available for purchase cheaply.
- People are happy to move to the tropics as opposed to remote locations in central and western Qld.(It is possible to live on the coast at Cooktown and work at Olive Vale).
- Local town right at project door ,Laura already has most services Shop,Fuel,Post office ,Medical Centre, School ,mobile phone access and some houses available for rent.(Olive Vale does not need to replicate these facilities as you do in remote locations)we already have mains power on site.
- Full sealed road access so staff do not need 4x4 vehicles to have all year round access.(Also regular transport right past front door of homestead).

The purpose of the financial model was to illustrate the viability of cropping options within the model. The Assumptions were detailed in the financial analysis. Thompson does not acknowledge these in his report. That being:-

Market rationale:

- Regional market knowledge and local intelligence suggests strong demand for grain sorghum for the Atherton Tablelands and Townsville districts, based on the industries of dairy, poultry, pigs and other intensive industries utilising grains in there production diets.
- Current grains in the far north are imported from the Emerald region and are price at that point plus freight costs.

- This provides Far Northern producers the business opportunity to service regional production producers with a transport price differential as a point of marketing difference.
- Producing grains on farm also provides the opportunity to utilise grain for the cattle business either for a fodder supplement programme or for an in-paddock production feeding system.
- Current analysis suggests that QLD is rapidly moving towards continuing drought conditions which will only increase the demand for high value fodder.
- The analysis suggests the property is well situated within a reliable regional rainfall belt (90%) providing the opportunities to either sell fodder or utilise fodder on farm in conjunction with grains.
- Maize, sorghum and baled forage sorghum is to be used on farm in feedlotting and is valued on an 'on-farm' as fed value.
- As the business grows further marketing analysis will be conducted on other higher-value cropping options such as guar, mung beans, soybean and other pulse crops.
- Nearly 100 million people now depend on upland rice as their daily staple food. Almost two-thirds of the upland rice area is in Asia. Bangladesh, Cambodia, China, India, Indonesia, Myanmar, Thailand, and Vietnam are important producers. There is significant demand for this commodity as arable land becomes scarce.
- Olive Vale will be used as a Staging point for fattening and transport of livestock from Cape York to Live Cattle export ports (at Mourilyan, Townsville and Karumba) and for meatworks cattle to Townsville. The distance from processing and markets is considerable and transport is expensive. Traditional means of grazing (i.e. by 'wild' harvest limit live export opportunities as they do not allow producers to meet the quantity and quality of supply required. Current markets are primarily the saleyards at Mareeba (when road transport allows access) and live export through the Port of Weipa. Live export is limited by the ability of cattle producers to supply sufficient cattle of export size and grade to the quantity required. Improvements in consistency of cattle quality and quantity would need to be achieved if live export was to be considered a viable option for cattle producers throughout the region. Wet season isolation causes problems for Cape York graziers getting cattle to market when the price is higher during the wet season. The Olive Vale proposal, with all-weather access, will address a number of issues with supply of cattle out of Cape.

Variable costs

- The gross margins presented within the analysis have been based on industry averages, regional agriculture organisations and local regional knowledge.
- Conservative yield and price projections have been used as a buffer against the commodity demand and supply fluctuations.
- All gross margin input prices are based on previous analysis conducted in December 2013
- Machinery costing are based on DPI machinery (FORM) analysis spreadsheet

Fixed costs

- Fixed costs have been based on the current cattle operation and reflect the increase in new agricultural cropping activity.
- Labour represents the highest component of fixed costs.
- Higher repairs and maintenance have been captured to reflect clearing and land preparation for crop production.

Lending

- The analysis reflects a full commercial lending scenario, based on the total capital investment required.
- Term length reflects the scale of operation
- Interest rate: 8%
- Term length: 20 years

Capital equipment and land clearing costs

- Land clearing is based on current commercial contract rates.

I did underestimate the amount of land proposed for clearing which will not be harvested each year in the financial modelling. Such non harvested areas within a cropped area typically include soil erosion control structures which cannot be cropped over, headlands and access tracks, fire breaks, cropped areas in fallow rotation for disease and weed control purposes etc. I should have probably allowed for 10%, not 1.9%. However, the assumption was made (and a valid one which Thompson could have consulted with Olive Vale's consultant on) that tracks and firebreaks are already in place or can be constructed, under self-assessable codes. Contour banks can also be work-over (broad-based) banks.

Conclusion

Thompson states "*Land Suitability frameworks have a superficially simple structure, but can be quite complex in the way they are applied and interpreted. Mis allocation of suitability are not unusual as a result*". It is not unusual for soil scientists to disagree and the profession is not considered an exact science. Each soil scientist must look at the combination of factors that combine to assign a soil land class. An important one is climate. Thompson has not considered the methodology or process behind the Olive Vale application. However, the original Olive Vale application could have undertaken some better explanation of methodology, so that the reviewer would better understand that methodology.

Whilst Thompson makes some valid points, Thompson makes a gross assumption that the soil types "*Emma, Kimba, Clark, Batavia and Myall are red and yellow earth and podzolics developed on strongly weathered deposits. These soils comprise approximately 20% of Cape York. These types of soils are common throughout Queensland – including many coastal areas in the 800 to 1200 mm rainfall zones. They are rarely used for rainfed grain cropping in Queensland, however, they are used for cane where supplementary irrigation is available*". Thompson's comments may be appropriate in drier regions with greater rainfall variability in Queensland like

the Darling Downs, Central Queensland and Maranoa, but are not necessarily applicable in the reliable rainfall areas of the seasonally wet tropics.

It appears that Thompson did not make the connection with climate which is detailed in the Olive Vale assessment report. That being Olive Vale receives, on average, between 1000-1100mm. Up to 82% of rainfall is on average concentrated in the November to April period. In the absence of irrigation, the 'growing season' is confined to the summer period. At least four 'humid' months occur during the summer months suggesting that, on average, moisture would be available for crop growth. Temperatures in excess of 35°C are common in summer but 40°C is rarely exceeded. Minimums lower than 10°C have occurred, but are extremely rare and frost does not occur. Variability is as important an attribute of rainfall as its seasonality. Various indices have been used in Australia to describe variability. Variability over the continent can be mapped using the ratio of the 90-10 percentile range to the median. Variability index (VI) = 90 percentile-10 percentile. Laura has a variability index of 0.724. However, 90% of years' rainfall exceeds 672mm. Maybe this could have explained this better in the Consultant report (application).

Thompson has been too generalised in assigning a land suitability class 4 to red and yellow earth and podzolics developed on strongly weathered deposits. If Thompson's methodology and assumptions was correct, then that would call into question at least five studies, that are published by DNRM/DPI in the north, and a number of authors and fellow soils scientists.

Thompson then goes on to base his financial modelling largely on his assignment of land suitability classes which, in my opinion, are flawed, and inconsistent with the previous studies and similar ones in similar, and lower rainfall, environments in north Queensland.

The applicant has the ability to achieve economies of scale in fuel and fertiliser pricing, reduced labour costs with no competing industry, and has the logistics in place (owned and operated) to reduce costs. This was not considered by the review.

The Olive Vale assessment and Land suitability report was consistent with DNRM/DPI soils studies in the Mareeba-Dimbulah study, CYPLUS suitability and Gilbert River studies (now 3 studies on Gilbert). These may be outside of the cape, but they are in similar, or lower rainfall environs and have some similar soils. It also demonstrates Thompson's generalised statements, and assumptions in north Queensland – which he bases his report and subsequent questioning of the financial viability on are not necessarily correct.

In making my assessment of the Olive Vale proposal, I reviewed the closest land surveys conducted in similar environments. Those being Cape York Peninsula Land Use Strategy (CYPLUS) Soil Survey and Agricultural Suitability of Cape York Peninsula (Biggs and Philip 1995); Soils and Agricultural Land Suitability of the Gilbert River Area; Chadshunt to Mt Sircom. (Enderlin, Neil G. 2000); and Soil survey of the Mareeba-Dimbulah irrigation area, Far North Queensland – MDIA (Enderlin 1997).

The report prepared by W.P (Bill) Thompson of Land Resource Assessment and Management Pty. Ltd. is selective in what it has taken from the Land suitability and financial viability reports prepared for the Olive Vale Proposal.

The Olive Vale application report/s met with the published Guidelines for land suitability and Financial Viability (see Attachment 1). Otherwise they would not have been accepted by the Department and would have not been approved. without the submission of further information by way of Information Request (IR). The Olive Vale application, in assigning land suitability classes to the soils, is consistent with other studies conducted within Far North Queensland.

The author has taken on some suggestions from the Thompson review, mainly through better explanation of methodology and greater intensity and spread of soil test/description sites, that could be implemented on future applications under the High Value Agriculture framework.

References:

Biggs, A.J.W. and Philip, S.R. (1995) Cape York Peninsula Land Use Strategy (CYPLUS) Natural Resources Analysis Program (NRAP) - Soil Survey and Agricultural Suitability of Cape York Peninsula, Queensland Dept. of Primary Industries, Mareeba

Enderlin, Neil G. (2000). Soils and Agricultural Land Suitability of the Gilbert River Area; Chadshunt to Mt Sircom. Unpub. Department of Natural Resources and Mines, Mareeba.

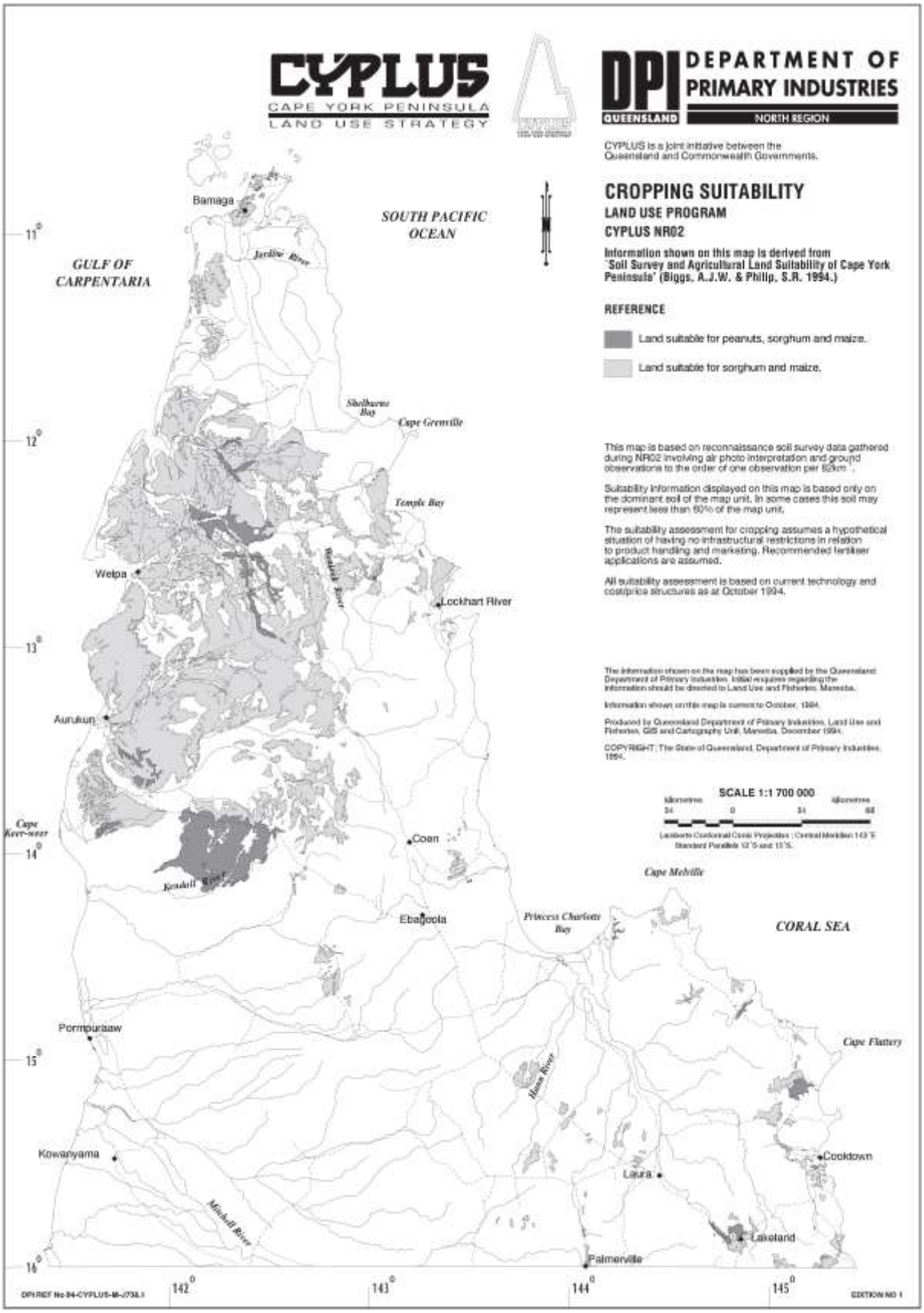
Enderlin, Neil G. (1997). Soil survey of the Mareeba-Dimbulah irrigation area, Far North Queensland – MDIA, Department of Natural Resources and Mines, Mareeba.

Flinders and Gilbert Agricultural Resource Assessment (FGARA). Land suitability: technical Methods - A technical report to the Australian Government from the CSIRO Flinders and Gilbert Agricultural Resource Assessment, part of the North Queensland Irrigated Agriculture Strategy. CSIRO, December 2013

Guidelines for Agricultural Land Evaluation in Queensland, Second edition, Department of Natural Resources and Mines and the Department of Science, Information Technology, Innovation and the Arts. © State of Queensland, 2013.
Wilson, P and Philip, S (1999) An Assessment of Agricultural Potential of Soils in the Gulf Region, North Queensland: A Report to Department of Natural Resources Regional Infrastructure Development (RID), North Region. Mareeba. DNRQ990076

Peter Spies
B. App. Sc. (Rural Technology) Hons, Assoc.Dip. Rural Tech. (Agronomy).
Pinnacle Pocket Consulting
Ph. 0419 020 046 Email: info@pinnaclepocketcattle.com

APPENDIX 1 – CYPLUS Cropping Suitability for Sorghum and Maize.



ATTACHMENT 1 - Guidelines for Land Suitability and Financial Viability