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Report for Review

Centre Pivot Proposal

Nyamba Buru Yawuru

Acknowledgement of Traditional Owners

The authors wish to acknowledge the Traditional Owners of the land of this subject area, the Yawuru people, and pay their respects to their elders' past, present and future.

Disclaimer

The analysis and conclusions of this report are subject to the underlying assumptions made related to input costs, prices and sale of fodder products. The results are also subject to assumptions related to the roll out of the project including its staging, timing and establishment of fodder production and market sales. Furthermore, other variables will impact on the project including operational costs and sale prices over the longer term.

Each of these variables in subject to risk and uncertainty.

Cost estimates in this study have largely been drawn from the work of previous studies related to this project, with the key focus being on incorporating new information where this is available and adjusting those costs for a reconfigured proposal which is for 5 smaller pivots (40 hectares) instead of 3 larger pivots (60 hectares) which was the basis of a 2016 study. Further inquiry has also been undertaken to update costings, particularly fertiliser costs and pumping costs. It should be noted that operational rates for fodder harvesting have been based primarily on the previous feasibility study.

The costings used should in no way be seen to be a replacement to any budgeting or assessment at an operational level.

No consideration has been given to financing costs in this study although discounted cashflows have been subjected to a 5 percent discount rate.

Issues such as depreciation of assets will need to be validated through accounting processes, as these have been generalised using straight line depreciation of 12% for machinery and 7% for centre pivot systems.

While this provides a guide to the factors affecting feasibility, it is not intended to be used as a bankable feasibility study.

The study has identified known risks but these must be considered within the context of emerging trends and markets.

Prepared for Nyamba Buru Yawuru Ltd

1 May 2019

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EXECUTIVE SUMMARY

A centre pivot irrigation development of 200 hectares (ha) is proposed by Nyamba Buru Yawuru Ltd (NBY) to be located on the Roebuck Plains 68 kilometres from Broome Western Australia, with the aim to produce fodder primarily for the Roebuck Export Depot (RED) and the local fodder market.

An analysis by GHD was conducted in 2016 focussing on a Rhodes Grass hay operation. The GHD study predicted an expected Internal Rate of Return (IRR) of 12.4% noting significant sensitivity analysis was also conducted to demonstrate break-even prices and yields.

A review has been conducted on behalf of NBY in order to refresh any data related to:

- changing configuration of the project (5 pivots of 40 ha each rather than 3 pivots of 60 ha each);
- further information on costings (where available);
- take into account up-to-date advice from the Department of Primary Industries and Regional Development (DPIRD) and formerly named the Department of Agriculture and Food, based on recent experience of growers in the region; and
- changing market conditions associated with the RED and other fodder markets.

Furthermore, the review scope included a detailed assessment of nominal cashflows in the first four years of production and the analysis was taken over 30 years (rather than 15 years in the GHD study).

The expected outcome for a Rhodes Grass hay operation is for an IRR of 1%. The lower predicted IRR (when compared to the previous study) is mainly due to:

- variability of production associated with re-establishing the crop each 5 years being factored into the assessment;
- a staged implementation of 2 years, noting the water resource consultant has suggested an even longer staging of three years;
- a proposed increased harvest rate for Rhodes Grass in order to achieve higher quality fodder outcomes, thereby increasing operating costs; and
- adjustments in costs, to include administration costs, reseeding costs, higher costs associated with road construction and the acquisition of some additional equipment.

Additionally, this study does not include any provision for salvage value of equipment after 15 years, but rather applies a straight-line depreciation approach to infrastructure and other equipment. There are two reasons why salvage value is removed, being one:

- the term of the analysis being extended to 30 years; and
- the perception of a relatively high-risk profile associated with the development, noting if it fails it could reflect a general failure of the emergent irrigated agriculture sector in the region and coupled with the isolation of the Kimberley, there is a risk that there is no salvage value to the project infrastructure.

The key risks associated with a Rhodes Grass hay operation include:

- hay quality not being fit for purpose for the RED, based on the recent experience in the Kimberley and therefore not providing a sufficient substitute to oaten hay;
- the marketing of product, noting the RED would feasibly only account for 20%-40% of product being produced;
- pricing risk, with the RED paying average prices of $353 per tonne for oaten hay, with prices varying between $295 in 2017 and $450 per tonne in 2019,
- competition from other suppliers, noting a local grower has provided silage to the RED at a price of between $260 and $280 per tonne; and

- the management of the operation, noting the performance of fodder production units across the Kimberley is still in their infancy and while some operations are running well with expert management, there is no room for less than average performance as margins are relatively tight.

It is because of these risks that three options are presented being:

- Option 1 – Rhodes Grass hay crop (Perennial Crop).
- Option 2 – Annual crops of Cavalcade (a tropical legume) as a summer crop for either hay or silage and Maize as a winter crop for silage[1].
- Option 3 – An outsourced option where an investor ready site is put to sublease to an independent operator.

Both Option 1 and Option 2 require considerable upfront investment with Option 1 requiring about $6.5 million and a further $2 million in operational funding to cover an operational deficit in the first 5 years. Option 2 will require $6.3 million in establishment capital with a further $1.5 million to cover the first two years of operational costs. Option 1 will take three years before gross margins breakeven (when set up costs and financing costs are excluded). Option 2 would break even in Year 2.

The main savings between establishing Option 1 and 2 are likely to be the fertigation system which represents almost $300,000 in cost[2] and reduced costs associated with the access road of approximately $350,000[3].

While the modelling has been undertaken for Option 1 as a hay crop, the operation will need to consider market factors in determining whether silage is a preferred option for all or part of the crop. Option 2 would most likely be a combination of Cavalcade hay and Maize silage.

Production levels (tonnes of fodder) from both options would significantly exceed the expected requirement of the RED and this is most pronounced for Option 2. In both cases, other markets would need to be found for fodder product and this could impact on the expected price received.

Rhodes grass is considered the most readily produced fodder crop as this perennial can be grown on rotations for five years or longer depending on management. There is a cost during the establishment phase and re-establishment phase in that yields are lower in the first two years as the grass crop matures.

The digestibility of Rhodes grass can be a problem with this declining rapidly if the crop is not cut in a timely manner. There is an inverse relationship between the amount of stalk in the crop and the digestibility of the fodder. For this reason, it is proposed the crop be harvested up to 10 times per annum with crop rotations of between 25 days (in summer) and up to 60 days (during the coldest months in winter).

While this regularity imposes a cost to production, it will be vital for NBY to produce a high-quality hay if it is to establish itself as a reliable producer. This is particularly important because NBY is not vertically integrated into the existing Roebuck Plains pastoral operations. These are managed by the Indigenous Land and Sea Council (ILSC) through a sublease arrangement. The business operations of the ILSC are independent of the proposed NBY fodder operation so in that respect any market share (whether it be through the RED or the Roebuck Plains Station in general) will need to be based on a competitive market.

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[1] It is noted that some growers are currently growing oaten hay as a winter crop with some success. Further modification of Option 2 might be considered, but the results are modelled on Cavalcade and Maize which are a more reliable summer winter annual crop rotation.

[2] It is noted that fertigation systems are not being installed in some new irrigation projects due to them not being considered worthwhile but for the sake of comparison it is retained in Option 1.

[3] As a perennial crop which can be cut regularly. Rhodes Grass will be harvested throughout the year requiring all year access to the site, whereas an annual crop model is less likely to require a road of the same specification because harvesting is limited to twice a year during dry months.

Alternatively, there is the opportunity to grow annual crops which are likely to result in a higher quality fodder product (whether it be hay or silage). This option poses additional risks in being a more complex production system while addressing the key risk of fodder quality. It would appear a combination of Cavalcade (a legume which is adapted to the tropics) and Maize for silage would provide an opportunity for a more energy intense feed which may be an adequate substitute for oaten hay.

Consideration will need to be given to the risk profile of NBY in choosing which model to use.

An experienced manager should be able to deliver good outcomes using Option 2, but close consideration will need to be given to the production system, noting the need to establish two crops per annum.

Option 3 – Outsourced option by putting this investor-ready proposal to market through a sublease.

Option 3 could be the least risky of all three but would mean that NBY would not be directly responsible for the production of fodder. If Option 3 is to be adopted the following steps would need to be undertaken:

- excision of the fodder production site from the existing sublease with the ILSC;
- the development of an Information Memorandum (IM) for the site compiling all existing documents which have been prepared to ensure the site is investor ready (this document may provide a basis for an IM);
- the offering of a sublease over the site through an Expression of Interest;
- negotiation with a preferred proponent
- establishment of terms and conditions for sublease which would be recommended to have a term of between 20 and 30 years

Options 1-3 could all potentially result in positive outcomes for NBY.

Option 1 is only expected to provide a profitable outcome if the cost of capital (establishment costs) is not included. However, if the cost of capital is included, Option 1 has an expected IRR of only 1% and this relies on the assumption that Rhodes Grass hay will be a substitute for oaten hay. As such, Option 1 should only be considered if:

- markets and prices are confirmed and are sufficient to justify the investment;
- the upfront costs of development are considered appropriate for either all or partial funding from grants in order to create a strategic resource for NBY and the community;
- savings can be identified in the establishment costs;
- savings can be identified in the operational costs; and
- yields can be reasonably expected to be higher than those assumed in this study.

Option 2 may come with more risk associated with the reliability of the cropping system in that most production in the region has been focussed on the “tried and tested” Rhodes Grass option. Preliminary estimates show this option could have an IRR of 11% depending on a range of assumptions. However, this option

- assumes there is a market for 8,000 tonnes of silage per annum;
- yields of 40 tonnes of wet silage per ha can be achieved (20 tonnes of dry matter);
- a summer crop of Cavalcade can be grown at 6tonnes per ha of hay being produced; and
- a range of other assumptions.

While Option 2 seems more favourable than Option 1, there is less experience in growing Maize in the West Kimberley and further investigation on potential yields on the site is warranted before finalising any investment decision.

Option 3 which involves outsourcing the project to a third party and thereby outsourcing most of the risk, could be tested with minimal risk to NBY through an Expression of Interest process which would determine whether this option has the capacity to deliver a rate of return for NBY through rental payments noting Options 1 or 2 could still be implemented if offers weren't sufficiently attractive or if grant funding could be accessed for development costs which in itself would reduce risks to NBY.

Option 3 might result in a favourable outcome for an independent operation because an that operator might have advantages over NBY where:

- they were vertically integrated with cattle production on the rangelands and could utilise the fodder in order to obtain additional profitability through their existing operations; and
- they had other fodder operations which provides them with economies of scale and experience in the production of fodder for the general market.

Risks associated with the in-house fodder production options vary and are a consideration in deciding the optimal pathway. Agriculture is an inherently risky business especially where it involves a degree of innovation and is being implemented by a new entrant. Seasonal factors and market factors impact on agribusiness and this is exacerbated by the relatively low rates of return which are a feature of farming in general. Table 1 outlines subjective risk assessments of the various parameters, by option. In addition, high level risk mitigation strategies are listed.

Table 1: Subjective Risk Profiles of Options 1 and 2

	Option 1	Option 2	Summarised Mitigation Strategies
Dry matter production	Low Risk	Low Risk	Need sound expertise, knowledge of agronomy.
Reliability of fodder quality	Moderate to High Risk	Moderate Risk	Expertise, fertiliser, regularity of harvest (for Rhodes Grass)
Market risks (Whether Product is Fit for Purpose)	Moderate to High Risk	Moderate Risk	As above, plus monitoring of feed quality, marketing, negotiations with customers, longer term supply contracts.
Market risks (Whether Product Supply Matches Demand)	High Risk	High Risk	Negotiations with customers. Alternative supply arrangements to the RED.
Management Risks (Right Person for Role)	Moderate Risk	Moderate Risk	Selection of suitable manager, remuneration of manager and retention strategies.
Cost Profile	Moderate Risk	Moderate Risk	Need sound management with KPIs and identifiable cost reduction strategies.
Inter-Seasonal Risks (Crop Reliability)	Low Risk	Moderate Risk	Need sound management with sufficient capital to withstand seasonal fluctuations.
Likely financial outcomes	High Risk	Moderate - High Risk	Risk mitigation including potential solar pumps, grant funding longer term supply contracts.

Option 3 is not assessed as above, as it would pose very little risk to test the market with an offer through an Expression of Interest process. However, while the offering might attract serious investors, there is no guarantee that such interest can be elicited from the market.

The following table outlines expected outcomes based on a 5% discount rate and various assumptions related to pricing and costs.

Table 2: Summary of Modelling Outcomes

Parameter	Option 1	Option 2
IRR	0.7%	11.1%
BCR	0.45	1.7
NPV	-$3,542,902	$4,575,499
Average Annual Gross Margin ex establishment costs (Nominal)	$326,522	$720,372
Average Annual Cost ex establishment costs (Nominal)	$1,746,784	$1,597,628
Average Annual Income (Nominal)	$2,009,903	$2,180,000
Establishment Costs (Nominal)	$6,582,360	$6,394,293
Tonnes Produced (Rhodes Grass Hay)	5,934	
Tonnes Produced (Cavalcade Hay)		1,200
Tonnes Produced (Maize Silage)		8,000

Finding 1: Based on the assumptions used, Option 1 (Rhodes Grass) does not break-even with a 5% discount rate but would still be profitable on an annual basis if the establishment costs are not considered.

Finding 2: Based on the assumptions used, Option 2 breaks even with a 5% discount rate and provides an annual Gross Margin of almost $800,000 per annum if establishment costs are excluded.

Both Option 1 and 2 are highly dependent on a range of pricing and costing assumptions. Key parameters are presented in Table 3 which are elaborated further in the report.

Table 3: Key Parameters

Key Parameters of Option 1 and Option 2	Option 1	Option 2
Average Tonnes Produced	5,934	9,400
Average Tonnes Per Hectare	29.7	46
Average Price $/tonne (Hay)	$350	$350
Average Price $/tonne (Silage		$220
Average Annual Gross Margin ex establishment costs (Nominal)	$326,522	$720,372
Average Annual Cost ex establishment costs (Nominal)	$1,746,784	$1,597,628
Average Annual Income (Nominal)	$2,009,903	$2,180,000
Establishment Costs (Nominal)	$6,582,360	$6,394,293
Land preparation and infrastructure	$2,032,000	$1,717,000
Bore construction and development	$642,667	$642,667
Supply and installation of pivots and pumps	$1,530,000	$1,530,000
Supply and installation of fertigation system	$347,300	$0
Contingency of Development Costs (10%)	$455,197	$388,967
Professional Fees (10%)	$455,197	$388,967
Machinery Setup Costs	$1,120,000	$1,530,000
Average Annual Manager Cost	$180,000	$180,000
Average Annual Labour (non-management) Cost	$160,000	$100,000
Average Annual Admin Costs (Insurances, Accounting, Record Keeping)	$60,000	$60,000
Depreciation on Machinery ($/annum)	$134,400	$134,400
Depreciation on Centre Pivot ($/annum)	$131,411	$131,411

Key difference between Option 1 and Option 2 are:

- Tonnes produced, noting the bulk of production in Option 2 is maize silage which has a dry matter content of approximately 50%, coupled with high yields from maize.
- Annual costs are less for Option 2 mainly due to a lower intensity harvesting regime.
- Higher machinery costs in Option 2 reflect need to have both haymaking and silage making equipment
- Land preparation costs are much lower for Option 2 because it would not be necessary to all weather the access road, given harvesting only occurs twice a year.

Finding 3: While Option 1 (Rhodes Grass) and Option 2 (two annual crops), are similar in the cost of establishment there are some relatively small savings which impact on the outcome of Option 2, namely those associated with infrastructure, while some additional machinery costs are associated with Option 2 due to need to make both hay and silage.

Key cost elements are presented in ranked order of importance, noting these need to be focussed on in the development in order to ensure its viability. The largest components of operational cost associated with **Option 1** (apart from the establishment costs), ranked in order are:

- Fertiliser 30%
- Pumping (Irrigation) 26%
- Labour and Management 23%
- Cutting and Baling 16%
- Overheads Administration 4%

Of those costs, the only avoidable costs are pumping costs if a solar-diesel system in incorporated into the system. Fertiliser rates (and expenses) will need to be managed closely in order to optimise their application maximising the benefit of trade-offs between fertiliser inputs (and hence cost) and the quality and volume of hay production.

All other costs (including labour and harvesting costs) are relatively inflexible and with limited opportunities for savings.

Option 2 has a similar spread of operational costs for pumping, labour and fertiliser, while having much lower cutting and baling costs. Key components are:

- Pumping (Irrigation) 32%
- Labour and Management 22%
- Fertiliser 23%
- Cutting and baling 4%

Importantly there are opportunities to minimise costs in order to optimise profitability. This will need to be managed closely by the manager in establishing and operating the development. Appendix 2 outlines some of the most important factors which will need to be established as Key Performance Indicators.

Finding 4: Major components of operational costs are fertiliser, pumping and labour, with pumping costs being the main avoidable operational costs if diesel pumps are substituted with solar-diesel pumping technology.

PART 1 - PURPOSE OF REPORT

This report has been prepared to:

- Provide an assessment basis for the Department of Prime Minister and Cabinet (PM&C) to consider any further funding for this Project.

- Advise and support the NBY's own internal decision making and approval processes; and,

- Provide an economic and financial analysis with a risk dimension, around profitability and sustainability, of sufficient rigour and depth to enable decision making criteria for investment options by the NBY governance group, and public and private interests.

In addition to the points above, NBY has sought advice on

- a financial assessment of the roll out of the Centre Pivot program over the first three years including detailed nominal cashflows which highlight staging of:
  - revenue;
  - capital; and
  - operating costs; and
- with reference to the above, any strategies to minimise risks without impacting significantly on the viability of the project.

Appendix 1 includes Key Performance Indicators for the Project and Appendix 2 summarises how the project meets the following criteria for NBY:

- Economic and financial projections.
- Description and details (estimated numbers) of employment outcomes.
- Detailed analysis of the potential scope for the project to lead to diversification and access to commercial markets outside of the vertical integration model the project currently intends to operate within.
- Available options for project expansion, as an enabling project to unlock further economic development opportunities.
- Advice of how this project may contribute to NBY's long term capacity and sustainability;
- That the impact of the project on country and the Roebuck Plains environmental management has been carefully considered.
- Description of how this Project will economically benefit Yawuru peoples, and how it will fit within the NBY's broader strategic plans for economic development.
- The obligations, commitments and aspirations of NBY as they represent and serve the Yawuru People.

PART 2 – PROJECT DESCRIPTION

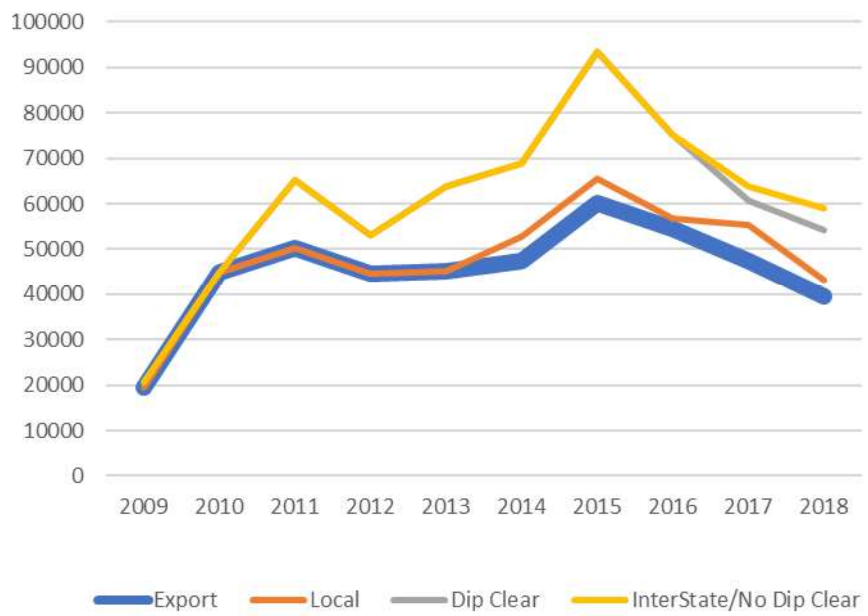
Economic Rationale

NBY is a major land owner in the Broome region, with both residential and agricultural lands. In particular, NBY is the pastoral leaseholder at Roebuck Plains, which is a strategically located property near the Port of Broome and within proximity to the Kimberly Abattoir providing a significant opportunity for diversification and intensification.

NBY is currently in partnership with the Indigenous Land and Sea Corporation (ILSC) which holds a sublease over the Roebuck Plains Station. Australian Indigenous Agribusiness PTY LTD (AIA), which is a wholly owned subsidiary of the ILSC manages the pastoral operations at Roebuck Plains. Furthermore, the AIA operates (as a separate business unit) the Roebuck Plains Export Depot (RED) on the Roebuck Plains Station. T

The RED is the largest export depot in the region so plays a critical role in the supply chain of cattle for export in the Kimberley. Since its establishment in 2009,the RED has had an annual throughput of just over 60,000 cattle. These cattle are maintained at the RED for an average of 5 days with about 75% of these being processed for live export through the Port of Broome with the remainder being held at the RED to undergo their tick inspections before they are transported south of the tick quarantine line or being maintained for conditioning prior to sale or transport to other parts of the country.

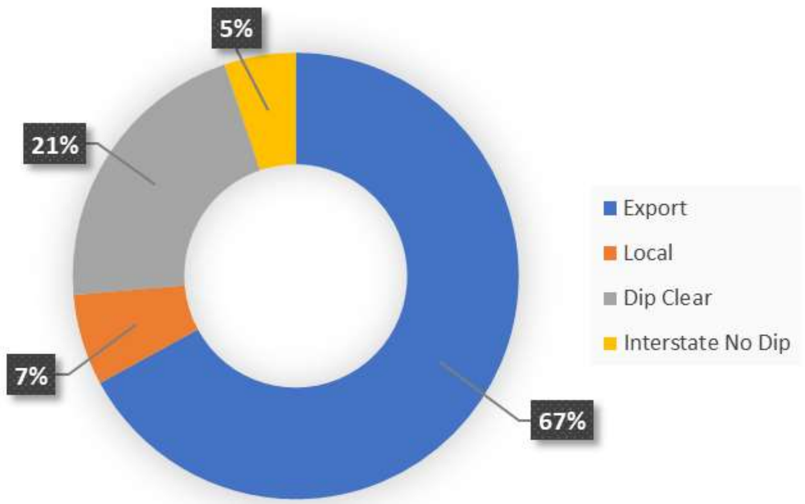
Chart 1: Throughput of Cattle in the Roebuck Export Depot Since Inception



Finding 5: Stock throughput of the Roebuck Export Depot has been varied between 53,000 per annum and 96,000 per annum (excluding the first establishment year) meaning there can be a 44% variation in cattle numbers and therefore feed requirements will vary from year to year.

The live export trade has represented 67% of cattle passing through the RED in recent times. Overall, the total number of stock exported through the RED onto ships to Asia has ranged between 40,000 and 60,000 cattle per annum meaning any operations supporting this industry must have a degree of flexibility. In recent times, the percentage of stock have been retained at the RED to be conditioned for further travel or to be inspected for ticks has been growing and now represents about 33% of all stock passing through the RED. This may be a growing market.

Chart 2: Percentage of Stock Sent Through the RED by Purpose (Over the last 5 years)



Finding 6: Almost 70 of all stock passing through the RED are destined to the live export trade,

As such, the RED plays an important role in the transport logistics supply chain of the Kimberley Region.

The Kimberley is regarded as a niche cattle market when compared to Queensland and the Northern Territory. Its operations rely mainly on a so called 'breeder model'' which sees:

- breeder cows run across the rangelands throughout the year;
- calves carried on the rangelands with their mothers for a period of approximately 9 months each year;
- weaners run on the rangelands for a further 12 months;
- weaners being separated into those that are retained to add to the breeder herd and those that are sold for live export;
- the land transport of weaners from pastoral stations to the export depot where they are prepared for live export for an average period of 5 days while being conditioned on hay, pellets and silage, noting stock are normally fed pellets and hay while in transit at sea; and
- export, by ship of most cattle through to Southeast Asia, with the balance being exported via the Kimberley Abattoir or by land to other markets across Australia.

The model outlined above varies depending on the location of pastoral stations and access to grazing throughout the year. While the system is dynamic and its output changes from year to year, the long-term challenges are:

- increasing the low average liveweights of stock when sold, either for live export of abattoir production; and
- Increasing the number of stock in the region through higher stocking rates either on underutilised properties or by taking stock from the traditional rangelands system into more intensive forms of agriculture.

The system also suffers from some vulnerabilities due to risks associated with access to markets, highlighted by the embargo on live exports to Indonesia in 2011. The Kimberley's isolation adds to the vulnerability to changes to the live export trade in that alternative Australian based markets are great distances away. The RED will have a role into the future, regardless of the live export trade insofar as stock must be inspected as they travel south through the tick line (which is at Roebuck Plains) and need to be conditioned to travel to the eastern states. Improvements to road infrastructure, such as the Tanami Road may improve the prospects of more cattle being moved internally through Australia.

The long-term challenge for the pastoral industry centres on producing a higher value outcome which can access a wider range of product outcomes and markets.

Roebuck Plains Station represents a strategic location to play an important part in the development of an evolving industry. As the leaseholder, NBY has an opportunity to develop more intensive forms of agriculture with involvement in the research and development. The concept of a Western Australian Tropical Research Institute operating out of Broome is being mooted by the State Government. NBY would be well positioned to take advantage of that opportunity if it were involved in the development of irrigated agriculture so close to Broome. At a practical level, as the pastoral lease holder, NBY has the capacity to obtain diversification permits and the area being set aside for intensive agriculture (200 hectares) will not impact adversely on the pastoral operations but provide an important diversification opportunity for the station both in the short term and long term.

Centre Pivot Irrigation Systems could provide a step towards more value adding in the cattle industry and in other forms of agriculture. As such, there may be an opportunity to align a proposal to develop irrigated agriculture to the future research aims of the State.

Finding 7: As the leaseholder at Roebuck Plains, NBY is strategically positioned to play a long term role in the development of a more robust cattle industry in the Kimberley through the development of an irrigated fodder production unit.

Finding 8: There are some vulnerabilities in the Kimberley cattle system as it relies on the live export trade and these should be considered in any business decisions.

Finding 9: There may be an opportunity to align development in irrigated agriculture to the future research aims of the State Government noting the proposal to develop a Western Australian Tropical Research Institute centred in Broome

Market for Fodder

Originally, the project was couched solely as a fodder substitute for the RED (GHD, 2016). It was noted that the "*RED provides cattle with a ration of hay, silage and pellets to improve condition and weight gain prior to export* and that *the proportion of the ration is somewhat flexible and can change depending on the relative price and availability of different feeds".*

At present, oaten hay is freighted to Broome from the Southwest agricultural area which imposes significant costs on the delivery of hay. The cost of oaten hay has averaged $354 per tonne (landed at the RED) since 2009, but in 2019 oaten hay is currently selling for $450 per tonne due to the high demand for hay in other southern regions.

The RED also sources local fodder product, namely silage from a grower who is located close by and operates on an irrigated site of about 60ha. This product adds value to the ration provided to stock and is a significant competitor to the proposed NBY fodder project. Silage is currently being purchased at $280 per tonne.

Incidentally, the price of oaten hay and silage convert approximately to 50 cents per kilogram of dry matter, noting hay has a higher proportion of dry matter content (90%) while silage can be as low as 50% dry matter.

Chart 4: Oaten Hay, Price Paid by RED

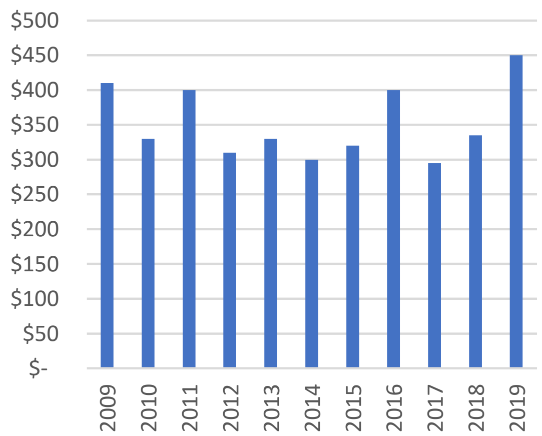
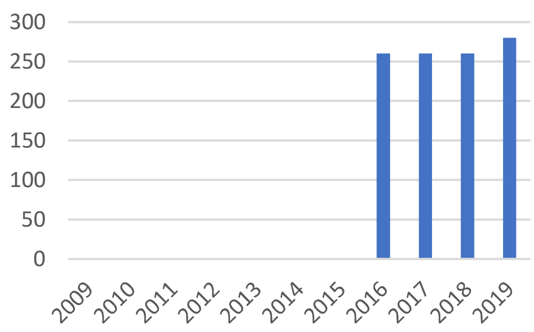


Chart 3: Silage, Price Paid by RED



Finding 10: Hay prices delivered to the RED have varied between $295 per tonne and $400 per tonne in recent times with silage prices varying between $260 per tonne and $280 per tonne.

The RED manages its fodder needs through an annual tender process. Normally notices are sent to potential providers in January to February as this is when the market has a better understanding of the likely price of fodder in any given year when factoring in a number of supply and demand factors. The tender process is finalised by the end of February. NBY would need to establish itself as a reliable and competitive provider of fodder it is to develop a supply arrangement with the RED.

There are three components to the RED tender process, being

1. Silage Hay (Sorghum and Rhodes) which is currently being supplied locally and would be a direct market for NBY
2. High Grade Oaten Hay – which could be potentially substituted with local grown hay product subject to negotiations with the RED and quality and performance outcomes being met
3. Shipper Pellets which cannot be readily substituted with locally grown product.

In 2019, the following tender notices were put to potential suppliers.

Figure 1: Example - Extract from Calls for Tenders Providing Silage Hay to the RED

Roebuck Export Depot

Australian Indigenous Agribusiness Pty Ltd

PO Box 1293

Broome Road, Broome 6725

ABN: 28 108 266 548

Attention:

Could you please provide a written costing on the provision of the following fodder product for 2018 season in line with our requirements and conditions, your costing should outline any payment terms and conditions as well as penalties or discounts applicable. In addition, please indicate whether your company is Indigenous owned or part owned, whether you employ Indigenous staff and/or whether you have a training program for Indigenous staff.

Silage Hay (Sorghum & Rhodes)

- *Expected usage*: 500-1000 metric tones
- *Delivered:* Roebuck Export Depot
- *Notice:* To be delivered within 7 days of order being placed.

Regards

John Scott
Roebuck Export Depot Manager
0427206875

It is essential that digestibility of hay will exceed 60% and have a crude protein rate of more than 9% in order to compete with alternative local supplies. The challenge for the proposal will be creating a hay product from tropical grasses which matches the quality of imported oaten hay. It has been reported that the quality of oaten hay which has been delivered to the RED from the southwest has varied in recent times with some poor-quality batches being delivered. This may be a reflection on the high demand for hay in 2018.

It is also noted that there is an increasing body of knowledge in growing good fodder in the region meaning good quality hay and silage has been demonstrated but will need to be well managed.

Figure 2: Example - Extract from Calls for Tenders Providing Oaten Hay to the RED

Roebuck Export Depot

Australian Indigenous Agribusiness Pty Ltd

PO Box 1293

Broome Road, Broome 6725

ABN: 28 108 266 548

Attention:

Could you please provide a written costing on the provision of the following fodder product for 2019 season in line with our requirements and conditions, your costing should outline any payment terms and conditions as well as penalties or discounts applicable. In addition, please indicate whether your company is Indigenous owned or part owned, whether you employ Indigenous staff and/or whether you have a training program for Indigenous staff.

High Grade Oaten Hay

- *Expected usage*: 2000-3000 metric tones
- *Delivered:* Roebuck Export Depot
- *Notice:* To be delivered within 7 days of order being placed.

Regards

John Scott
Roebuck Export Depot Manager
0427206875

It is noted that the RED will require ongoing use of Shipper Pellets in order to comply with export licence requirements. The shipper pellet component cannot be substituted with hay or silage.

Figure 3: Example – Extract from Calls for Tenders Providing Shipper Pellets to the RED

Roebuck Export Depot

Australian Indigenous Agribusiness Pty Ltd

PO Box 1293

Broome Road, Broome 6725

ABN: 28 108 266 548

Attention:

Could you please provide a written costing on the provision of the following fodder product for 2019 season in line with our requirements and conditions, your costing should outline any payment terms and conditions as well as penalties or discounts applicable. In addition, please indicate whether your company is Indigenous owned or part owned, whether you employ Indigenous staff and/or whether you have a training program for Indigenous staff.

Shipper/Starter Pellets

- Product: standard ship pellet, Crude Protein Min. 11% DDM & Metabolisable Energy 9mj/Kg/DDM
- *Expected usage*: 2000-3000 mt
- *No delivery will be required* Roebuck Export Depot will employ a transport company.
- *Load Parameters*: Bulk product in 75mT loads
- *Notice:* To be suppled within 2 days of order being placed.

Regards

John Scott
Roebuck Export Depot Manager
0427206875

As part of the ILSC, the RED includes a provision to consider Indigenous outcomes in its purchasing arrangements. Going forward, and possibly as a prerequisite to investment, NBY should consider negotiations to establish more reliable supply contracts with its partner the ILSC and the RED.

Finding 11: The RED obtains supplies through competitive tender processes, noting its procurement includes provision to consider Indigenous suppliers and outcomes.

Table 4: RED Consumption 2017/18 Compared with Possible Options (Converted to Dry Matter Equivalent)

	Tonnes	Dry Matter (Tonnes DM)	NBY Option 1 (Tonnes DM)	NBY Option 2 (Tonnes DM)
Pellets	2170	2127		
Oaten Hay	1700	1445		
Silage	800	440		
Rhodes Grass Hay			5043.9	
Cavalcade Hay				1190
Maize Silage				4400
Total	**4670**	**4012**	**5043.9**	**5590**

Table 4 outlines the current consumption from the RED, converted to tonnes of dry matter. This comparison is important to understand the substitutability of different categories of feed. It also includes estimated production levels by the NBY project proposal for Options 1 and 2, both of which are explained later in this document.

- Option 1 would potentially provide a substitute to existing RED use of Oaten Hay and Silage representing 37% of its production
- Option 2 would potentially provide a substitute to existing RED use of Oaten Hay and Silage representing 35% of its production.

Importantly, Mr John Scott who manages operations at the RED has indicated local fodder would not be an appropriate substitute for shipper pellets due to export licensing requirements. Given the limited market of the RED, the two key challenges for the NBY project will be to ensure it produces fodder which is a substitute for product which is currently provided to the RED and a market is found for any surplus.

Hay quality will be a major concern for the project noting that the Mowanjum Irrigation Trial has only achieved a sale price of $160 per tonne for excess Rhodes Grass hay. (CSIRO: Andrew Ash) If this price were achieved for the NBY project, it would not be viable in its current configuration. However, this price is not necessarily reflective of what could be achieved given the location of the project and a focus on producing high quality product.

Finding 12: The RED will at best represent only about 40% of the total fodder produced meaning alternative markets will need to be established for the remaining 60%.

Finding 13: It is essential that the project results in a high-quality fodder outcome if it is to compete with locally grown and imported product.

Location and Site Access

Figure 4: Location (source Google Maps)

The site has been selected for its water resources, suitability for the environment and proximity to Broome and its main supplies. This will make the site more attractive for labour and management meaning it would be possible to either commute to the site from Broome or reside on the site while on shift. The site is 68.6 kilometres from Broome and is approximately 40 kilometres from the RED. Importantly, there is 9 kilometres of dirt road from the main highway into the site which is unformed and graded Pindan.

It is estimated that the project could result in up to 200 heavy vehicle movements per annum including the transport of fodder, fertilisers and other inputs. Under a Rhodes Grass hay option these movements would be occurring throughout the year with each road train moving up to 60 tonnes per a return truck movement, including fertilisers imports and the movement of equipment and machinery. A Rhodes Grass silage option would require more evenly spread truck movements throughout the year impacting on the road during the northern wet season. While an annual crop option (such as Option 2 which involves a Cavalcade Maize rotation) would likely result in higher quantities of dry matter being produced and transported, this would only occur twice a year provided storage could be made available at the project site or at the RED or another location on Roebuck Plains Station.

For this reason, provision has been made to hardstand storage at the site, noting this would be particularly important for Option 2.

Based on the above, it is assumed that a Rhodes Grass hay option would require road improvements while an annual crop option would not require as significant improvement because movement could be confined to the dry season. It has been assumed that the cost of improvements for a Rhodes Grass option would be $70,000 per km (based on comparable estimates from local governments for gravel sheeting and some drainage) while this could be halved for an annual crop option which saw movement of fodder mainly occurring during the dry season.

Figure 5: Existing Access Road Into Site

Finding 14: There is a strong case to invest in road improvements to the site, noting that Option 1 is going to require approximately 200 heavy vehicle movements per annum and significant movements of small vehicles.

Finding 15: Option 2 which involves an annual crop rotation of Cavalcade and Maize, is likely to impose less demands on the access road into the site than Option 1 because harvesting will occur during the dry season

The proposed development is planned to be positioned in a compact way so that there is minimum environmental impact and farming efficiency is maintained. However, some modification in design could be implemented depending on the results of water testing once the first pivots are commissioned.

Staging

This study assumes that two pivots would be constructed in Year 1 and three would be constructed in Year 2. The purpose of this staging is to enable testing to occur onsite in order to iron out any operational 'bugs' and to ensure water monitoring can occur with functioning bores. It is noted that the water management consultant has recommended staging over three years in order to test water usage.

This is a significant departure from the GHD study which assumed all pivots would be operational in the first year of the project.

It is noted that a staging option of 2 pivots in Year 1, 2 pivots in Year 2 and 1 pivot in Year 3 would reduce the IRR return from 0.7% to 0.5% and reduce average Gross Margins from $326,000 per annum to $316,000 per annum.

While the impact of delaying production of one pivot (or even two pivots) for one additional year is relatively low, over the life of the project, unnecessary delays impact negatively on an already marginal outcome. Furthermore, any delays would impact on the amount of working capital required in the early stages of the project. This issue is addressed further in Part 6 of the report. Staging was modelled by focussing all capital costs in the first year except for those costs directly related to the establishment of the pivot systems. This is one of the reasons staging has a negative impact on estimated returns, noting NBY could delay some machinery purchases in the first year until planting and harvesting commenced in order to reduce the cost of capital over that period.

Figure 6: Layout of Proposed Development (Source NBY)

Production

Two systems are anticipated and modelled as options for the site and a third option is addressed involving third party investors operating the site under a sublease or other.

Option 1 is to grow Rhodes Grass which is a perennial tropical species which has high production levels and is relatively easy to grow.

Under Option 1:

- the crop will be re-established every 5th year to maintain production and yield;
- the crop will be harvested up to 10 times per annum with higher frequency over the summer months (wet season) to account for the rapid growth rates and to ensure maximum palatability of the hay;
- the number of cuts will ramp up over two years from the establishment of the crop; and
- it is expected that the average yield per cut will be 3.5 tonnes per hectare.

The previous feasibility study (GHD 2016) had predicted a maximum number of cuts at 6 per annum with an average cut being 5 tonnes. While this will result in lower costs, the digestibility of the hay is likely to increase if the Rhodes Grass is harvested with more frequency, increasing the value of the crop.

Table 5: Comparison of Assumptions Harvesting Frequency Rhodes Grass

Year	Number of Cuts	Expected Yield (tonnes Hay equivalent)	Number of Cuts (GHD)	Expected Yield (tonnes Hay equivalent) (GHD)
Year 1	6	16 - 18	4	20
Year 2	8	26-29	5	25
Year 3	10	32-36	6	30
Year 4	10	32-36	6	30
Year 5	10	32-36	6	30

The main advantage of Option 1 is there is only one crop establishment every five years and there is a reasonable track record of growing Rhodes Grass in the Kimberley. The disadvantages of Option 1 are that harvesting will need to occur with greater regularity than is normally anticipated if digestibility is to be sufficiently high for the purpose of the RED. It would be advisable to obtain commitments from RED that good quality Rhodes Grass hay will be a substitute for oaten hay in addition to be a competitor to existing silage production around the Broome area.

Option 2 is to grow two annual crops including a tropical legume (Cavalcade) in the summer months and Maize in the winter months in order to produce baled Cavalcade and Maize silage.

Under Option 2:

- two crops will be re-established every year;
- only two harvests will occur;
- it is expected that the average yield for Cavalcade will be 7 tonnes/ha of high-quality hay; and
- the average yield for maize will be 40 tonnes/ha of high-quality maize silage.

The advantage of Option 2 is that the tropical legume and maize combination will likely result in a product that is highly digestible for stock and could be used more confidently as a substitute for oaten hay. Furthermore, only two harvests are required leading to some savings. However, there is a distinct disadvantage in that the crop needs to be established twice each year and there may be some additional variability in the crops performance from year to year depending on the season and compared to Rhodes Grass.

While both options are compared separately, a production system might include a combination of both options.

Option 3 is to develop an investor ready site and put it to the open market through an expression of interest process and likely resulting in the granting of a sublease for a period of 20 – 30 years to the successful proponent. This option is not modelled as the financial value (in the form of rental payments) of this option will be determined by the market. However, the report examines the pros and cons of this option within a risk management framework.

Table 6: Summary of Potential Crop Species

Species	Common name	Positive attributes	Additional comments
Chloris gayana	Rhodes grass	High biomass production. Comparatively good cool season production. Leafy growth is suitable for growing animals. Stoloniferous (creeping) growth habit fills in gaps at seeding .	Can be difficult to manage under direct grazing, especially to maintain feed quality. Stem suitable for maintaining rather than growing animals Uneven (patch) grazing is common. Often requires slashing after a few grazing periods to even up stand Best suited to perennial hay or pasture crop.
Centrosema pascuorum	Cavalcade	Wet season annual legume.	Low production over dry season even with irrigation – wet season option only – plant in December to maintain fresh growth by April. Twining growth habit and strong stems can make it difficult to harvest requiring the right type of disc mower to avoid entanglement.
Zea mays	Maize (Corn)	Good energy. High potential yields (but potential production on red-brown(pindan) sands is still to be determined. Best suited to silage production. Large number of varieties available.	Only suited to dry season production when milder temperatures are present – dry season option. High nutrient requirement crop and requires very high management skill. Requires a precision seeder to establish.

Details of Pasture or Crop Species

Rhodes Grass

Rhodes grass is a stoloniferous perennial grass with moderate feed quality and palatability. It provides good groundcover but requires regular rotational grazing or cutting as tall, rank growth is unpalatable to stock. Often the most productive growth occurs after the first two years, but the plant density and productivity can decline in subsequent years hence the need to replace the crop after five years.

Importantly, Rhodes grass:

- is adapted to a range of soil and climatic conditions;
- is easy to establish with good seedling vigour;
- has moderate to high drought tolerance; and
- has moderate feed quality and palatability.

While Rhodes grass is active in the summer (wet season) its growth rate in the northern regions (including the Kimberley) is slower in the winter months hence the reduced frequency of harvest and lower hay yields over the that period. Like most sub-tropical grasses, Rhodes grass prefers high temperatures with maximum growth at 30°C/25°C (day/night temperature) under controlled conditions. Growth is reduced greatly below 18°C/13°C and there is negligible growth when the average daily temperature is below 8°C.

Rhodes Grass dry matter becomes less digestible if not cut regularly. The Department of Primary Industries and Regional Development indicate that digestibility is 61-65% when cut monthly and this can be improved with greater frequency and high rates of fertiliser. Digestibility over 60% is essential if NBY is to provide Rhodes Grass hay into the RED market. Similarly, crude protein rates must be higher than 8% if it is to be useful as a feed for the RED (or similar). Therefore, nitrogen fertiliser must be used in order to ensure adequate crude protein levels are achieved (noting up rates of between 10.4%-13.8% can be achieved with low or high nitrogen applications while crops with no nitrogen can be as low as 6.3% .

When used as hay, the optimal number of cuts depends on many things. Weather and temperature have the biggest influence, so yield is one thing but maintaining quality is the real challenge, particularly during the wet season. During the summer months (Oct to April) the optimum cutting cycle is about 21 to 28 days. But moisture and humidity will need to be managed. This might mean you can't cut for 30 days, and you will have a higher yield but lower quality. In the dry season the growth will slow, and you have more time and more control, so yield per cut will drop but quality will be up, time between cuts will increase.

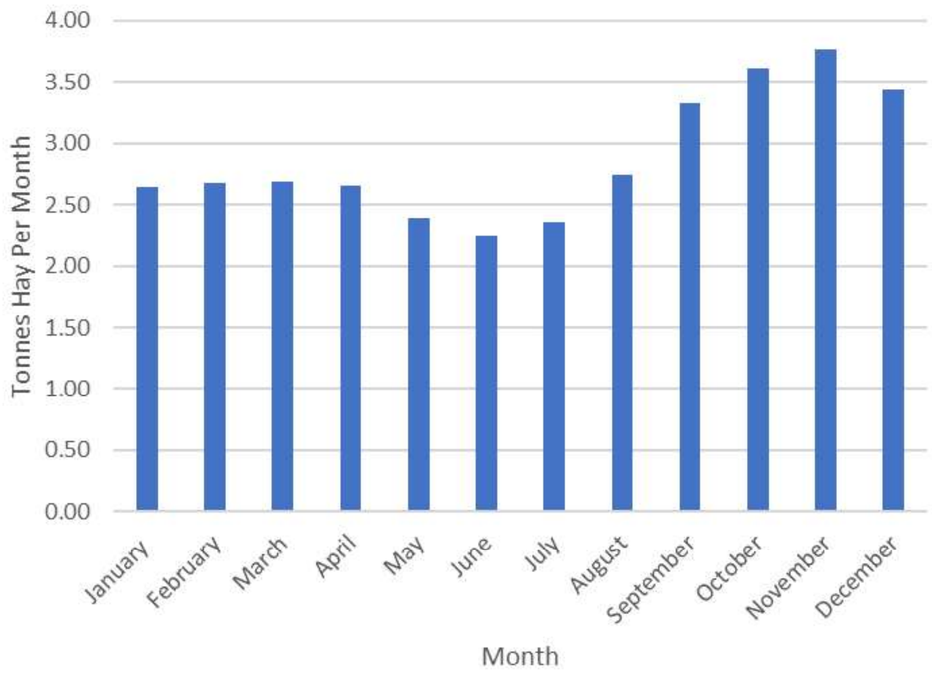
For the purposes of this study, it is assumed that Rhodes Grass will be cut 10 times per annum once fully established with varying rotation lengths depending on the time of the year (see Figure 4 over page).

It has been recorded that digestibility is reduced to 49-56% when only cut every 105-140 days, so ongoing management of the crop is required if the product is to be of any value in the market.

Rhodes grass is readily established from seed with rapid germination (1–7 days) depending on temperature. Rhodes grass displays good seedling vigour and often achieves full groundcover within three months of sowing. It is assumed that 6 months is required for re-establishment before the first hay cut.

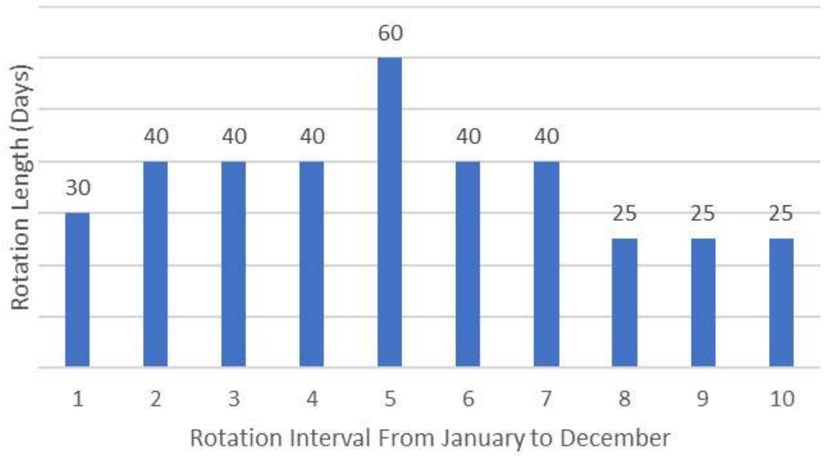
Data has been provided from yield information at Mowanjum (Department of Primary Industries and Regional Development, 2019) which has provided the basis for yield projections for the NBY site. Hay production figures are based on raw Dry Matter estimates per annum converted to hay production by assuming hay consists of 85% Dry Matter and achieves 80% utilisation of available pasture.

Chart 5: Rhodes Grass Hay Production Per Month (based on Mowanjum Data)



Assuming 10 cuts per annum once fully established the following hay outcomes are modelled for Option 1.

Chart 6: Assumed Rotation Length (Days) by Each interval Over the Calendar Year



A report has been prepared for NBY outlining farm management requirements including fertiliser requirements for Rhodes Grass and other species. (AgVivo, 2019).

Table 7: Fertiliser Recommendations Rhodes Grass Hay - Source (AgVivo, 2019)

Rhodes Grass for Hay

Product	Rate (kg/ha)	Timing & Method	Comment
Zinc Sulfate	5	Pre Plant Spray	Tank mix spray onto bare soil
Copper Sulfate	4		
MAP (Mono Ammonium Phosphate)	100	Pre Plant Spread as a blend	Builds soil P & K levels
Muriate of Potash	100		
MAP	100	Drilled at Seeding	Place with seed
Custom Blend (60N, 10P, 60K & S)	300	Top dressed Post cutting	Repeat each cutting
Plant tissue test every 2-3 months to monitor available plant levels of essential nutrients.			

Table 7 is an extract from the report prepared by AgVivo. Fertiliser levels and costs were modelled based on this information and further discussions with the author Mr Sam Taylor. Pricing was based on estimates for product landed at site:

- Mono Ammonium Phosphate (MAP) $920 per tonne;
- Higher value fertilisers $1,500 per tonne (eg Zinc Sulphate and Copper Sulphate)
- Muriate of Potash $1000 per tonne; and
- Custom Blend $920 per tonne.

It is noted the key variable for fertiliser is the application of Custom Blend each time the hay is cut. AgVivo estimated a fertiliser rate of 300kg/ha for Custom Blend based on an average cut of 4 tonnes. This has been scaled to 250kg/ha based on the higher rate of cutting being at 3.45 tonnes per cut. Given a cost of $920 per tonne (landed at site) this results in the estimated cost of fertiliser being considerably higher than was used for the GHD study. It should be noted that transport costs represent approximately $300-$350 per tonne to land fertiliser in the Kimberley Region (pers comm Sam Taylor).

Table 8: Assumed Fertiliser Costs for Rhodes Grass Hay

	Year 1	Year 2	Year 3-5
This study	$1380/ha	$1840/ha	$2406/ha
GHD study	$771/ha	$771/ha	$771/ha

Finding 16: Fertiliser costs are a significant component of operational costs given the high cost of transport to the Kimberley area and high fertiliser rates are required in order to maintain quality and quantity of fodder.

Cavalcade

Cavalcade is a tolerant tropical legume which can withstand partial submersion on seasonally-flooded soils. It can also tolerate periods of drought during the dry season. Seed should be sown at 10kg-15kg per hectare when used for hay crops in order to ensure good establishment in the first year. Some soil disturbance is required, such as a rough cultivation, to enable establishment.

Cavalcade requires superphosphate at the rate of 100 kg to 250 kg/ha with the higher rates being applied to virgin or previously unfertilised areas. In subsequent years, superphosphate fertiliser should be applied at 50 kg to 100 kg/ha/year as maintenance dressing. Applications of potassium, molybdenum or zinc fertilisers may be necessary on some soils.

This study assumes an annual rate of superphosphate at 250kg/ha, noting the production will require re-establishment of the crop each year.

Cavalcade is reported to provide 4 to 6 tonnes per hectare of high-quality herbage (dry matter) and, under ideal conditions, up to 7 tonnes per hectare. For the purposes of this study, it has been assumed that Cavalcade could produce 6 tonnes/ha.

Since Cavalcade is very palatable and is well accepted and sought after by stock and would provide a high-quality fodder option for the RED.

Cavalcade can be grown as a summer crop in an annual rotation with maize and being a legume, provides the beneficial effect of fixing nitrogen into the soil through natural processes. As such it is an ideal high value complimentary crop to maize.

Finding 17: Cavalcade grown in an annual rotation with maize could provide a useful adjunct to the main fodder production as it results in a high nutritional value product, provides nitrogen into the soil and utilises the site during the summer months.

Maize

Maize is essentially a warm season rather than a hot season crop. It is not well-adapted to the harsh, hot conditions in the Kimberley during the wet season but can grow during the winter months, between May and October.

The Department of Primary Industry, Fisheries and Mines (DPIFM) conducted a four-year (1999-2002) evaluation of irrigated maize on "Blain" soil (sandy textured red earth). The objective was to identify the best adapted varieties and determine the agronomic requirements for producing dry season irrigated maize in the Northern Territory. The trials confirmed the potential of irrigated maize with yields approaching 13.0 t/ha. The average yield for all varieties over four years was 9.3 t/ha. (Department of Primary Industry and Resources (Northern Territory), 2007).

AgVivo has reported that maize, when grown as silage can produce 20-25 tonnes of DM/ha over a 120-day rotation grown between May and September. This converts to between 40 – 50 tonnes of silage per ha. This study assumes production levels of 40 tonnes per ha of silage (based on $220 per tonne) and 55% dry matter.

As a fast and vigorous plant, fertiliser requirements are high, but these are offset by the significant dry matter levels production. Maize silage has high digestibility and, if produced correctly, can provide good weight gains for cattle. As such, Maize silage would be a strong competitor to existing silage producers based in the region. Maize silage should be ideally positioned to be used in the RED as a substitute to existing silage usage and, subject to assessment and agreement by the RED, could be a substitute for some or all oaten hay provision. It would be expected, when combined with a Cavalcade hay production system, that all hay and silage requirements of the RED could be met[4].

Table 9: Maize Fertiliser Requirements - Source (AgVivo, 2019)

<table>
<tr><th>Product</th><th>Rate (kg/ha)</th><th>Timing & Method</th><th>Comment</th></tr>
<tr><td>Zinc Sulfate</td><td>5</td><td rowspan="2">Pre Plant Spray</td><td rowspan="2">Tank mix spray onto bare soil</td></tr>
<tr><td>Copper Sulfate</td><td>4</td></tr>
<tr><td>Muriate of Potash</td><td>100</td><td rowspan="2">Pre plant spread</td><td rowspan="2">Apply as a blend</td></tr>
<tr><td>MAP (Mono Ammonium Phosphate)</td><td>100</td></tr>
<tr><td>MAP</td><td>100</td><td colspan="2">Drill 5cm to side or below seed at planting</td></tr>
<tr><td>Urea</td><td>70</td><td>Topdress</td><td>2 weeks after sowing</td></tr>
<tr><td>Muriate of Potash</td><td>250</td><td rowspan="3">Topdress as a blend</td><td rowspan="3">4 weeks after sowing</td></tr>
<tr><td>MAP</td><td>100</td></tr>
<tr><td>Urea</td><td>200</td></tr>
<tr><td>Muriate of Potash</td><td>250</td><td rowspan="2">Topdress as a blend</td><td rowspan="2">6-7 weeks after sowing</td></tr>
<tr><td>Urea</td><td>350</td></tr>
</table>

Combined with additional phosphate applications for the Cavalcade crop, it is estimated that the above regime would cost $1,740 per hectare per annum.

Finding 18: An annual maize crop grown over the winter months provided it is grown in the right management regime, it could provide significant dry matter product for a silage operation.

[4] The RED feed composition will be determined by the RED's requirements for suitable quality feed AND the capacity of the RED to cost effectively manage the mixing and distribution of the feed in its day to day operations.

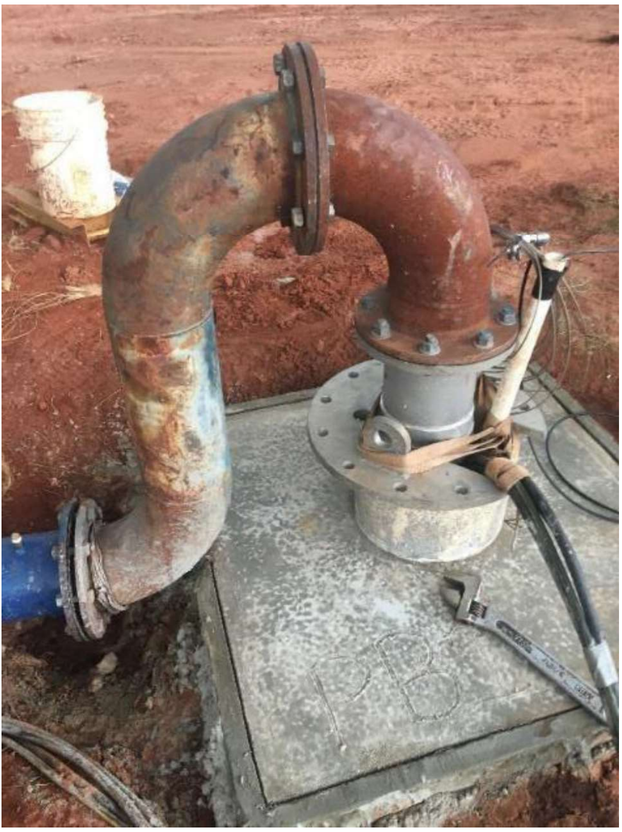
Pumping Costs

Figure 7: Water Resource Testing Onsite March 2019

It is expected that each 40ha pivot will require an instantaneous flow rate of 50L per second, that is equivalent to 10.8 mm/day maximum flow rate (application rate).

The total pumping head will comprise 25m static lift, 10m of drawdown, 10m of pipe friction and 30m of operating pressure for the pivot, converting to a total 75m total dynamic head. This estimate is conservative noting pipe friction and pivot operating pressure can be reduced by varying the materials and sizes used. A minimum total dynamic head will be at least 55m, meaning there might be some scope for a small reduction in capital cost and operating costs.

Figure 8: Central Bore for Testing Onsite



Based on these assumptions, using estimates derived from DPIRD modelling, it is estimated that pumping costs will be $162 per million litres. This compares with the estimate of $111 per million litres used in the GHD study of 2016. Two factors impacting on this cost are an assumed diesel price of $1.4 per litre (compared to $1.2 per litre by GHD); and an increase in dynamic head of 10 metres to account for higher estimated operating pressure for the pivot.

Option 1 has been assumed to require 12.5 million litres of irrigated water per ha (based on irrigation requirements minus months when there is likely to be precipitation) and the Option 2 is assumed to require 9 million litres per ha with some late season watering for Cavalcade and irrigation over the dry season for Maize.

Table 10: Pumping Costs Per Ha Per Annum

Pumping Costs	$/ha/annum
GHD Rhodes Grass	$1,751
Option 1 - Rhodes Grass	$2,018
Option 2 - Cavalcade	$243
Option 2 - Maize	$1,205

Given the pumping cost will be a significant part of operating costs, there should be some effort to ensure the assumptions behind them are realistic and the system is optimised. With regard to the bores, testing on site by Sam Burton has demonstrated feasibility of flow rates well in excess of that required.

The management of water use will need to be fine-tuned with reference to data derived from the site. As a principle irrigation is more efficient with heavier less frequent irrigations (with approximately 20 millimetres being applied over a 40-hour period (Department of Primary Industries and Regional Development, 2018). This requirement will need to be balanced against the daily temperatures, cloud cover and the need to manage fertiliser requirements noting heavier water applications can result in higher fertiliser needs over the longer term.

High rainfall events and wetter than average seasons, will reduce the need for irrigation and therefore reduce cost of pumping, however, it is likely that any substitution for irrigation through rainfall will be relatively short-lived due to the high evapotranspiration rates in the north.

Finding 19: Pumping Costs represent a significant component of operational costs, noting these are higher for the Rhodes Grass Option due to the need to pump continuously throughout the years, except after rainfall events.

Solar Pumps

Pumping costs are a major component of the operational costs associated with the project and solar pumps represent an option to reduce those operational costs.

A key factor for NBY is that one of its main competitors (Mr Graham Rodgers, who operates 65ha of centre pivots in closer proximity to Broome) has access to mains power which provides a much cheaper pumping option. Furthermore, operations at Wallal are based on pressurised artesian water which means diesel costs are reduced significantly.

Water Pumping Solutions (Water Pumping Solutions, 2018), a supplier of solar-diesel pumps, has assessed the costs and benefits of a solar-diesel system based on 60ha centre pivot model. This analysis estimates almost identical pumping costs when they are adjusted for the larger pivot system. The system is enabled to allow solar array powered pumping during sunlight hours with sensors to automatically shift to diesel powered generators when the solar system output is insufficient to power the bore pumps.

Water Pumping Solutions estimate that its system could provide 60% of all pumping costs through solar power. This would result in annual savings of $242,000 per annum in diesel fuel costs for the Rhodes Grass Option) and $174,000 per annum for Option 2. Water Pumping Solutions estimate the capex for a solar array, pumps and associated infrastructure to be $361,000 per unit. It is assumed that the costs would be similar for 40 ha units with the only adjustment being a proportionally smaller solar array for each 40-ha pivot. This results in an assumed an additional cost of approximately $300,000 per unit, noting this study has estimated the cost of installing pumps, fuel systems and associated infrastructure at $1.53m or $306,000 per unit. The benefit of solar-diesel pumps is outlined further in the sensitivity section, noting the improvement in the overall IRR for Option 1 of approximately 3% when they are applied, and this improvement extends if grant funding can be sourced for the solar pumps. Importantly, there is not the same benefit to Option 2 because pumping costs represent a smaller proportion of costs for that option with the high costs of solar arrays impacting on the initial capital outlay.

Finding 20: Solar-diesel pumps would likely provide a significant improvement to Option 1’s internal rate of return noting the high costs of diesel represent a significant factor in operational costs.

PART 3: PREVIOUS STUDIES

GHD Study - General Feasibility Analysis

The study has been commissioned to refresh work undertaken by GHD in 2016. Since then there have been significant developments in the delivery of irrigated agriculture in the Kimberley region. Significant experience has been gained with similar projects at Mowanjum and others. Furthermore, there have been changes to the throughput of cattle of the RED and there is a growing local market for fodder with a competitor, Mr Graham Rodgers providing silage to the RED.

The GHD study undertook a detailed analysis of likely benefits and costs associated with a 3-pivot system (over 180 ha) which has been revised on the advice of others in the industry noting that 60 ha pivots have a tendency towards higher maintenance costs, particularly over ground which is not entirely flat.

Three years on, this study refreshes the values from the GHD study with consideration over a longer timeframe. Table 11 summarises the key differences in the two studies.

Table 11: Comparison of Key Assumptions 2016 GHD Study and This Study

GHD Study	This study	Reason
3 x 60 ha centre pivots	5x40ha centre pivots	Experience in the Kimberley has shown that smaller centre pivots are easier to manage
One option (Rhodes Grass hay only)	Two options modelled being Rhodes Grass hay and an annual rotation of summer legume with Maize.	Issues related to the challenges of Rhode Grass hay and the substitutability related to oaten hay indicate other options might be contemplated Developments in maize production in the north also demonstrate possible viability – either as an alternative or in combination.
5-year rotation for Rhodes Grass	5-year rotation for Option 1 (Rhodes Grass)	While some growers have extended their rotations, 5 years is regarded as optimal.
5 tonnes per ha per cut	3.5 tonne per ha per cut (Option 1)	More regular cutting of fodder (up to 10 cuts per annum) will improve hay quality
Value of hay $350 per tonne	Value of hay modelled at $350 per tonne (Option 1)	No major change in value of fodder since 2016.
Land preparation and infrastructure $1.6 million	Land preparation and infrastructure Option 1 $2.03 million Option 2 $1.71 million	Variations reflect increased costs due to smaller pivots, increased spending on access road particularly for Option 1 and a lower contingency allowance.
Development costs $5,352,476	Development costs Option 1 $6,582,000 Option 2 $6,264,000	Increased cost mainly due to increased spending on access road with some additional costs related to the more intense configuration (5 pivots instead of 3) Option 2 has lower costs than Option 1 due to no fertigation system and lower road upgrade costs.

Table 11 continued…

GHD Study	This study	Reason
Value of hay production varies between $7,000/ha and $10,500/ha depending on timing.	Value of hay production per hectare varies between $4352/ha and $12,960/ha depending on timing and scenario.	Overall average values of production are lower than the GHD study because greater variation if factored into the model year to year, due to staggering of pivot production cycles and the inclusion of a crop establishment phase each 5 years which is assumed to limit production more profoundly than previously modelled.
The resulting gross margins range from $124/tonne to $200/tonne.	The average gross margins are: Option 1 $55/tonne Option 2 $77/tonne	Higher operational cost structure related to effort to improve hay quality (Option 1) and additional costs associated with pumping water and fertiliser regimes impact on estimated gross margins for both options.
No silage was considered	Silage production from a Maize (Option 2)	Maize crops are best suited to silage production.
Assuming 50% of the required capital was financed, the enterprise would require an initial loan of around $2.83 million.	Assuming 50% of the required capital was financed, an initial loan of around $3.2million would be required, plus an additional $1.8million in operating capital to cover shortfall in first 3 years.	Variations reflects higher establishment costs, noting there will also be at least 3 years before gross margins break-even
Through put at the RED of between 92,000 and 70,000 head of cattle (2016)	Throughput of the RED is between 92,000 and 56,000 head of cattle (2019)	Downturn in cattle numbers through the RED in 2017-18
Modelling hay cuts -Year1, 4 Year 2, 5 Year 3, 6 ongoing to Year 5	Option 1 Modelling hay cuts – Year 1,6 Year 2, 8 Year 3, 10 ongoing to Year 5 Option 2 based on one hay cut and one silage cut per annum.	Higher rate reflecting aim to improve hay quality. Option 2 based on an annual crop rotation.

Finding 21: Differences between the configuration of the 2016 proposal and the existing proposal, along with reviewed costs, alter the outcomes of the two studies, noting the 40 ha centre pivot configuration is considered easier to maintain and there are other variables which impact on the feasibility assessment.

Tera Rosa - Aboriginal Heritage

Consultants Tera Rosa undertook an Aboriginal heritage survey consistent with the requirements of the Aboriginal Heritage Act. As a result of the work program clearance survey of the Roebuck Plains Station Pivot Irrigation Project, no cultural heritage places or isolated artefacts were identified. NBY has been advised that the proposed works may proceed within the surveyed area.

Though no cultural material or other heritage concerns were identified during the course of the archaeological survey, the density of vegetation and ground cover within the survey area did significantly limit ground surface visibility within the areas assessed.

As such, Nyamba Buru Yawuru Ltd is advised that cultural monitors should be engaged during any ground disturbing activities to ensure that no inadvertent impact is made to any heritage values unable to be identified during the survey.

Finding 22: An Aboriginal heritage survey did not identify any cultural heritage places or isolated artefacts, however, it recommended cultural monitors be engaged during any ground disturbing activities to ensure that no inadvertent impact is made on any heritage values.

EcoScope - Flora and Fauna

An environmental assessment was conducted by EcoScope (EcoScope, 2017) in accordance with Commonwealth and State legislation and guidelines including reference to:

- Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) (1999)
- Western Australian Wildlife Conservation Act 1950 (WC Act) (1950) • Western Australian Environmental Protection Act 1986 (EP Act) (1986)
- Western Australian Biodiversity Conservation Act 2016 (BC Act) (2016c)
- Western Australian Animal Welfare Act 2002 (2002) Department of Environment Water Heritage and the Arts (2009) Matters of National Environmental Significance. Significant impact guidelines 1.1 - Environment Protection and Biodiversity Conservation Act 1999.

In addition, the Western Australian Minister for the Environment has published lists of fauna and flora species in need of special protection because they are considered rare, likely to become extinct, or are presumed extinct. The current listings were published in the Government Gazette on 3 January 2017 (Government of Western Australia 2017b) and were taken into account.

The flora and vegetation survey were conducted in 2017 in accordance to the Flora and Vegetation Technical Guidance (EPA 2016e). EcoSope concluded the species richness of the study area (117 species) was low in comparison with other flora and vegetation surveys in same bioregions. Only one conservation significant flora species was recorded (Triodia caelestialis) which was recorded as a characteristic species throughout much of the study area. Of the three vegetation types were recorded from the study area, none of the vegetation is of any conservation significance.

Surveys undertaken identified four species of conservation significance have a moderate to high likelihood to occur or have been recorded from site: Greater Bilby, Rainbow Bee-eater, Spectacled Hare-wallaby and Dampier Peninsula Goanna. However, the study concluded that none of the species are likely to be significantly impacted by the proposed development of the study area.

On the basis of these studies, NBY has conditional approval for land clearing up to 422 hectares.

Finding 23: A flora and fauna study has concluded that no species of conservation significance will be significantly impacted by the proposed development in the study area.

Soil and Land Capability

The proposed site lies entirely in the Yeeda land system (Department of Agriculture and Food Western Australia 2012). This system is dominated by red sandplains supporting pindan vegetation with dense Acacia shrubs, scattered bloodwood and grey box trees and curly spinifex and ribbon grass.

- The State land type are sandplains and occasional dunes with shrubby spinifex grasslands or pindan woodlands
- Geology is Quaternary Aeolian sands.
- Geomorphology is Sandplain and Dunefields with little organised drainage; sandplain up to 16 km in extent, with shallow valleys, plains with thin sand cover, and scattered pans; limited surface drainage in zones of sheet-flow up to 3.2 km wide and extending up to 8 km downslope from adjacent uplands (Payne & Schoknecht 2011).

Importantly, these lands are ideal for the development of irrigated agriculture as they are relatively free draining and are usually associated with good groundwater resources.

In September 2018, Field Capacity Pty Ltd in conjunction with Western Horticultural Consulting Pty Ltd conducted a soil survey and land capability assessment of a site on Roebuck Plains Station to determine its suitability for irrigated agriculture. A literature review carried out prior to this investigation determined that the land systems and soil types in the area were well understood at a regional level.

The detailed site assessment confirmed that the soils present:

- "*were very uniform across the proposed site and were mainly classified as a Cockatoo Sand (Normal Phase);*
- *were consistent with those profiles described in previous studies in the area;*
- *had a high capability for irrigated fodder production provided appropriate land management practices are applied*".

It was noted that "*fodder production systems of the same nature of the proposed development are being successfully implemented at analogous irrigation developments on similar soil types within the region*". (Field Capacity Pty Ltd, 2018)

Finding 24: A Soil and Land capability study has concluded that the lands are ideal for the development of irrigated agriculture as they are relatively free draining and are usually associated with good groundwater resources.

Hydrology Study

Hydrological testing by Groundwater Consulting Services (Mr Sam Burton) is currently underway and the first phase of testing based on the results of an onsite bore have met expectations for the project. However, the final report is still to be provided to NBY.

An H3, detailed hydrogeological assessment including drilling, test pumping and a groundwater model is being prepared and once completed will be submitted to the Department of Water and Environmental under the terms of the Operational Policy 5.12 in order to achieve a licence for abstraction in accordance with the *Rights in Water and Irrigation Act 1914 (the Act).*

It is noted that licensees may be required to provide groundwater monitoring reports to satisfy the department that their groundwater abstraction is not causing detrimental impacts on the environment, other users, or the resource itself.

Operational Policy 5.12 indicates there are two types of groundwater monitoring reports that the department may require from licensees being:

- Groundwater monitoring summary – a brief report on the most recent groundwater monitoring results, to assess the impacts of abstraction over a specified reporting period; and
- Groundwater monitoring review – a detailed report on all available groundwater monitoring results, to assess the impacts of abstraction over the life of the operation.

Licence conditions may have a further impact on costs associated with the project and as noted, any requirement to stage the development under the licence conditions should be considered within the terms of the feasibility of the project.

Farm Management (Supplementary Information)

A number of observations have been made by AgVivo (AgVivo, 2019) in its Farm Management report to NBY. Key elements of this report have been utilised in the estimation of fertiliser requirements. These have had a significant impact on the comparison between the 2016 GHD feasibility study and this study.

Other elements have been used as a guide to corroborate assumptions which have been modified from the GHD report. For example, a $50,000 allowance for tools has been included in the establishment cost (a parameter not addressed previously). Furthermore, the inventory of other equipment has been compared, noting while there are some minor variations, the assumptions used are comparable.

Native Title

The site is located on the Yawuru determination area which on exclusive possession native title lands. This status does not pose any obstacle to the development of the site for the purposes of irrigated agriculture.

Land Tenure

The site is within the Roebuck Plains Pastoral Lease which is currently subleased to the Indigenous Land and Sea Council. It should be noted that operations on the site may benefit from an excision from the existing sublease or some other form of legally binding agreement which ensures access to the site for the purposes of the fodder operation. Such an arrangement would also ensure the necessary security of tenure was in place if NBY sought to engage a third party in the delivery of the project.

It is noted that a diversification permit will be sought from the Pastoral Lands Board as soon as the water licence is issued.

Finding 25: A water licence is yet to be issued and this, along with the necessary tenure amendments (such as the diversification permit issued by the Pastoral Lands Board) will, when completed, form a package of reports which are a precursor to decision making on the site.

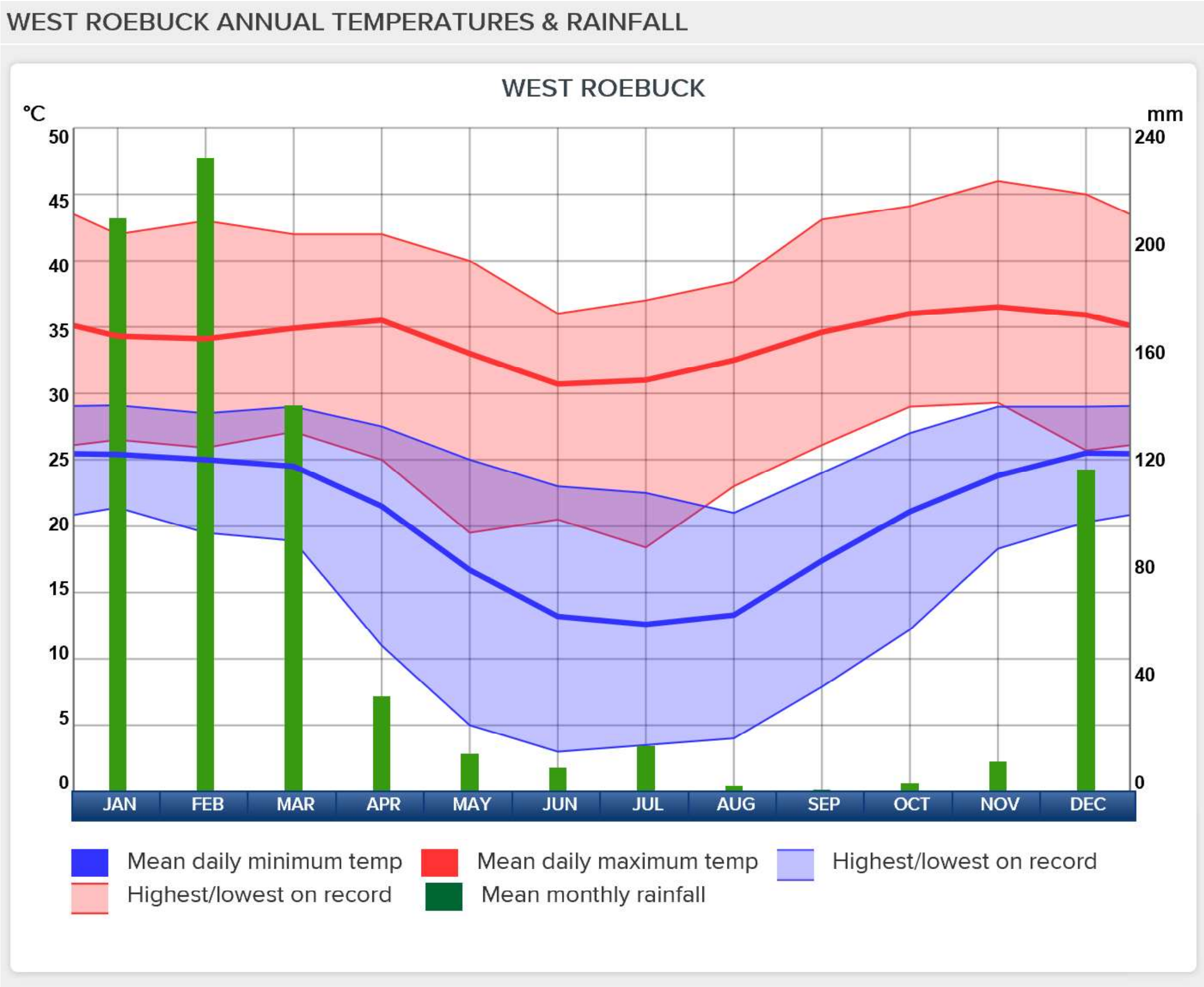
Table 12: Comprehensive List of all Studies Undertaken (Excluding this Report)

Study	Author	Key Conclusions
Economic Management	GHD	GHD had found that a Rhodes Grass hay system could provide an Internal Rate of Return of 12.4%.
Aboriginal Cultural Research	Tera Rosa	Though no cultural material or other heritage concerns were identified during the course of the archaeological survey, it is recommended that cultural monitors be engaged during any ground disturbing activities.
Flora and Fauna	EcoScope	The study concluded that no species are likely to be significantly impacted by the proposed development. It is noted that NBY has been granted a land clearing permit.
Hydrology Study	Groundwater Consulting Services	Preliminary results from hydrological testing suggest there is adequate groundwater reserves existing onsite. However, a final report is being prepared and an abstraction licence is yet to be issued.
Farm Management Discussion Paper	AgVivo	Various recommendations on fertiliser rates for various crop options, along with recommendations on machinery requirements.
Soil Survey and Land Capability Assessment	Scott Brain (Field Capacity Pty Ltd)	It was noted that "*fodder production systems of the same nature of the proposed development are being successfully implemented at analogous irrigation developments on similar soil types within the region*".

Climate

The Bureau of Meteorology publishes rainfall data for West Roebuck. Rainfall is reflective of a seasonal wet season which can be somewhat unreliable with the median rainfall of 744 mm per annum and the average rainfall of 789mm per annum. Temperatures variations are particularly important if Rhodes grass is grown noting night temperatures have been recorded as low as 3^{O} centigrade in June, although average night temperatures in June tend not to fall below 12° centigrade.

Chart 7: Rainfall and Temperature – West Roebuck



Graph Courtesy of weatherzone.com

Rainfall throughout the summer months will result in some savings to irrigation costs because less irrigation is required. However, the extent of the savings will vary between seasons depending on the regularity and extent of rainfall events. There is likely to be some variability on irrigation requirements over the summer months, noting rainfall has been recorded to vary from 361mm to 1700mm in any given year. However, the variation in irrigation costs will be moderated in that it is only likely to impact on the seasonal conditions between November and March when rainfall is expected in the region. Estimates include regular irrigation over the dry months with some reduction accounting for the average of 60 days when rainfall occurs (see Table 6 over page).

Table 13: Rainfall and Temperature Mean Median Max and Min

	Jan	Feb	**Mar**	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Mean Max (°C)	34.3	34.1	**34.9**	35.5	33.0	30.7	31.0	32.5	34.6	36.0	36.5	35.9	34.1
Mean Min (°C)	25.4	25.0	**24.5**	21.5	16.7	13.2	12.6	13.3	17.4	21.1	23.8	25.5	20.0
Mean Rain (mm)	207.3	229.0	**139.7**	34.6	13.8	8.7	16.5	2.2	0.7	3.0	11.0	116.3	788.5
Median Rain (mm)	128.9	319.7	**105.2**	3.2	0.0	0.2	0.6	0.6	0.4	0.4	3.2	77.4	743.8
Mean Rain Days	14.9	13.9	**12.0**	3.1	1.4	1.1	2.1	1.7	2.6	1.7	2.1	8.4	60.4
High Rain (mm)	492.8	517.6	405.8	279.6	79.0	108.2	128.0	14.4	2.0	24.8	40.2	223.8	***1700.8***
Low Rain (mm)	43.8	9.2	14.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.2	***361.6***

Weather data courtesy of WeatherZone.com.

PART 4: FEASIBILITY STUDY

Benefits

Option 1

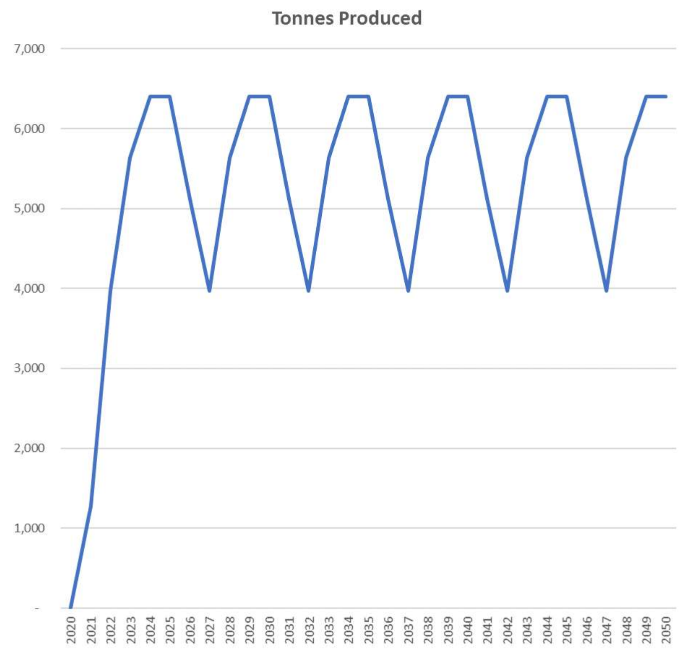
Hay production has been modelled based on the roll out of two pivots in Year 1 and 3 pivots in Year 2. This approach will ensure there is appropriate staging of the development in order to ensure water monitoring can occur and adjustment made to iron out any 'bugs' in the operational system and its deployment.

It will also benefit to ensure production is staggered because Rhodes Grass takes up to two years to reach full production after it is planted. Staging will smooth production somewhat over the longer term.

At an operational level, production will most likely be smoothed after its initial establishment through the further staggering of crop re-establishment timelines. For modelling purposes, no assumptions are made about operational 'smoothing' that may occur.

The following figure outlines the basis of production estimates in the feasibility study which align strictly to the crop estimates provided by DPIRD and as per the previous GHD study.

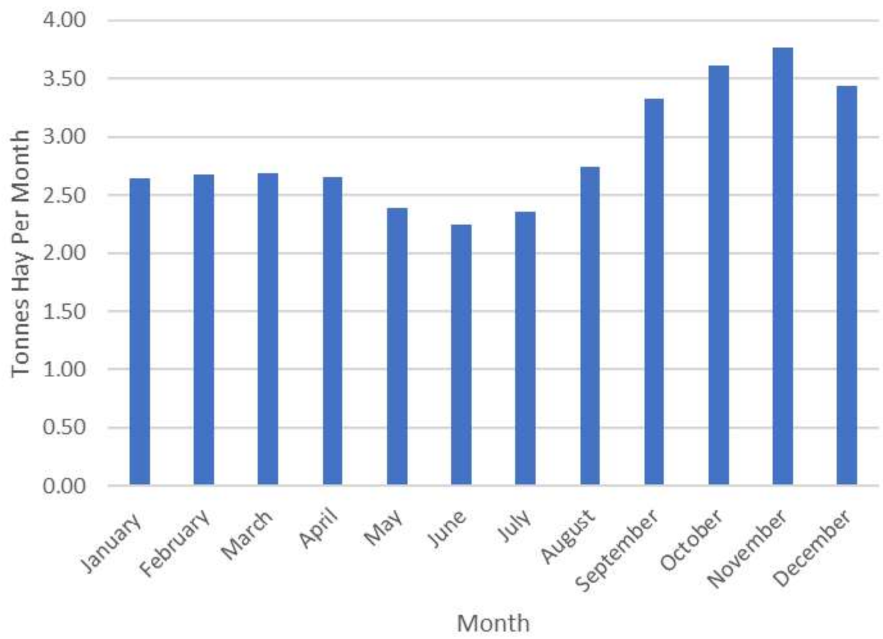
Chart 8: Fodder Production Over the Life of the Project (Option 1)



This production pattern, if not smoothed through gradual changes to the rotations would result in the same oscillating revenue stream. Importantly, as outlined in Part 6 of the report, there are also intra-seasonal oscillations which reflect dry matter growth over the different times of the year which are not observable on annual production forecasts (as per figure above).

Finding 26: Option 1 will likely have some inter-year fluctuations in production which arise due to the rotation cycle of the crop and independent of seasonal conditions. These will need to be managed at an operational level.

Chart 9: Intra-seasonal Dry Matter Production (Rhodes Grass)



As outlined in Chart 5 (previous part of report) and chart above, Rhodes Grass grows most vigorously during the spring/summer months, particularly in the lead up to December each year and this is when more regular cutting or grazing is required to maintain quality. This will impact on production during the year.

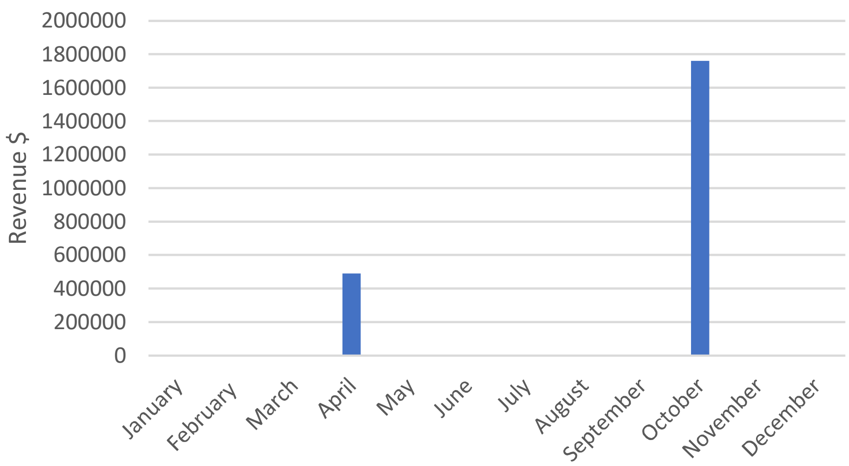
Finding 27: Rhodes Grass will need to be harvested at different frequencies during the year to ensure crop quality, particularly noting the more rapid growth from September to April, impacting on hay production (and therefore revenue) levels throughout the year.

Option 2

Option 2 results in two annual fodder crops with a legume (Cavalcade) grown in the summer months (October to March) and Maize grown over the dry season (April to September) with two single harvests of those crops occurring around April (Cavalcade) and October (Maize).

As an annual crop, it intensifies harvesting and creates a much lumpier revenue stream for the operation. It will also mean greater storage of fodder is required onsite. This is a consideration in managing risks to the operation (compared to Option 1), although fodder storage, if managed well, should be relatively straightforward.

Chart 10: Revenue from Option 2



Finding 28: Option 2 will require management of two major harvests throughout the year, noting it will also likely require some fodder on-site due to the concentration of product being produced in both April and October.

Establishment Costs

Establishment costs have been derived from a combination of the GHD study (2016) assumptions with key modifications where variables are considered in more detail. These form the basis of the capital investment which is subjected to the discounted cashflow assessment.

Table 14: Establishment Cost Estimates

	Option 1	Option 2
Land preparation and infrastructure	$2,032,000	$1,717,000
Bore construction and development	$642,667	$642,667
Supply and installation of pivots and pumps	$1,530,000	$1,530,000
Supply and installation of fertigation system	$347,300	
Contingency on development costs 10%	$455,197	$388,967
Professional fees 10%	$455,197	$388,967
Machinery	$1,120,000	$1,347,000
Total	$6,582,360	$6,014,600

Key elements of the establishment costs are listed below with comments related to any variation on the GHD study and recommendations by AgVivo.

Table 15: Land Preparation and Infrastructure

	Option 1	**Option 2**	**Comments**
Construction and farm labour accommodation	$250,000	$250,000	Same as GHD study
330 hectares land clearing at $2,000 per ha	$660,000	$660,000	GHD study allocated $990,000 to land clearing based on 220ha at urban land clearing rate divided by 2
12 km of perimeter fencing at $3,500 per km	42,000	42,000	GHD study allocated $35,000 for 7km at $5,000/km
9 km of road upgrade at $70,000 per km	$630,000	$315,000	GHD study allocated $25,000 to road improvements
1000 sqm Shed at $300 per sq m	$300,000	$300,000	GHD study allocated $200,000
500 sqm Machinery Shed at $300 per sqm	$150,000	$150,000	GHD study allocated $100,000
Total	$2,032,000	$1,717,000	

NB: Adjusted rates for fencing, construction and road upgrades are based on discussions with pastoralists and others.

Table 16: Pivot Establishment Costs

	Per Unit	Total
Pivot Unit Cost	$151,000	$755,000
Pump Bore and Power Source	$105,000	$525,000
Installation Costs	$47,000	$235,000
Fuel Tank		$15,000
Total		$1,530,000
Additional Cost for Solar Array	$300,000	$1,500,000
Total		$ 3,030,000

Costs associated with establishing centre pivots have been based on those estimated by the GHD study, adjusted for the increased number of pivots being purchased (5 pivots instead of 3). While there maybe some expectation of reduced costs due to size difference (40ha instead of 60ha), experience with the test bore suggests that the cost of pumps is similar to that used by GHD, so costs were left unchanged.

The fertigation system cost was only applied to Option 1. Advice had been received that this might be an opportunity for a saving noting that more standard practice in the region is not to deploy fertigation systems and to apply fertiliser by machine. However, this was left in Option 1 due to the regular cutting of hay and regular application of fertiliser. It is noted that while the cost a fertiliser spreader is minimal, additional costs of labour may be required to apply fertiliser by means of a towed spreader.

Contingency on development costs have been adjusted to 10% (from GHD's 20%). It is noted that overall costs are still significantly higher than GHD's estimates.

Table 17: Machinery Costs

It should also be noted that while the estimates were provided in 2016, investigations online in 2019 did not identify any reason for approximate pricing changes, noting prices listed under the 2016 study relied on accessing near-new/second-hand purchases to manage costs.

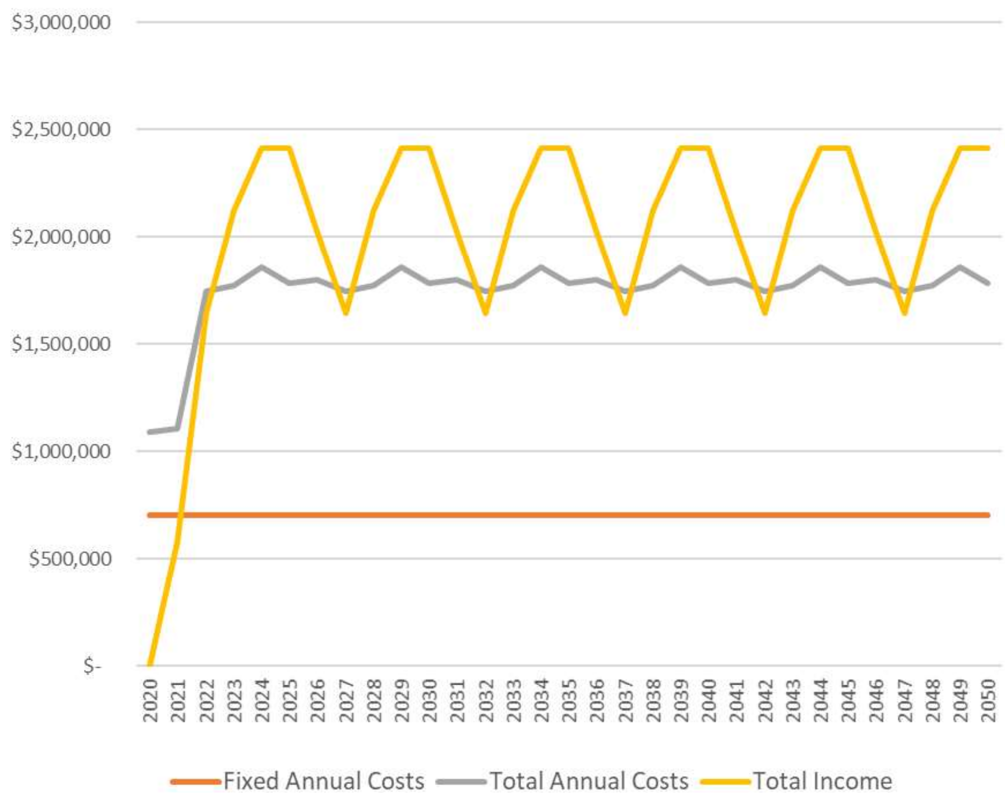
	Option 1	Option 2	Comments
Tractor approx. 140KW	$200,000	$200,000	AgVivo recommended 3 tractors of suitable horsepower
Tractor approx. 80KW	$110,000	$110,000	As above
Prime Mover and Trailers	$40,000	$40,000	
Utility	$120,000	$120,000	
Offset disc plough	$80,000	$80,000	
Harrow	$70,000	$70,000	
Planter combine Seeder	$50,000	$50,000	
Boom sprayer	$40,000	$40,000	
mower conditioner	$90,000	$90,000	
Hay rake	$50,000	$50,000	
Baler	$80,000	$80,000	AgVivo recommended large square baler
Bale wagon	$90,000	$90,000	
Other	$50,000	$50,000	
Tools	$50,000	$50,000	
Front End Loader (in addition to Tractor above)	-	$150,000	Additional capacity for silage, also recommended by AgVivo
Forage Harvester	-	$150,000	Additional capacity for silage
Forage Wagon and Silage Wrapper	-	$220,000	Additional capacity for silage
Fertiliser Spreader	-	$20,000	Recommended by AgVivo, note fertigation system under Option 1 but not under Option 2
Total	$1,120,000	$1,597,000	

Finding 29: Establishment costs have been estimated to be $6.6 million for Option 1 and $6.3 million for Option 2, which exceed the establishment costs estimated by GHD in 2016 by between 23% and 13% for Option 1 and 2 respectively.

Operational Costs

Option 1

Chart 11: Fixed Annual Costs, Total Annual Costs and Income (Option 1)



Operating costs for hay production were estimated consistent with the GHD study of 2016 with some minor adjustment for cost variations. Key variations are:

- Cut and bailing costs – which exceed GHD estimates because of increased regularity of cutting and baling
- Pumping costs adjusted for the new configuration with some adjustment for diesel price movements
- Crop establishment costs, which cover the cost of seed only (as labour and machinery is already included and will be substituted from hay making activities)
- Farm management costs which are considerably higher than GHD's estimate due to the challenges faced by local producers in attracting skilled management expertise.
- Administration costs (which were not included in the GHD study, covering insurances, accounting and rates and charges.
- No salvage value has been assessed, noting GHD included salvage values after 15 years. Instead straight-line depreciation rates of 12% and 7% have been applied to machinery and centre pivot assets respectively, resulting in higher costs estimates and no recovery of assets at the end of the 30-year life of the project.

The approach not to include salvage values is justified on two main bases being:

- the project is considered a long-term project with the cashflow estimates being over 30 years; and
- the risks associated with the project, including the general isolation affecting the Kimberley region, would mean that it there is considerable uncertainty related to the salvage value of equipment which could be stranded assets if the project was wound up (ether from a hypothetical end of life basis or in actuality).

Option 2

Variations have been applied to costs associated with Option 2 (when compared with Option 1) namely:

- Far less expense is applied to harvesting because there are only two cuts per annum.
- Fertiliser costs reflect the requirements of two crops therefore they exceed that for Option 1.
- Additional establishment costs for silage and hay making equipment are factored into Option 2.
- The fertigation system is removed from the configuration, noting a lower regularity of fertiliser application is required.
- There is no requirement for an all-weather road as is the case for the Rhodes Grass Option because fodder productions are concentrated to occur twice a year and will generally be in the dry season.

Option 2 can be brought into production within the first year. Revenues and costs are expected to be less variable, if seasonal factors do not impact on production. As a result, the expected outcome for production and costs are much simpler for Option 2

Chart 12: Predicted Nominal Cash Flow Option 2

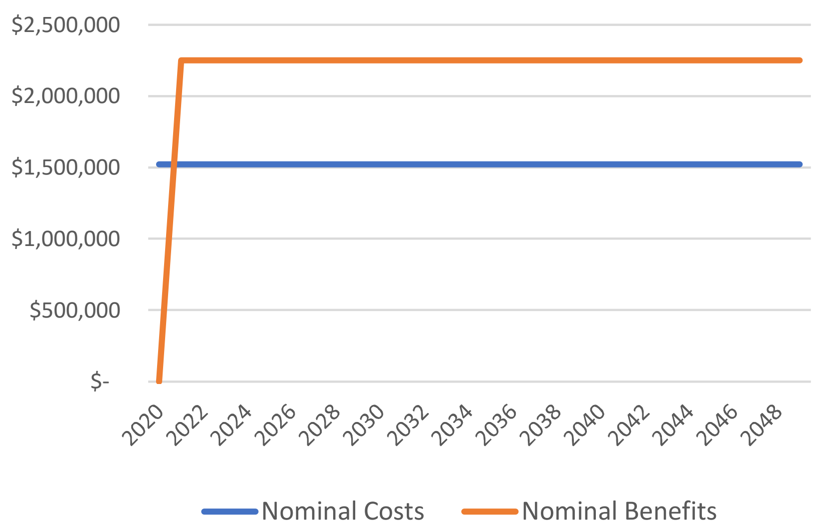


Table 18: Estimated Costs Associated with Rhodes Grass Hay Production- Each Year

Option 1	Year 1	Year 2	Year 3-5	Percentage
Fertiliser	$335,500	$389,100	$481,100	30%
Weed Spraying	$18,030	$18,030	$18,030	1%
Cut and Bale	$150,000	$200,000	$250,000	16%
Pumping	$406,134	$406,134	$406,134	26%
Crop Establishment Costs	$61,115	$0	$0	0%
Farm Management	$180,000	$180,000	$180,000	11%
General Labour	$160,000	$160,000	$160,000	10%
Vehicles	$36,000	$36,000	$36,000	2%
Administration	$60,000	$60,000	$60,000	4%
Annual Operating Costs	**$1,406,779**	**$1,449,264**	**$1,591,264**	**100%**

Fertiliser represents the highest operational costs (as a category) for the Rhodes Grass option, noting pumping is also a significant element to operational costs. Fertiliser costs are almost directly proportional to the amount of product, which is derived from the site, hence the increase in costs which are expected as the crop matures over its 5-year rotation. This is an element which can be managed closely with monitoring of soil nutrient levels, hay production and hay quality.

Table 19: Estimated Costs Associated with Cavalcade and Maize Rotation

Option 2	**Each Year**	**Percentage**
Fertiliser	$347,900	26%
Weed Spraying	$18,030	1%
Cut, Bale and Silage	$50,000	4%
Pumping	$406,134	31%
Crop Establishment Costs	$122,231	9%
Farm Management	$180,000	14%
General Labour	$100,000	8%
Vehicles	$36,000	3%
Administration	$60,000	5%
Annual Operating Costs	**$1,320,295**	**100%**

As with Option 1, fertiliser and pumping costs represents the highest operational costs (by category) for an annual crop rotation. Crop establishment costs (in the form of seed – ex machinery costs), while minor are an annual outlay in Option 2. General labour costs have been estimated to be lower (compared to Option 1) due to the lower regularity of harvesting.

Finding 30: Annual Operating Costs are estimated to be between $1.6million and $1.3million with the largest components being fertiliser (approximately 30%) and pumping costs (approximately 25%).

Net Present Value Outcomes

Table 20: Estimated Net Present Value and other Results of Option 1 and 2

Parameter	Option 1	Option 2
IRR	0.7%	11.1%
BCR	0.45	1.7
NPV	-$3,542,902	$4,575,499
Average Annual Gross Margin ex establishment costs (Nominal)	$326,522	$720,372
Average Annual Cost ex establishment costs (Nominal)	$1,746,784	$1,597,628
Average Annual Income (Nominal)	$2,009,903	$2,180,000
Establishment Costs (Nominal)	$6,582,360	$6,394,293
Tonnes Produced (Rhodes Grass Hay)	5,934	
Tonnes Produced (Cavalcade Hay)		1,200
Tonnes Produced (Maize Silage)		8,000

Finding 31: Option 2 would appear to provide the strongest return with an expected IRR of 11% however, this would need to be considered against the potential risks associated with the annual cropping system and the challenges selling the significant volume to silage Option 2 brings into the market.

Finding 32: Option 1 has an expected IRR of 1%, which does not break-even on a discount rate of 5% meaning this option will not be profitable unless some or all of the establishment costs are grant funded. Even with this relatively lower IRR, there are significant risks associated with the market.

Table 21: Key Parameters for Option 1 and Option 2 with Estimates

Key Parameters of Option 1 and Option 2	Option 1	Option 2
Average Tonnes Produced	5,934	9,400
Average Tonnes Per Hectare	29.7	46
Average Price $/tonne (Hay)	$350	$350
Average Price $/tonne (Silage		$220
Average Annual Gross Margin ex establishment costs (Nominal)	$326,522	$720,372
Average Annual Cost ex establishment costs (Nominal)	$1,746,784	$1,597,628
Average Annual Income (Nominal)	$2,009,903	$2,180,000
Establishment Costs (Nominal)	$6,582,360	$6,394,293
Land preparation and infrastructure	$2,032,000	$1,717,000
Bore construction and development	$642,667	$642,667
Supply and installation of pivots and pumps	$1,530,000	$1,530,000
Supply and installation of fertigation system	$347,300	$0
Contingency of Development Costs (10%)	$455,197	$388,967
Professional Fees (10%)	$455,197	$388,967
Machinery Setup Costs	$1,120,000	$1,530,000
Average Annual Manager Cost	$180,000	$180,000
Average Annual Labour (non-management) Cost	$160,000	$100,000
Average Annual Admin Costs (Insurances, Accounting, Record Keeping)	$60,000	$60,000
Depreciation on Machinery ($/annum)	$134,400	$134,400
Depreciation on Centre Pivot ($/annum)	$131,411	$131,411

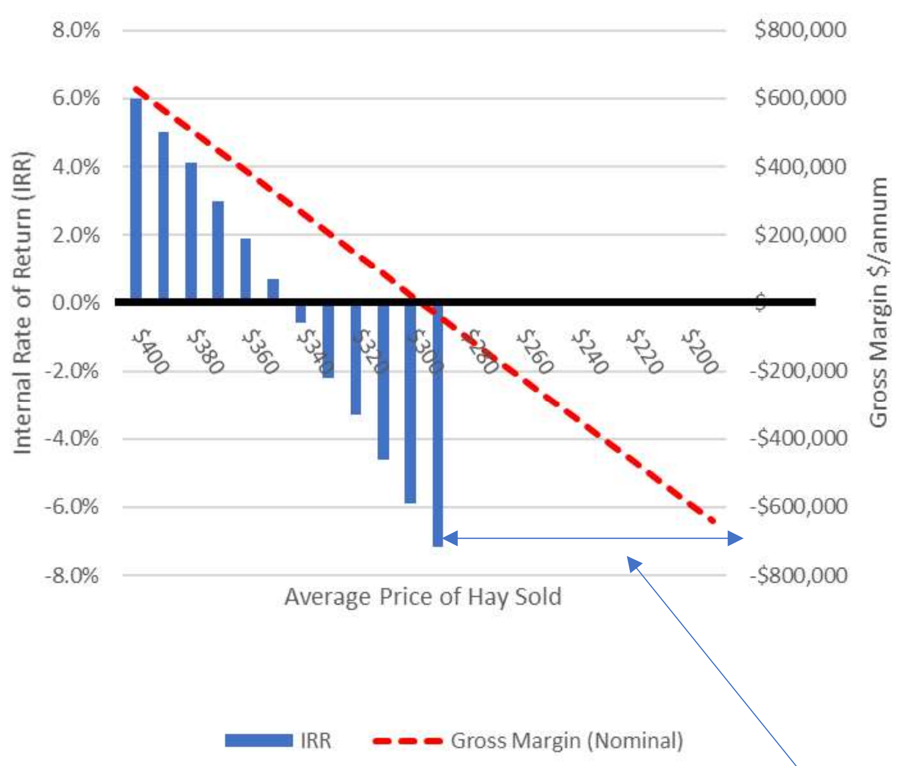
Finding 33: There are variations in the key parameters of Option 1 and 2 with major differences being the volume of product produced and average prices/tonne. Minor differences in establishment costs and machinery setup costs impact on the estimated IRR.

Sensitivity Analysis

Key factors will affect the financial results of the project and should be reviewed more closely at the establishment phase and during the life of the project in order to monitor and improve the financial outcome of the project. The most important for both options is the average price received for fodder

For Option 1, the break-even rate to cover all establishment costs (at a 5% discount rate) is $390 per tonne, well above current prices. If establishment costs are excluded, the project should be able to have a positive gross margin provided the average price does not go below $296 per tonne.

Chart 13: Sensitivity Analysis to Price Received for Rhodes Grass Hay (Option 1)



-IRR not calculable/relevant

This IRR outcome is improved if road construction costs are reduced by half ($35,000 per km for Option 1 and $17,500 per km for Option 2). The outcome is improved further if solar-diesel pump systems can be installed for an additional $300,000 per unit and this results in a 60% reduction in fuel costs. Option 1 is most impacted by the installation of solar pumps due to the higher water use of Option 1. The IRR for Option 2 is estimated to be reduced if solar pumps are installed at a cost of $300,000 per unit although the IRR is highest if the capex cost for solar is covered by grant funding.   Further improvements to the financial outcome can be achieved if the solar-diesel pumps can be installed using grant funding.

For Option 2, the break-even rate to cover all establishment costs (at a 5% discount rate) is $300 per tonne for Cavalcade hay and $189 per tonne for silage (86% of assumed prices). These prices could be achievable provided all product was sold at the average prices paid for by the RED. The following chart demonstrates the estimated sensitivity to price fluctuations for Option 2.

Chart 14: Sensitivity Analysis of Price Received for Maize Silage (Option 2)

Table 22: Improved Outcome if Road Costs are Reduced (assumed halving) and Solar-diesel Pumps are introduced

	Option 1				**Option 2**			
	IRR	**BCR**	**NPV ($m)**	**Gross Margin $/yr.**	**IRR**	**BCR**	**NPV ($m)**	**Gross Margin $/yr.**
Baseline Assumptions	0.7%	0.46	-$3.44	$326,000	11.1%	1.7	$4.36	$710,372
Halve Road Construction Costs	1.0%	0.49	-$3.01	$326,522	11.5%	1.8	$4.72	$710,372
Introduce Solar Power and Halve Road Construction Costs	2.1%	0.63	-$2.87	$465,202	9.5%	1.5	$5.77	$779,166
Introduce Solar Power with Grant Funding and Halve Road Construction Costs	5.5%	1.09	$0.48	$570,202	14.8%	2.2	$7.39	$884,166

Table 17 shows that if road construction costs can be halved and pumping costs can be reduced to 20% of their existing level (a proxy for implementing solar systems) and the solar system is included at no cost, then IRR increases to almost 6% for Option 1 and 10% for Option 2.

PART 5: STRENGTHS WEAKNESS OPPORTUNITIES AND THREATS

The following summarises the strengths weaknesses, opportunities and threats (SWOT) associated with the project. This forms the basis of further discussion around risk and establishing mitigation strategies, which are important to consider in any decision making as well as informing Key Performance Indicators.

Strengths

Whilst the project has the potential to provide positive financial outcomes for NBY and it is acknowledged comes with some risks, a key benefit is to enable NBY to strategically position itself as a diversified producer of irrigated crops into the future. At 200 hectares, the development represents one of the largest of its kind in the immediate area around Broome, therefore providing an ideal location for further research into tropical agriculture in the region.

In summary, the project will:

- create of a viable fodder production unit to supplement NBY income;
- aligned to the strategic opportunities in the Kimberley, noting the importance of Broome as a potential location to value add to the cattle industry and as a key export centre;
- position NBY as a leader in the establishment of a Western Australian Tropical Agriculture Unit in the North
- create a diversification opportunity which would provide a basis for further research and development;
- de-risk pastoral and export depot operations with greater access to locally grown fodder;
- create the opportunity of capacity development among Yawuru people through training, employment and development opportunities; and
- add value to NBY's land holdings at Roebuck Plains providing an opportunity for expansion into other crops such as vegetables if these prove to be viable and infrastructure is developed in the region.

Importantly for the project:

- environmental, cultural and water resource management issues have been resolved;
- there is little risk in the technical viability of the development; and
- financial returns can be de-risked if some or all of the capital for the development could be sourced from grant funding, noting the operation should provide positive gross margins once established.

The latter point is important within the context of the infancy of the fodder industry across the Kimberley, noting that there are other producers in the region who are focussed on their own commercial interests, but an NBY development so closely located to Broome could provide a base for a broader research and extension program. This would have a broader public interest both for Aboriginal agricultural enterprises (some of which will be linked to the expansion of irrigated agriculture in the Fitzroy Valley) and the broader farming community in the region.

Weaknesses

Fodder production requires considerable investment which comes at risk. The development proposed is going to require approximately $6.5 million in capital investment and a further $2 million facility to cover operational losses during the establishment phase. This could, without further support, create some vulnerability within the NBY Ltd entity, particularly if there are unforeseen delays in development, excessive costs, or if market targets are not reached in the early stages of the project.

Some specific weaknesses are that:

- NBY is not a vertically integrated cattle production operation, meaning it will need to rely entirely on the sale of product into a competitive market, notwithstanding the relationship it has with the ILSC and the RED.
- The RED has a limited use for lower quality fodder and will rely on this development providing high quality forage if the project is to provide an offset for any of the oaten hay currently used;
- Fodder quality poses a challenge in the north noting there are alternative species to Rhodes Grass, but they are generally annual species and their productions systems are more complex.
- NBY has no experience in the development and operation of fodder production system so will rely on the quality of the manager who is hired to do the job.

Opportunities

The project, if established, would create opportunities into the future. Most importantly it would

- Place NBY in a strong position to play a leading in the area of research and development into irrigated agriculture which may tie into the development of the Western Australia Tropical Agriculture Research Institute.
- Create opportunities to diversify into other crops, noting market conditions are changing constantly and developments in the logistics supply chain (for example airfreight from either Broome airport or Derby's Curtin airbase which is being developed for freight) could create new opportunities for projects like this one.
- Assist in the development of expertise in agriculture noting NBY does not directly involve itself in any agricultural operations at this stage.

The project would be an important asset for NBY noting:

- The project viability would potentially be improved if NBY took more direct control over the management of Roebuck Plains Station or the RED at some point into the future.

The project would provide benefits to NBY even if it chose to take a more passive approach and outsource the project to a third party.

Putting aside the obvious benefits if the project is profitable, the project would play an important role in positioning NBY as a major player in the agricultural sector, aligned to its strategic location near the Port of Broome, the Broome airport and the main road north and south.

Threats

The key threats are summarised as i) market threats and ii) production threats. These issues have been discussed in detail throughout the report.

In addition to these, the geographical location of the project impacts on its access to low cost energy given it is too far from the Horizon Power grid. It is noted that at least one of the competitors to this project has the benefit of mains power at a much lower cost per KWhr. While the operation is technically sound and high-quality product can be produced, longer term market prices for hay appear to be below the break-even level for Option 1.

This issue will need to be managed tightly within the context of Key Performance Indicators and opportunities for savings will need to be identified to offset any market softness.

The usual list of threats to agriculture include weather conditions and threats from pests and diseases. These threats apply to this project. With proper management these threats should not impact in any long-term way, noting the site is free draining, elevated from the flood plain and somewhat isolated from other irrigation areas, providing some biosecurity benefits.

Some contingency will need to be made for access to the site which could be cut off for up to one month through heavy rains and the resultant flooding on the Roebuck Plains. This would not necessarily pose a problem if the crop had been cut and hay made prior to a major rainfall event as the ideal rotation of Rhodes Grass at that time of the year is about 25 days. Similarly, it would be advisable to have a sufficient area of hardstand storage for excess product if it accumulated during road closures.

However, poor timing and extended delays getting onto the site will impact on the quality of the hay noting extending the rotation over this period will simply result in lower quality, but not impact dry matter yield. The feasibility study has incorporated an additional $50,000 for hardstand for hay storage both as a mitigation against rainfall events closing access to the site and to ensure there is some flexibility with fodder storage between the peaks and troughs of seasonal market demand.

Annual crops shouldn't be as affected by rainfall related access isolating events as the harvest of Cavalcade would more than likely occur in March or April when larger rainfall events are less likely.

Risks

A number of key risks area identified in both the weaknesses and threats section of the SWOT analysis over page. Table 20 lists the key risks for both options with an explanation of those risks provided.

Table 21 (over page) outlines key mitigations for those risks.

Table 23: Subjective Risk Profiles of Options 1 and 2

Issue	Option 1	Option 2	Mitigations (Summarised)
Market risks (Whether Product Supply Matches Demand) and price	High Risk	High Risk	Negotiations with customers. Alternative supply arrangements to the RED.
Dry matter production	Low Risk	Low Risk	Need sound expertise, knowledge of agronomy.
Reliability of fodder quality	Moderate to High Risk	Moderate Risk	Expertise, fertiliser, regularity of harvest (for Rhodes Grass)
Market risks (Whether Product is Fit for Purpose)	Moderate to High Risk	Moderate Risk	As above, plus monitoring of feed quality, marketing, negotiations with customers, longer term supply contracts.
Management Risks (Right Person for Role)	Moderate Risk	Moderate Risk	Selection of suitable manager, remuneration of manager.
Cost Profile	Moderate Risk	Moderate Risk	Need sound management with KPIs and identifiable cost reduction strategies.
Inter-Seasonal Risks (Crop Reliability)	Low Risk	Moderate Risk	Need sound management with sufficient capital to withstand seasonal fluctuations.
Likely financial outcomes	High Risk	Moderate - High Risk	Risk mitigation including potential solar pumps, grant funding longer term supply contracts.

Mitigations

Mitigations need to be built into the operational management of the project in order to ensure the operation is profitable, noting relatively poor predicted financial performance of the project (at least for Option 1) in its current configuration. Mitigations are:

- The quality of product is meeting the specific needs of the RED and other potential clients regarding digestibility and protein content;
- The challenges around managing complex crop rotations if the system is to adopt to annual crops per annum instead of a Rhodes Grass will need to be clearly understood in the delivery of the project.
- Technology and how it can reduce costs, (eg the solar pump example).
- Alternative markets over and above the RED
- The source of capital funding for the project, noting there is a strong case for grant funding for part of the project outlay given the impact it will have on NBY, the region and the development of new opportunities in agriculture.
- How outsourcing risk to a third party, through a sublease arrangement, might enable NBY to observe the development while having guaranteed (or something close to guaranteed) revenue stream with no capital outlay.

Table 24: Key Risks and Mitigations

Issue	Mitigations
Dry matter production	• Appropriate fertiliser rates are applied • If annual crop rotation, include summer legume • Appropriate irrigation rates applied • Appropriate agronomy skills of manager.
Reliability of fodder quality	• Regular cutting of Rhodes Grass • Use of high energy crop in annual rotation (Maize and Cavalcade) • High use of nitrogen-based fertiliser • Appropriate agronomy skills of manager
Market risks (Whether Product is Fit for Purpose)	• Ensure regular quality testing of fodder • Work with customers to ensure product meets and even exceeds requirements and the quality of the competition.
Market risks (Whether Product Supply Matches Demand)	• Develop longer term contracts for supply from the RED and other customers • Create new markets either locally or further afield
Management Risks (Right Person for Role)	• Appropriate wages and conditions to attract skilled personnel • Appropriate incentives for manager to stay on if succeeding.
Cost Profile	• Manage against performance indicators • Regular engagement with other growers and the Department of Primary Industries and Regional Development to develop skills
Inter-Seasonal Risks (Crop Reliability)	• Ensure there is sufficient working capital to manage seasonal fluctuations
Likely financial outcomes	• Understand the financial implications of decisions and performance. • Develop a comprehensive Gross Margins forecasting tool to be utilised by the manager. • Possible outsourcing to third party through sublease.

Finding 34: There are a number of risks which need to be understood and managed if the project is to proceed and a clear mitigation strategy should be in place which can be assessed against Key Performance Indicators.

PART 6: THE FIRST FIVE YEARS

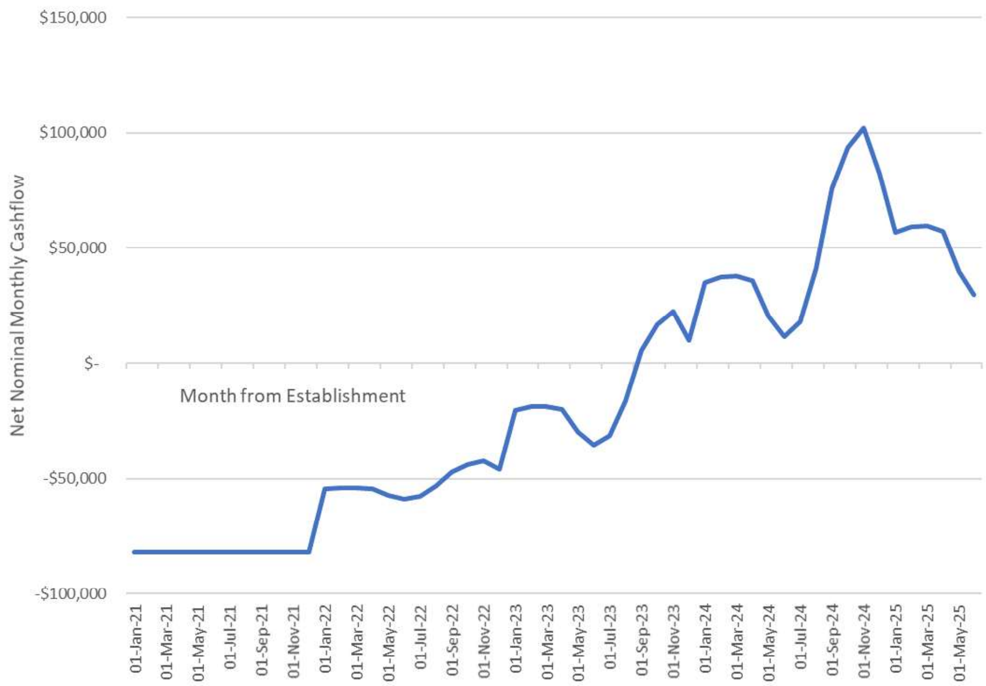
Cashflows

The brief of the report has been expanded at the request of the NBY Chief Financial Officer, noting the marginal nature of returns for Option 1 in particular. A greater understanding is required about possible cashflows over the establishment phase, particularly if a Rhode Grass option is adopted.

This was derived by examining the roll out of firstly two centre pivots and then a further three centre pivots in the second year of the project with corresponding estimates based on monthly yields reflecting seasonality. It has been assumed the project would commence on 1 January 2021. The following nominal cashflow is presented for Option 1 (Rhodes Grass Hay), noting it does not include debt servicing costs or establishment costs.

A baseline in expenditure (mostly making up of fixed costs) is about $92,000 per month[5]. These costs apply regardless of production levels, noting management and staff would be involved in the establishment of the system and cropping regime for approximately a year before production was forthcoming. This would be exacerbated by any delays in construction (noting these figures are based on a crop being harvested 12 months out from the commencement of construction and phased in with two pivots in Year 1 and three pivots in Year 2).

Chart 15: Revenue Stream from Project After Commencement (Option 1)



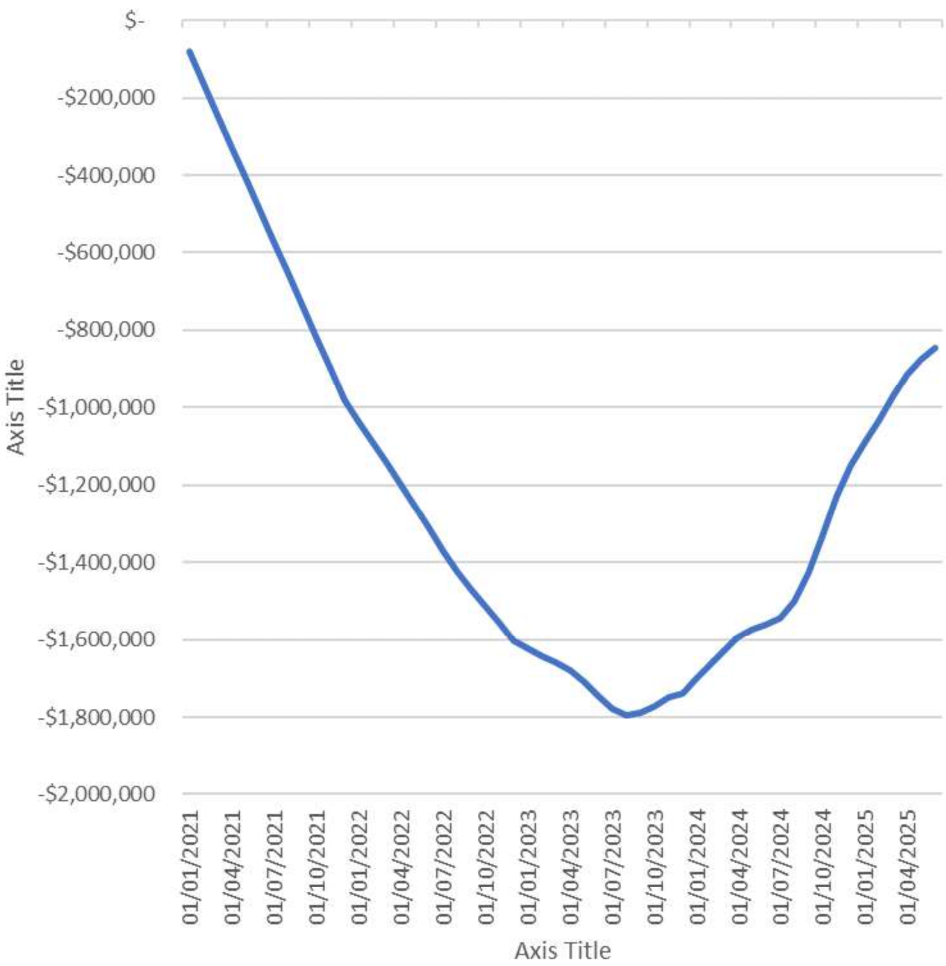
[5] A table of projected monthly cashflows which underpin Figure 17 is presented in Appendix 3

Peak Debt

On the basis of the estimated cashflow, a debt servicing provision will be required for at least the first five years (this does not include any debts accrued related to establishment costs or debt servicing).

This estimated peak operational debt of almost $2million and this would need to be funded from a short-term source (for example, line of credit or other) with the balance diminishing over time as the crop was fully established.

Chart 16: Operational Debt Levels Based on Cumulative Gross Margins



Management of these operational debts would need to be rigorous to ensure the project's success, by paying close attention to when key personnel are hired and when key capital purchases are made. Any delays in sales, beyond the first twelve months of operations will only compound the estimated loss period outlined above.

Finding 35: Operational losses will likely occur in the first three years of operation and there should be sufficient working capital available to cover these expected losses.

APPENDIX 1 – SUGGESTED KEY PERFORMANCE INDICATORS

Table 25: KPI Tables with Subjective Ranges

Suggested KPI	Purpose	Comment
Average hay price ($/tonne)	Monitor the value of product into the marketplace	Either higher production or additional savings are necessary if prices are to fall in current market range. This KPI should be reviewed prior to implementation if Option 1 adopted depending on how project is funded and other factors affecting rate of return as current model estimates do not break even based on a 5% discount rate.
Average silage price ($/tonne)	Monitor the value of product into the marketplace	
% of fodder sold	Ensure product is fit-for-purpose for the RED and acts as a substitute to oaten hay. Also ensure surplus feed is sold.	All fodder must be sold.
Crude Protein	Crude Protein rates must be equivalent to alternative high-quality foods	Crude protein rates of 9% or more are achievable provided Rhodes Grass is cut regularly, appropriate fertiliser rates are applied and or the use of tropical legumes such as Cavalcade in an annual crop rotation. Higher rates will enhance reputation of the project as a favoured supplier
Digestibility	Digestibility is an essential part of the fodder quality equation.	Similar to P4
Annual Production Option 1 (tonnes of hay per annum)	Ensure business is viable by achieving production targets	
Annual Production Option 2 (tonnes of silage per annum)	Ensure business is viable by achieving production targets	
Operational Costs	Savings should be identified once the project is operational in order to fine tune the system and obtain the highest possible Gross Margin	It would appear there are opportunities to make savings around water usage and fertiliser use once the system is fine tuned through operational experience.

Suggested KPI	Purpose	Comment
Total Establishment Costs	To ensure project can be delivered at or below estimated costs	Any savings will improve the IRR on the project including not utilising contingency provision and savings on specific purchases or development.
Costs Road Construction Costs	It may be possible to not invest as much in the road particularly if annual winter crops are the main crop	The objective is to effectively all-weather the road into the site. Drainage costs are likely to be minimal, but costs associated with road base need to be managed.
Costs Accommodation – Sheds-Fencing	The implementation of this project will need to ensure as many savings are possible in order to reduce contingency costs and make additional savings.	Any improvement to the estimated outlays will impact positively on the rate of return.
Machinery Establishment Costs	Ensure purchases are within the parameters outlined in this report.	Some second hand machinery may be required, while considering the importance of reliability in the remote Kimberley region.
Annual Pumping Costs ($/annum)	Savings in this area will impact significantly and these can be achieved by efficient scheduling of irrigation or the implementation of solar-diesel systems	Pumping costs make up a significant proportion of the operating costs and represents a significant disadvantage to competitors in the immediate region who either have access to mains power or naturally pressurised water sources.
Fertiliser Costs ($/annum)	Fertiliser is a key component to ensuring the quality and quantity of product produced. However, it also represents the largest single component of cost.	Agronomic management which achieves outcomes while identifying savings will be critical to the success of the project.
Management/Labour Costs ($/annum)	While management and labour costs form a relatively inflexible component of the project, the right personnel will make a considerable difference to outcomes.	Consideration might be given to a base rate with bonuses for profitability to attract right manager

APPENDIX 2 TABLE OUTLINING HOW PROJECT MEETS REQUIREMENTS

Criteria	Summary of Outcomes	Further Comment
Economic and financial projections.	Details are outlined in the report, noting the project can provide a positive Net Present Value under certain circumstances	Consideration should be given to the development of an annual cropping regime assessed alongside the originally proposed Rhodes Grass option.
Description and details (estimated numbers) of employment outcomes.	The project is likely to require the employment of a manager and two labourers who will be either full time or close to full time.	The development of capacity and experience in the field of irrigated agriculture could enable further development into the future
Detailed analysis of the potential scope for the project to lead to diversification and access to commercial markets outside of the vertical integration model the project currently intends to operate within.	Whilst the intention was to operate within a vertically integrated model, the RED is indicated it would require NBY to sell it fodder in a competitive market.	The strategic objective is to become vertically integrated. At this stage, the irrigation project represents a first step into direct involvement in the agricultural setting linking into other NBY partners, particularly the ILSC.
Available options for project expansion, as an enabling project to unlock further economic development opportunities	An annual crop rotation is considered and demonstrates it could provide higher rates of return.	In establishing a presence in irrigated agriculture, NBY will unlock further potential associated with a range of tropical crops which rely on irrigation.
Advice of how this project may contribute to NBY's long term capacity and sustainability.	NBY will be able to take advantage of vertically integrated opportunities if it takes direct control over its Roebuck Plains Station and RED in the future.	Fodder production provides a strategic vehicle for The development of technology that reduces the cost of energy (solar powered pumps) could represent an opportunity for improvements to the cost of inputs while improving sustainability.

Criteria	Summary of Outcomes	Further Comment
That the impact of the project on country and the Roebuck Plains environmental management has been carefully considered	A Flora and Fauna Study has been conducted noting that no impacts on species of interest	
Description of how this Project will economically benefit Yawuru peoples, and how it will fit within the NBY's broader strategic plans for economic development; and	The project could provide future job and skills development opportunities within the strategic agricultural framework.	
The obligations, commitments and aspirations of NBY as they represent and serve the Yawuru People.	Yawuru buru means the whole of Yawuru country, land and sea, shared by all Yawuru people as well as particular places that a person is associated with. Yawuru people are connected to country and their use and occupation of the seas and land on Yawuru Country – is fundamental to who they are. The development of agriculture fits well with their knowledge of country and as such they represent the best custodians of development.	Yawuru are developing the technical capacity to record our knowledge of our Country and map it in geo-spatial form. The maps will combine Yawuru cultural and historical occupation and use knowledge with western scientific data so that Yawuru are in a position to assess the impacts – both positive and negative – of current and proposed use of our Country. In this way Yawuru can more effectively engage themselves or with third party developers and plan a long-term Yawuru land and sea management regime for Yawuru Country.

APPENDIX 3 TABLE OF MONTHLY CASHFLOWS AT ESTABLISHMENT (OPTION 1)

	Costs	Revenue	Net Cashflow	Accumulated Operational Debts
01-Jan-21	-$90,844	$0	-$90,844	-$90,844
01-Feb-21	-$90,844	$0	-$90,844	-$181,687
01-Mar-21	-$90,844	$0	-$90,844	-$272,531
01-Apr-21	-$90,844	$0	-$90,844	-$363,374
01-May-21	-$90,844	$0	-$90,844	-$454,218
01-Jun-21	-$90,844	$0	-$90,844	-$545,061
01-Jul-21	-$90,844	$0	-$90,844	-$635,905
01-Aug-21	-$90,844	$0	-$90,844	-$726,749
01-Sep-21	-$90,844	$0	-$90,844	-$817,592
01-Oct-21	-$90,844	$0	-$90,844	-$908,436
01-Nov-21	-$90,844	$0	-$90,844	-$999,279
01-Dec-21	-$90,844	$0	-$90,844	-$1,090,123
01-Jan-22	-$92,260	$44,335	-$47,925	-$1,138,047
01-Feb-22	-$92,260	$44,953	-$47,307	-$1,185,354
01-Mar-22	-$92,260	$45,107	-$47,152	-$1,232,506
01-Apr-22	-$92,260	$44,490	-$47,770	-$1,280,277
01-May-22	-$92,260	$40,164	-$52,096	-$1,332,372
01-Jun-22	-$92,260	$37,693	-$54,567	-$1,386,939
01-Jul-22	-$92,260	$39,546	-$52,713	-$1,439,653
01-Aug-22	-$92,260	$46,034	-$46,225	-$1,485,878
01-Sep-22	-$92,260	$55,766	-$36,493	-$1,522,371
01-Oct-22	-$92,260	$60,710	-$31,550	-$1,553,921
01-Nov-22	-$92,260	$63,181	-$29,078	-$1,583,000
01-Dec-22	-$92,260	$57,620	-$34,640	-$1,617,639
01-Jan-23	-$145,532	$125,616	-$19,916	-$1,637,555
01-Feb-23	-$145,532	$127,367	-$18,165	-$1,655,721
01-Mar-23	-$145,532	$127,804	-$17,728	-$1,673,448
01-Apr-23	-$145,532	$126,054	-$19,478	-$1,692,926
01-May-23	-$145,532	$113,799	-$31,734	-$1,724,660
01-Jun-23	-$145,532	$106,796	-$38,737	-$1,763,396
01-Jul-23	-$145,532	$112,048	-$33,484	-$1,796,881
01-Aug-23	-$145,532	$130,431	-$15,101	-$1,811,982
01-Sep-23	-$145,532	$158,005	$12,473	-$1,799,509
01-Oct-23	-$145,532	$172,011	$26,479	-$1,773,031
01-Nov-23	-$145,532	$179,014	$33,482	-$1,739,549
01-Dec-23	-$145,532	$163,257	$17,725	-$1,721,824
01-Jan-24	-$147,656	$162,562	$14,906	-$1,706,918
01-Feb-24	-$147,656	$164,828	$17,171	-$1,689,747
01-Mar-24	-$147,656	$165,394	$17,738	-$1,672,009
01-Apr-24	-$147,656	$163,128	$15,472	-$1,656,537
01-May-24	-$147,656	$147,269	-$388	-$1,656,924

	Costs	Revenue	Net Cashflow	Accumulated Operational Debts
01-Jun-24	-$147,656	$138,206	-$9,450	-$1,666,375
01-Jul-24	-$147,656	$145,003	-$2,653	-$1,669,028
01-Aug-24	-$147,656	$168,793	$21,136	-$1,647,892
01-Sep-24	-$147,656	$204,477	$56,821	-$1,591,071
01-Oct-24	-$147,656	$222,602	$74,946	-$1,516,125
01-Nov-24	-$147,656	$231,665	$84,009	-$1,432,116
01-Dec-24	-$147,656	$211,274	$63,618	-$1,368,499
01-Jan-25	-$147,656	$184,729	$37,073	-$1,331,425
01-Feb-25	-$147,656	$187,304	$39,648	-$1,291,778
01-Mar-25	-$147,656	$187,948	$40,292	-$1,251,486
01-Apr-25	-$147,656	$185,373	$37,717	-$1,213,769
01-May-25	-$147,656	$167,351	$19,694	-$1,194,075
01-Jun-25	-$147,656	$157,052	$9,396	-$1,184,679

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