



South Australian Centre for Economic Studies

Illustrating the financial comparison of alternative SEB offset options

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1. Introduction

The Native Vegetation Regulations 2017 (the Regulations) came into effect on 1 July 2017. The Regulations permit clearance of native vegetation under certain instances subject to a Significant Environmental Benefit (SEB) offset being implemented.

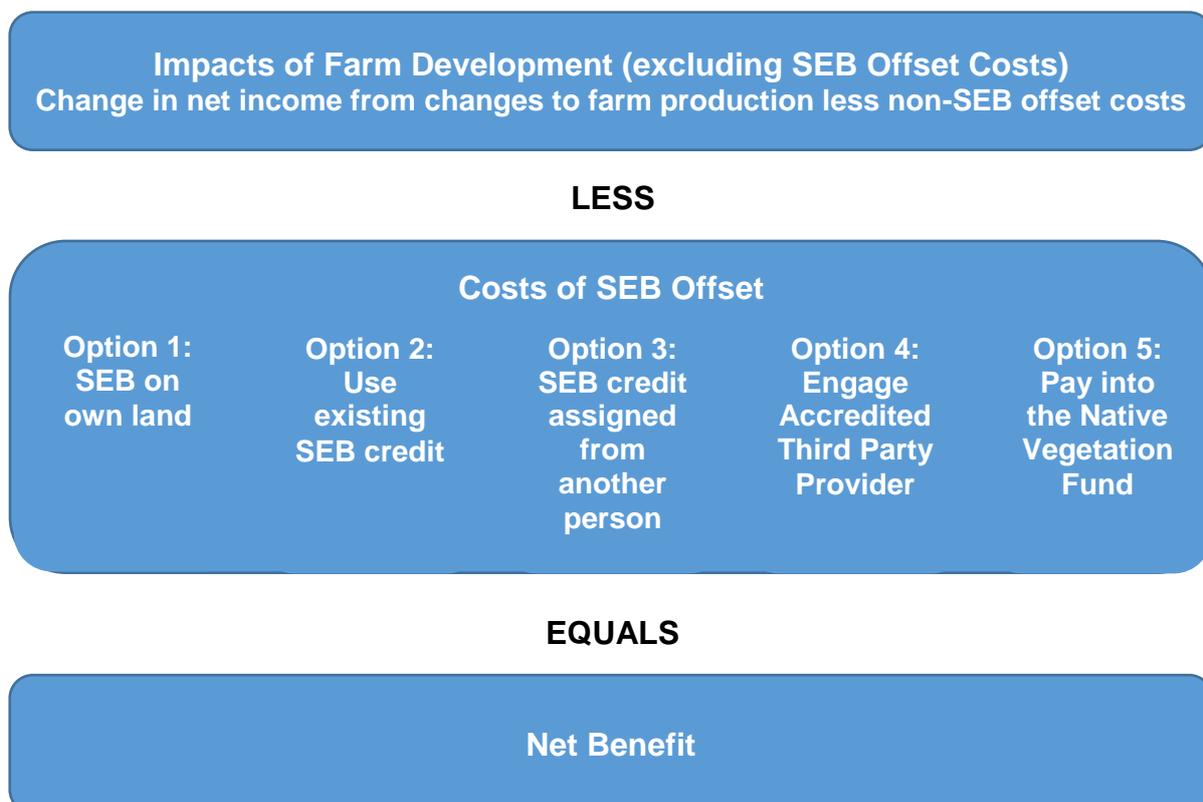
There is a range of options available to landholders to implement an SEB offset. Most of them involve managing, protecting and potentially improving an area of native vegetation. There is also a last resort option of making a payment into the Native Vegetation Fund.

Farmers are active land managers who take many decisions to promote the productivity and sustainability of their land. The issue of clearance of single trees is complex and landholders have many reasons for wishing to remove some trees from arable land (refer to section 4. Results of the Financial Analysis). They draw on their own local knowledge and experience, supplemented with external advice, to make judgements about what the best management strategies are. The SEB Offset arrangements are designed to influence landholders' land management and usage decisions to ensure that ecosystem and environmental attributes at the regional level are not eroded.

The *Commissioner for Kangaroo Island Act 2014* enables the Commissioner to form Local Advisory Boards to provide advice to the Commissioner on a matter and the Commissioner formed the Local Advisory Board for Native Vegetation Management on Kangaroo Island. The Advisory Board asked for an illustrative study of how a business decision regarding the clearance of native vegetation could be approached, and the SA Centre for Economic Studies (SACES) has been engaged to prepare it. The study demonstrates the financial evaluation of alternative options to achieve the SEB offset that is required for a development scenario. The development scenario and SEB Offset scenarios have been chosen with input from the Advisory Board, the Native Vegetation Branch of the Department for Environment and Water, and the Department of Primary Industries and Regions, South Australia (PIRSA).

The model to analyse the business decision is a cash flow analysis conducted over a 25 year period. It takes into account the hypothetical costs and benefits incurred by the farm business over this period. The structure of the financial analysis is summarised in Figure 1. The benefit of the development scenario is the boost to farm income flowing from the land clearance and new activity. Against this is the cost of securing a suitable SEB offset and 5 Options for this are considered.

Figure 1: Structure of the Financial Analysis



The remainder of the report is organised as follows. Section 2 summarises the hypothetical development scenario considered in the analysis and the range of SEB offset options considered. Section 3 summarises the methodology and assumptions that underpin the analysis. And section 4 presents the results of the analysis.

The data provided here are purely illustrative and are included for the purposes of demonstrating how a financial evaluation of a development and associated offset options can be carried out. The data should not be construed as predictions or forecasts of the costs or benefits that would arise in a real-world development decision. Any person performing a financial evaluation of a real-world development scenario will need to secure their own information.

2. Scenario and SEB Offset Options

Development Scenario

The hypothetical scenario considered in this report has been developed by the Native Vegetation Branch, PIRSA and the Local Advisory Board for Native Vegetation Management (LAB) on Kangaroo Island. The scenario comprises the conversion of grazing land to cropping land for a property located in the Hundred of MacGillivray, which is located on the south coast of Kangaroo Island.

The native vegetation clearance scenario involves the removal of 20 trees in a 40 hectare (ha) paddock. 10 *Eucalyptus diversifolia* (soap mallee) trees of moderate health and 10 *Eucalyptus leucoxyton* (blue gum) trees of excellent health are removed. The health of the trees is an important factor in determining the biodiversity value of the native vegetation cleared, and consequently the biodiversity value of the SEB offset required.

The type of cropping activity undertaken on the cleared land is assumed to comprise a wheat-bean-canola rotation.

Offset Options

Five different options for achieving a SEB offset have been considered in the analysis, which comprise:

- Option 1 – Establishing a new SEB area on land the farmer owns or on land under their care and control;
- Option 2 – Apply to use SEB Credit that the farmer has previously established;
- Option 3 – Apply to have SEB Credit assigned from another person or body;
- Option 4 – Engage an Accredited Third Party Provider to find and deliver a SEB on their behalf; and
- Option 5 – Pay into the Native Vegetation Fund.

The first four options require the establishment on an “on-ground” SEB area which requires managing, protecting and potentially improving an area of native vegetation. Box 1 gives an example. The differences between the four SEB establishment options relate to who owns and manages the on-ground SEB area and whether it is pre-existing or needs to be established. The options provide flexibility in how an on ground SEB area is put in place.

The fifth offset option—paying into the Native Vegetation Fund—is a last resort which is available only if the landowner is unable to access any of the first four offset mechanisms. The funds paid into the Fund will then be used by the Native Vegetation Council (NVC) to establish, regenerate and maintain native vegetation on land in the same region as the proposed clearance.

In practice a landowner may find that not all of the listed offset options are available to him/her. For example, a farmer may not have sufficient suitable land to establish their own SEB area. Identifying suitable land for an SEB is complicated by a range of matching requirements. For example, an SEB offset area must be of the same vegetation type or better; be located as close as practical to the site of impact; must directly improve the condition, protection and/or extent of native vegetation; and must be “additional” in the sense the land is not already protected and managed for conservation purposes (DEWNR 2016). These requirements limit the range of SEB offset options available to a farmer.

Further details regarding the requirements around SEB offset options are in the report *Policy for a Significant Environmental Benefit* (DEWNR 2016).

Box 1: Example of an SEB area

Project Site – Kangaroo Island

Rainfall: 500 – 750 mm

Proposed activity - converting grazing land to cropping.

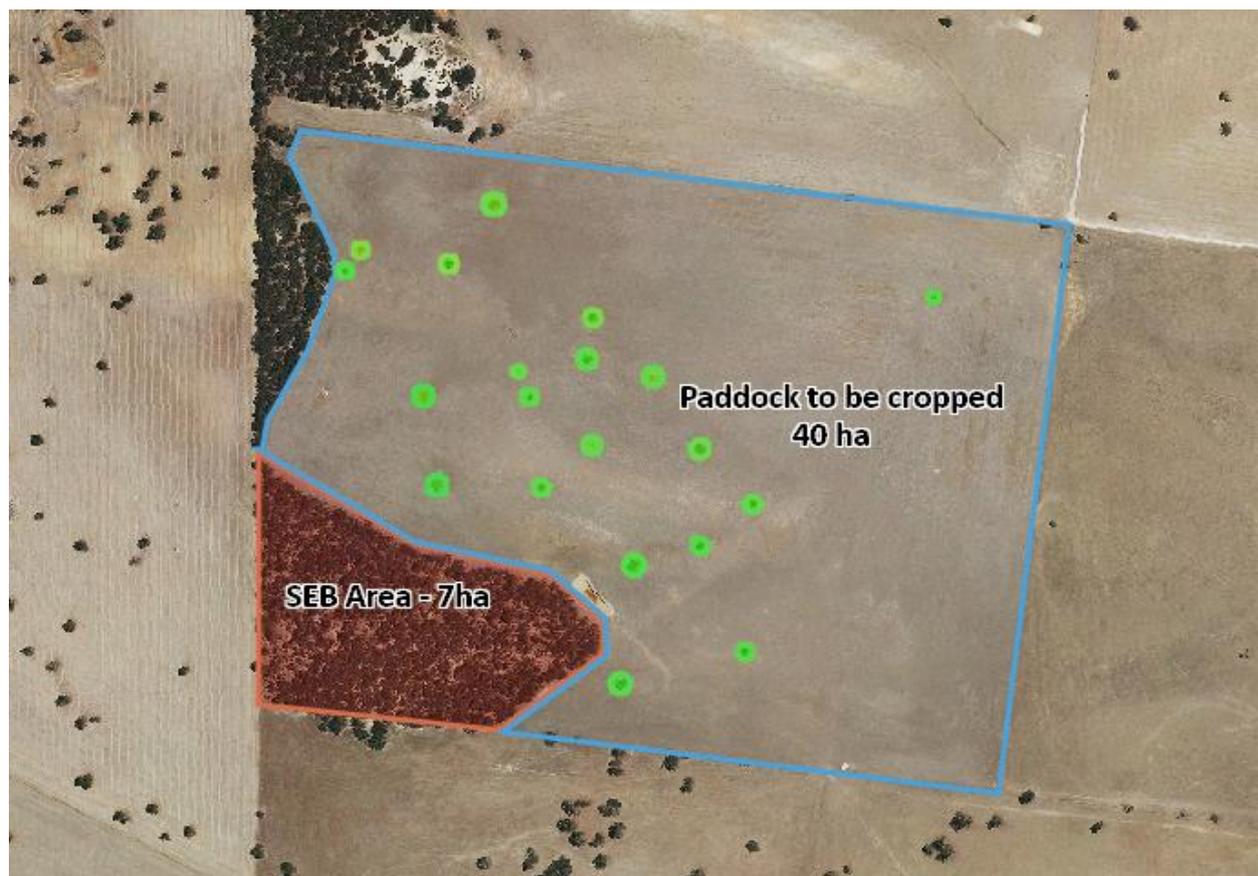
Vegetation Clearance

- 20 trees in a 40 hectare (ha) paddock.
- 10 *Eucalyptus diversifolia* (soap mallee) trees of moderate health and 10 *Eucalyptus leucoxylon* (blue gum) trees of excellent health are removed

SEB Area

- 7 ha area
- *Eucalyptus arenacea/baxteri*, *Eucalyptus obliqua* low woodland over *Allocasuarina striata*, *Banksia marginata*, *Banksia ornata*, +/- *Hakea rostrata*, +/- *Allocasuarina muelleriana* ssp. *notocolpica* shrubs
- Site Management Issues:
 - Introduced invasive plants – Blackberry and Bridal Creeper
 - Stock grazing – One boundary is already fenced, but the remaining needs new fencing
 - Understorey partly depleted from historical use, need additional plantings to increase diversity in the understorey
 - Pests – Cats and pigs occasionally occur within the site

Intended outcome: To improve the quality of the existing vegetation and natural regeneration through the control of threats such as woody weeds, excluding stock and some supplementary planting



Source: Scenario provided by the Native Vegetation Branch, DEWNR.

3. Methodology and Assumptions

3.1 Methodology

The financial analysis is a discounted cash-flow analysis conducted over a 25-year period. It includes assumed cost and benefit cash flows for the farm business. Sunk costs (i.e. costs that have already been incurred and can no longer be recovered) are excluded from the analysis.

The financial analysis compares the incremental costs and benefits of the development and five alternative options for achieving a SEB offset relative to a Base Case scenario in which the farm business decides not to clear native vegetation (i.e. maintains their existing farm activity).

The analysis is conducted in real terms and all cash flows are entered in 2018 prices.

The remainder of this chapter outlines the assumptions adopted for the discounted cash flow analysis. Unless otherwise stated, all assumptions used in the analysis have been provided by the Native Vegetation Branch, PIRSA and LAB.

3.2 General Assumptions

3.2.1 Discount Rate

Discounted cash-flow analysis involves estimating costs and benefits in monetary terms, and converting future cost and benefit streams to present values using discounting. The practice of discounting recognises that people generally prefer to consume something now rather than in the future. The discount rate can also be seen as capturing the opportunity cost of capital – which a provider of capital will want to recoup from a user of capital. A discount rate needs to be selected to discount future costs and benefits to “present values”, enabling the calculation of net present values.

The nominal interest rate has been assumed to be equal to the small business variable term “other” lending rate as published by the Reserve Bank of Australia (2018) for March 2018. On this basis the nominal interest is assumed to be 7.3 per cent. As the analysis is to be conducted in real terms the nominal discount rate was converted to a real discount rate by subtracting expected inflation. For this purpose an expected inflation rate of 2.5 per cent was assumed on the basis of this being the mid-point of the Reserve Bank of Australia’s target inflation rate band. The resulting real discount rate is 4.8 per cent.

3.2.2 SEB Points Required

A formal quantitative assessment methodology is used to determine scale of the Offset Option that is required to offset the native vegetation that is cleared. This assessment methodology takes into account the relative significance of the vegetation to be cleared, the degree of impact resulting from the clearance, and other mitigating factors. As a result of that assessment a DEWNR-accredited consultant calculates an SEB Points requirement to offset the vegetation clearance.

The assessment model is explained in detail in the *Guide for calculating a Significant Environmental Benefit* (DEWNR 2016a) and an overview is presented in Appendix A. A range of attributes are taken into account for the assessment, including species, tree height and diameter, health as indicated by canopy dieback, hollow entrances, proximity to other vegetation, density, and habitat suitability for threatened species (DEWNR 2016a). The biodiversity score is then multiplied by a loss factor to estimate the SEB Points of Loss. The Loss Factor refers to the degree to which the vegetation is impacted, with 1 representing complete clearance of the vegetation (which is the situation in the scenario considered here). Other loadings and reductions may then be applied to the SEB Points of Loss to estimate the SEB Points required to offset the impacts.

The development scenario here has an SEB Points requirement of 50 points. See Box 2 for details of the calculation.

Box 2: Calculating the SEB Points Requirement

The development involves clearing:

- 10 *Eucalyptus diversifolia* trees in moderate health
- 10 *Eucalyptus leucoxylon* trees in excellent health

Native Vegetation Branch assesses the SEB Points values as 2.34 for a moderate health *Eucalyptus diversifolia* and 2.66 points for an excellent health *Eucalyptus leucoxylon*. (Appendix A shows how DEWNR arrives at an assessment.)

Therefore the total SEB Points for the development are

$$SEB\ Points = 2.34 \times 10 + 2.66 \times 10 = 50.$$

3.2.3 On-ground SEB

Assumptions regarding the scope and nature of the on-ground SEB that would be required to meet the required biodiversity offset gains (i.e. SEB Points required) have been provided by the NVB. They have advised that a site on Kangaroo Island composed of existing moderate health vegetation of approximately 7 ha in size would be required to deliver the required 50 SEB Points.¹ The intended outcome from implementing the SEB area would be “to improve the quality of the existing vegetation and natural regeneration through the control of threats such as woody weeds, excluding stock and some supplementary planting”. Further specific assumptions regarding the SEB area are provided in Box 1.

It is important to note that the potential biodiversity gains and therefore SEB Points provided by establishing a SEB site will vary depending on the size of the site, landscape context, vegetation condition, and conservation significance of the vegetation. In other words, there is no precise relationship between the required SEB points and land area of the SEB site (i.e. a SEB area of less than 7 ha could provide the required 50 SEB Points if it has higher intrinsic biodiversity value, and vice versa). The scope for achieving biodiversity value gains due to implementation of protection and active management of the native vegetation will also vary from site to site. Hence the on-ground SEB site example used in our scenario should be considered illustrative only, not necessarily reflective of the circumstances facing any specific development proposal. A description of the methodology used to assess the SEB Points that would be provided by establishing a SEB Area is provided in the report *Guide for calculating a Significant Environmental Benefit* (DEWNR 2016a).

3.3 Impacts of Farm Development (excluding SEB offset costs)

As a result of clearing the native vegetation there is a potential to change farm activity. This section sets out a scenario for the change in activity and also sets out a scenario for the associated impacts on farm cash incomes.

The scenario presented here is one in which the farm increases its cropping activity by introducing a wheat-bean-canola rotation. Of course there are many alternative scenarios that could be considered. Under each alternative scenario the range of financial impacts and their value would differ, and the model would need to be adjusted for this.²

The scenario presented here is not a prescription of what a farmer should or could do. Nor does it illustrate how a farmer would choose the best land use option for cleared land. Rather, it illustrates a way to compare the impact of different SEB Offset options for a given land use scenario.

The income impacts that arise under this scenario include changes in farm net income and non-SEB offset costs that are common across all of the options. They include:

- change in gross margins due to change in farming activity (cost item);
- sale of firewood (benefit item);
- native vegetation clearance costs (cost item); and
- farm activity transition costs (cost item).

¹ Native Vegetation Branch, *Pers. Comm.* (2018).

² For instance, if a grazing-cropping rotation was planned for the cleared land, there might be impacts on stock carrying capacity to take into account.

3.3.1 Change in gross margins due to change in farming activity (cost item)

The change in farming activity from grazing to cropping would change the income earned by the farm business. This change in farm income has been modelled with reference to the net change in gross margins due to the change in farming activity. Gross margins are a measure of farm profitability that represents the “difference between the annual gross income for that enterprise and the variable costs directly associated with the enterprise” (Rural Solution SA 2017).

Assumptions regarding the gross margins per hectare for each type of crop were provided by PIRSA and are summarised in Table 3.1. An average of the gross margins per hectare for the three types of crops has been adopted for the analysis, which in effect means that a three-field crop rotation is assumed. On this basis the gross margins associated with establishment of cropping is assumed to be \$381 per hectare.

Table 3.1 Gross margins for wheat, lupins and canola

Type of cropping activity	Gross margins (\$ per ha)	Yield (t per ha)
Wheat	274	3.1
Lupins	589	2.5
Canola	279	1.4
Average	381	n.a.

Source: PIRSA.

We deduct from this the loss of margins as a result of the reduction in grazing activity. Assumptions regarding gross margins for relevant forms of grazing were provided by PIRSA and are summarised in Table 3.2 and we have considered the case where margins earned are equal to the average across these three grazing types. The average gross margin associated with displacement of grazing activity is assumed to be \$489 per hectare.

Table 3.2 Gross margins for relevant forms of grazing

Type of grazing activity	Gross margins (\$ per ha) (stocking rate = 12 DSE / ha)
Prime lamb	469
Self-replacing merino flock	604
Merino Wethers	395
Average	489

Note: DES = dry sheep equivalents.
Gross margins for light grazing are assumed to be half of those for a stocking rate of 12 DSE per hectare.

Source: PIRSA.

The net change in gross margins is therefore a loss of \$109 per hectare. With 40 hectares of new cropping area the total net change in farm gross margins under this scenario is a loss of \$4,347 per annum.

3.3.2 Sale of Firewood (benefit item)

In this scenario the native vegetation that is cleared by the farmer is sold as firewood, providing the farmer with a one-off income benefit in the first year of the analysis. We have assumed that the farmer will earn \$100 in firewood revenue for each tree cleared. On the basis that 20 trees are cleared, total revenue from the sale of firewood is assumed to be \$2,000.³

3.3.3 Native vegetation clearance costs (cost item)

The farm business will incur costs associated with clearing the native trees in the first year of the analysis. DEWNR has advised that these costs would be in the low \$100s per tree. We have consequently assumed a clearance cost of \$125 per tree, which gives a total clearance cost of \$2,500 on the basis that 20 trees are removed.

3.3.4 Farm activity transition costs (overheads) (cost item)

The illustrative scenario considered here assumes that the farming activity changes from grazing to cropping following the clearance of native vegetation. A farm business can be expected to incur some transition costs when undertaking such a change in farming activity. For example, there may be a need to purchase new machinery and equipment, establish new grain storage facilities, dismantle or convert existing stock holding

³ Landholders on the Advisory Board have indicated that in many scenarios the cleared vegetation would not be saleable. In one of those scenarios there would therefore be no revenue stream from firewood.

facilities etc. In the scenario considered here these costs are assumed to be \$25,000, all incurred in the first year of the analysis.

3.4 Option 1 – Establish a new SEB area on own land

The direct costs associated with establishing a new SEB area on land the farmer owns or on land under their care and control includes:

- SEB establishment and management costs; and
- Value of displaced agricultural production.

3.4.1 SEB establishment and management costs (cost item)

When a farmer establishes a new SEB area on land they own or on land under their care and control, the farmer will directly incur a range of establishment, management and maintenance costs associated with implementing and managing the SEB area.

The activities that would potentially be undertaken as part of achieving the SEB would include:

- Undertaking a vegetation assessment;
- Establishing monitoring points;
- Developing a management plan;
- Fencing the site to exclude stock;
- Establishing pest animal control, which is assumed to be targeted at cats and pigs;
- Undertaking woody weed control measures;
- Supplementary revegetation to increase understory species diversity;
- Establishing photopoint monitoring and reporting annually; and
- Continuing weed control on an annual basis.

Each of these activities would impose costs on the farm business. Assumptions regarding the frequency, unit costs and timing of these costs were provided by the Native Vegetation Branch and are summarised in Table 3.3. More detail regarding the timing of these costs is provided in Table B.1 in Appendix B.

The Native Vegetation Branch has advised that some of the above costs associated with establishing and managing the new SEB area should already be incorporated into existing farm operations, and would therefore not be incremental relative to the Base Case scenario. These costs include woody weed control and pest control. Farmers may also face costs associated with conducting repeat vegetation assessments in years 5 and 10, however these assessments would not be required for a SEB of the area considered in this scenario. On this basis, the incremental establishment and management costs associated with establishing a new SEB on land the farmers owns are assumed to be \$16,090 in undiscounted terms over the life of the analysis. A detailed breakdown of these costs and their assumed timing is provided in Table B.1 in Appendix B.

**Table 3.3 Assumptions regarding establishment and management costs for SEB on own land
Assumed costs over 25 year period**

	Units per year	Units	Unit cost	Total cost	Year in which activity undertaken	Costs incorporated into farm operations
Vegetation assessment and report writing	5	hrs	150	750	1	No
Management plan development	2	hrs	120	240	1	No
Fencing of property	950	m	8	7,600	1	No
Fencing maintenance beyond 10 years	8	hrs	75	3,000	Every 3 years	No
Revegetation (tube stock)	500	plants	3	1,500	1	No
Monitoring report and photopoints	2	hrs	150	3,000	1 to 10	No
Sub-total (Incremental to Base Case)				16,090		
Repeat vegetation assessments	na			na		No
Woody weed control						
- initial (years 1 to 3)	10	hrs	75	2,250	1 to 3	Yes
- annual (after year 3)	3	hrs	75	4,950	4 to 25	Yes
Pest control (cats and pigs)	5	hrs	75	9,375	1 to 25	Yes

Note: na = not applicable
Source: DEW, Pers. Comm. (2018)

3.4.2 Value of displaced agricultural production (cost item)

Under the option of establishing a new SEB area on land the farmer owns or on land under their care and control, the farmer potentially incurs an opportunity cost in terms displacing valuable agricultural activity that could have otherwise been undertaken on the SEB area. However, PIRSA has advised that it would be highly unlikely that a farmer would convert productive farmland to native vegetation, which implies that a farmer would only plant trees on very unproductive land. Thus the value of any displaced agricultural production is likely to be relatively small. On this basis we have assumed that the value of displaced agricultural production is zero.

3.5 Option 2 – Apply to Use Existing SEB Credit

The direct costs associated with applying to use a SEB credit that the farmer has previously established includes:

- Loss of SEB credit market value.

3.5.1 Loss of SEB credit market value (cost item)

Where a farmer applies to use an SEB Credit that they have previously established, the farmer will effectively incur an opportunity cost in terms of no longer being able to earn potential revenue by selling the SEB credit to a third party. This opportunity cost, or potential benefit forgone, needs to be incorporated into the financial analysis.

At the time of writing there had been no SEB market transactions that would provide a guide towards what a purchaser would be willing to pay to acquire a SEB. The Native Vegetation Branch has asked us to use the total undiscounted SEB establishment and management costs associated with establishing a new SEB on land the farmer owns. These costs were advised to be \$16,090 in undiscounted terms (refer section 3.4.1 for a description of the underlying assumptions).

3.6 Option 3 – Apply to Have SEB Credit Assigned From Another Person or Body

The direct costs associated with applying to have a SEB credit assigned from another person or body includes:

- Application fee;
- Management agreement legal costs;
- Contractual arrangements; and
- Payment to the party surrendering the SEB credit.

3.6.1 Application fee (cost item)

The farm business would have to pay an application fee when applying to have a SEB credit assigned from another person or body. The Native Vegetation Branch has advised that a \$560 application fee would be payable.

3.6.2 Management agreement legal costs (cost item)

Where a farmer looks to assign a SEB credit from an external party, the farmer may seek legal advice in terms of reviewing the agreement to purchase the SEB credit. The Native Vegetation Branch has asked us to model a scenario in which these legal costs are \$750. It is assumed that these costs would be incurred in year 1 of the analysis.

3.6.3 Contractual arrangements (cost item)

Where a farmer looks to assign a SEB credit from an external party, the farmer will likely face costs associated with developing and executing contracts with the external party. The Native Vegetation Branch has asked us to model a scenario in which these contractual arrangement costs are \$750. It is assumed that these costs would be incurred in year 1 of the analysis.

3.6.4 Payment to party surrendering SEB credit (cost item)

Where a farmer looks to secure a SEB credit or offset by engaging an external party, the farmer will need to make a payment to the party surrendering or providing the credit. This value will depend on the price that the counter-party is willing to sell for. The Native Vegetation Branch has asked us to assume a payment of \$18,799.

This cost is equivalent to the total undiscounted SEB establishment and management costs associated with establishing a new SEB on land the farmer owns (see 3.4.1), plus the costs associated with undertaking repeat vegetation assessments that may be faced by the third party⁴, plus a 10 per cent mark up to account for contingency and profit that may be sought by the landholder who assigns the credit. Of course the vendor of an SEB might set their price on some other basis.

3.7 Option 4 – Engage an Accredited Third Party Provider

The direct costs associated with engaging an Accredited Third Party Provider to deliver a SEB offset includes:

- Application fee (same as Option 3 – see 3.6.1);
- Management agreement legal costs (same as Option 3 – see 3.6.2);
- Contractual arrangements (same as Option 3 – see 3.6.3); and
- Payment to the party surrendering the SEB credit.

3.7.1 Payment to party surrendering SEB credit (cost item)

Where a farmer looks to secure a SEB offset by engaging an external third party provider, the farmer will need to make a payment to the party that delivers the SEB offset. This value will depend on the price that the Accredited Third Party Provider is willing to sell for. The Native Vegetation Branch has asked us to assume a payment of \$37,032.

This cost is equivalent to the total undiscounted SEB establishment and management costs associated with establishing a new SEB on land the farmer owns (see 3.4.1), plus the costs associated with undertaking repeat vegetation assessments, woody weed control and pest control that may be faced by the Accredited Third Party Provider (see Table B.1 in Appendix B for a breakdown of these costs), plus a 10 per cent mark up to account for contingency and profit that may be sought by the third party. Of course the vendor of an SEB offset might set their price on some other basis.

3.8 Option 5 – Pay into the Native Vegetation Fund

The direct costs associated with paying into the Native Vegetation Fund includes:

- Payment into Native Vegetation Fund.

3.8.1 Payment into Native Vegetation Fund (cost item)

Under the option of making a payment into the Native Vegetation Fund, the farmer makes a payment into the Fund in lieu of any direct offsets being achieved. The required SEB payment is calculated using a payment formula that takes into account the SEB Points required to achieve an offset, management costs for managing an area of vegetation, a rainfall factor for the clearance site, and an economies of scale factor for the clearance site. The details of the formula are specified in the *Guide for calculating a Significant Environmental Benefit*. The Native Vegetation Branch advised that the required SEB payment would be \$1,460.41 for a moderate health tree and \$1,662.63 for an excellent health tree. On the basis that 10 trees of each type are cleared, the total amount required to be paid into the Native Vegetation Fund would be \$31,230.

⁴ Although repeat vegetation assessments would not be required for a SEB established on own land, under the option of a SEB being assigned from a third party the SEB may come from a larger site that would be subject to repeat vegetation assessment requirements, and may therefore indirectly face a proportion of these costs. The Native Vegetation Branch provided an assumption regarding the scale of these costs.

4. Results of the Financial Analysis

The results of the financial analysis are summarised in Table 4.1. It shows the incremental costs and benefits relative to the Base Case scenario for each of the five SEB offset options.

The financial analysis shows that each of the SEB offset options has a substantial net cost relative to the Base Case scenario. For each option, the main impact arises from costs in reduced gross margins due to the shift from grazing to cropping activity, with further costs from providing the SEB offset and clearing native vegetation.

Table 4.1 Results of the financial analysis
Impact on farm cash income of options relative to the Base Case (present value in \$)^(a)

	Option 1: SEB on own land	Option 2: Use existing SEB credit	Option 3: SEB credit assigned from another person or body	Option 4: Engage Accredited Third Party Provider	Option 5: Pay into the Native Vegetation Fund
Impacts of Farm Development (excl. SEB Offset Costs)					
Change in gross margins due to change in farm activity	-61,163	-61,163	-61,163	-61,163	-61,163
Sale of firewood	2,000	2,000	2,000	2,000	2,000
Native vegetation clearance costs	-2,500	-2,500	-2,500	-2,500	-2,500
Farm activity transition costs (overheads)	-25,000	-25,000	-25,000	-25,000	-25,000
Total Impact on Gross Margins	-86,663	-86,663	-86,663	-86,663	-86,663
SEB Offset Costs					
SEB establishment and management costs	-13,987	na	na	na	na
Value of displaced agricultural production	0	na	na	na	na
Loss of SEB credit market value	na	-16,090	na	na	na
Application fee	na	na	-560	-560	na
Contractual arrangements	na	na	-750	-750	na
Management agreement legal costs	na	na	-750	-750	na
Payment to party surrendering SEB	na	na	-18,799	-37,032	na
Payment into Native Vegetation Fund	na	na	na	na	-31,230
Total SEB Costs	-13,987	-16,090	-20,859	-39,092	-31,230
Net Increase in Farm Cash Income	-100,649	-102,753	-107,522	-125,754	-117,893

Note: na = not applicable.

(a) Present values over a 25 year time frame using a 4.8 per cent discount rate.

The gross margin impacts are the same across all options, but the options differ in their SEB costs. The total costs of the various SEB offset options in present value terms range from a low of approximately \$14,000 for the option of establishing a SEB on own land up to \$39,100 for the option of engaging an Accredited Third Party Provider. Notable points regarding the cost structure of the various SEB offset options include:

- the options of having credit assigned from another body (Option 3) and engaging an Accredited Third Party Provider (Option 4) have additional costs compared to the other SEB offset options in terms of an application fee, managing contractual arrangements, and legal costs in terms of reviewing the management agreement.
- The most significant costs relate to SEB establishment and management costs (Option 1), loss of SEB credit market value (Option 2), the payment to party surrendering the SEB (Options 3 and 4), and the payment into the Native Vegetation Fund (Option 5).

This study considers just one possible scenario for a development and associated SEB options. Landholders might wish to remove single paddock trees for reasons other than those allowed for in this scenario, for instance to manage risk and environmental concerns, as opposed to simply clearing land to increase the arable area. Scenarios might arise where tree clearance:

- Reduces risk of herbicide resistance and off target damage (i.e. spray drift). As the boom of the spray units swings around a tree you get over application at one end (poisoning the soil) and at the accelerating end decreased droplet size and increased risk of spray drift and off target damage;
- Enables the use of shield spraying technology. Shield spraying enables reduced chemical use through targeted spraying as the shield fits between inter-rows enabling weed control between crop rows. As the system only works on straight lines, turning to negate single paddock trees renders the system unuseable;

- Enables the adoption of controlled traffic and auto-steer leading to increased soil compaction (refer Isbister et al 2013);
- Reduces risk of physical damage to machinery; and
- Reduces driver stress.

Appropriate cost and benefit assumptions would need to be made in a scenario where factors like these was relevant. The person carrying out the analysis would need to make judgments about the materiality of potential impacts and should seek to quantify those likely to have relatively large values.

The purpose of this study is to illustrate the business decision framework with reference to one decision scenario. It does not provide a transferable “off the shelf” estimate of benefit and cost items for other development scenarios. Proponents of other scenarios will need to inform themselves of their own cost and benefit circumstances, including available SEB offset options, to assess the financial impacts of their options.

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Appendix A

Estimation of SEB Points for On-ground SEB Area

Table A.1 Estimation of SEB Points for On-ground SEB Area for Moderate and Excellent Health Eucalypts

	Eucalyptus diversifolia tree of moderate health		Eucalyptus leucoxyton tree of excellent health		Notes and explanation.
	Data collected	Points allocated	Data collected	Points allocated	
Species	Eucalyptus diversifolia (KI) multi-stemmed	Predetermined in PSS	Eucalyptus leucoxyton	Predetermined in PSS	The particular species is given a score based on the following: Growth form – shrub or tree Environment – scattered or clump Location – influences height category
Height	8m	Predetermined in PSS	11m	Predetermined in PSS	Tree is assigned points based on the max./min. height for a particular species in a particular location: 1 point (low value) 2 points (medium value) 3 3 points (high value)
Diameter of trunk (1.5m above ground)	220cm	220	280cm	280	Tree is assigned points based on the tree trunk diameter where: 1 point (low value) = <20cm 2 points (medium value) = >20cm but <50cm 3 points (high value) = >50cm
Health (% canopy dieback)	40% dieback	40	0%	0	The tree is assigned a score based on the % dieback present which is entered into the PSS.
Hollow entrances	Nil.	-	Nil.	-	The tree is assigned points based on the number and size of hollows. The larger the number and size of the hollows, the higher the value and greater the score.
Density (distance to nearest tree from tree canopy edge)	30m away from nearest tree	2	30m away from nearest tree	2	Tree is assigned points based on separation distances: 1 point (low value) = widely separated >50m 2 points (medium value) = mid densely separated between 5 and 50m 3 points (high value) = close distance The closer in distance the trees, the higher the biodiversity value.
Proximity to native vegetation (at least 1 ha in area)	100m away from nearest remnant block	100	100m away from nearest remnant block	100	Tree is assigned points based on proximity to remnant block: 1 point (low value) = >200m away 2 points (medium value) = >50 but <200m away 3 points (high value) = <50m away The closer the tree to a remnant block, the higher the biodiversity value.

Table A.1 Estimation of SEB Points for On-ground SEB Area for Moderate and Excellent Health Eucalypts (continued ...)

	Eucalyptus diversifolia tree of moderate health		Eucalyptus leucoxyton tree of excellent health		Notes and explanation.
	Data collected	Points allocated	Data collected	Points allocated	
Suitability for threatened species	Nil.	2	Nil.	2	This will change depending on whether the tree is suitable for use by a species listed in the NPW Act 1972 or the EPBC Act 1999. The tree is assigned points according to whether common, uncommon or rare species are detected (at regional, state or national level): 1 point (low value) = none (common species only) 2 points (medium value) = 1 uncommon sp. 3 points (high value) = >2 uncommon or >1 rare sp.
Individual tree score (out of 100)		34.8		39.6	The higher the score, the greater biodiversity value of the tree.
Total tree biodiversity score		2.23		2.53	The multiplication factor is added to ensure the added benefit for higher value trees is reflected in the SEB points required. See NVC Scattered Tree Assessment Manual 2017.
Loss factor		1		1	The loss factor is determined from the degree to which the tree will be impacted (and is multiplied by the total tree biodiversity score).
SEB points required for on-ground SEB		2.34 SEB points required		2.66 SEB points required	To determine the SEB, an additional 5% (for the agricultural region) is applied. The additional 5% for any offset whether it be on-ground or payment is for the additional benefit for the offset area (a moderating factor that is applied to <u>all</u> SEBs to ensure that SEBs achieve over and above the impact of the clearance). For any clearance site, SEB points do not translate to a hectare amount for an on-ground SEB. Only an on-ground assessment can determine the value of the vegetation present.

Source: Native Vegetation Branch, Department for Environment and Water.

Appendix B

Supplementary Table

Table B.1 Farm Business SEB Establishment and Management Costs by Year (only first 15 years of total 25 year period shown)

	Present Value	Total Over Project	Year 1 2017/18	Year 2 2018/19	Year 3 2019/20	Year 4 2020/21	Year 5 2021/22	Year 6 2022/23	Year 7 2023/24	Year 8 2024/25	Year 9 2025/26	Year 10 2026/27	Year 11 2027/28	Year 12 2028/29	Year 13 2029/30	Year 14 2030/31	Year 15 2031/32
Costs incremental to Base Case for own land SEB option																	
Vegetation assessment and report writing	750	750	750	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Management plan development	240	240	240	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fencing of property	7,600	7,600	7,600	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fencing maintenance (after 10 years)	1,445	3,000	0	0	0	0	0	0	0	0	0	0	600	0	0	600	0
Revegetation	1,500	1,500	1,500	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Monitoring report and photopoints	2,451	3,000	300	300	300	300	300	300	300	300	300	300	0	0	0	0	0
Sub-total	13,987	16,090	10,390	300	600	0	0	600	0								
Costs not incremental to Base Case or do not apply for own land SEB option																	
Repeat vegetation assessments	742	1,000	0	0	0	0	500	0	0	0	0	500	0	0	0	0	0
Woody weed control	4,895	7,200	750	750	750	225	225	225	225	225	225	225	225	225	225	225	225
Pest control (cats and pigs)	5,652	9,375	375	375	375	375	375	375	375	375	375	375	375	375	375	375	375
Total Costs	25,276	33,665	11,515	1,425	1,425	900	1,650	900	900	900	900	1,650	1,200	600	600	1,200	600