3 Biocertification Assessment Results

3.1 DEVELOPMENT FOOTPRINT

The Warnervale Town Centre proposal comprises three main land uses, being development areas, offset (conservation) areas and areas for public recreation. The proposed footprint includes the development of 88.1 hectares, including general residential, special use and local centre development (Figure 4 and Table 4). 12.2 hectares of conservation lands are proposed within the certification boundary, with an additional 13.1 hectares of land is to be dedicated as public recreation land, through RE1 and E3 zonings.

All conservation lands will be secured through an E2 zoning, with the land dedicated as Community Land under the *Crown Lands Act* 1989. The area assessed as conservation includes the 'Daisy Reserve' directly to the west of the railway. The inclusion of this area, and its potential use as an offset for *Rutidosis heterogama* (daisy), may require further discussion between Council and OEH, however for this assessment it has been assumed that there are no restrictions on the generation of ecosystem credits for this area. Species credits for *Rutidosis heterogama*, however, will not be generated for this land as these individuals have already been used as an offset.

The final land use of land zoned as public recreation (RE1 and E3 zonings) is currently unknown, as the land may retain its vegetation and be managed as bushland or, alternatively, may be cleared for open space. These areas, therefore, will be considered 'retained areas' for the assessment, and will not be included in the assessment of either conservation or development areas (i.e. are neutral for this assessment). Once the final land use is known for these areas, an addendum to this assessment may be required to calculate either credits generated, or required, for these areas.

Table 4: Development footprint

Development Footprint	Area (ha)
Development	88.1
Conservation	12.2
Public Recreation	13.1
Total	**113.4**

Figure 4: Development Footprint

3.1.1 Management of Conservation Lands

The management of the 'Daisy Reserve' conservation lands on the Warnervale site will be secured through an E2 zoning (Environmental Conservation) and Section 88B covenant. A Plan of Management will be prepared for the site, and the land transferred into Council ownership. Please note that the threatened daisy (*Rutidosis heterogama*) present within the conservation lands will not generate credits under this assessment, as these individuals are already being used to offset impacts in the rail corridor. The ecosystem credits available within the Daisy Reserve, however, have been calculated for this project as these credits have not yet been used to offset any other impact.

The other conservation area, along the riparian line on the eastern side of the site, is also to be an E2 zone, with an associated Plan of Management. Again, the land will be acquired by Council, however a Section 88B covenant is not planned at this stage.

3.2 VEGETATION MAPPING AND ZONES

In total, across the entire site, four vegetation types were identified (Table 5 and Figure 5). In total 76.5 hectares of vegetation was mapped across the site, with the dominant vegetation types being Smooth-barked Apple - Red Bloodwood open forest on coastal plains on the Central Coast, Sydney Basin (45.7 hectares) and Spotted Gum - Grey Ironbark open forest on the foothills of the Central Coast, Sydney Basin (24.1 hectares).

Table 5: Area of vegetation within the study area

Biometric Vegetation Type	Area (ha)
Blackbutt - Turpentine open forest of the foothills of the North Coast	6.6
Smooth-barked Apple - Red Bloodwood open forest on coastal plains on the Central Coast, Sydney Basin	45.7
Spotted Gum - Grey Ironbark open forest on the foothills of the Central Coast, Sydney Basin	24.1
Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin	0.1
Total	**76.5**

The four vegetation types have been separated into 7 currently vegetated vegetation zones for this assessment (Figure 6). The zones have been separated by condition, and include the following:

- Poor- generally areas of scattered remnant canopy tress over a highly disturbed ground layer;
- Moderate- generally areas of regrowth;
- Good- best examples of native, intact vegetation on site (all structural layers present).

The proposed footprint consists of 12.2 hectares of land to be conserved. 56.6 hectares of vegetation is within the development footprint, with a further 8.6 hectares of vegetation excluded from the assessment due to its status as retained land (Table 6).

One zone is not assessed (Zone 9- Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin) as it is solely within the retained lands and therefore will not require or generate credits until its proposed land use is finalised.

Table 6: Area of vegetation zones within the study area

Veg Zone ID	Biometric Vegetation Type	Condition Code	Condition Description	Area (ha)		
				Conservation	Development	Retained Land
1	Blackbutt - Turpentine open forest of the foothills of the North Coast	Good	Majority of this vegetation type had been recently burnt (<2yrs). All structural layers present, with some weed species.	1.0	3.7	1.8
2	Smooth-barked Apple - Red Bloodwood open forest on coastal plains on the Central Coast, Sydney Basin	Poor	Scattered trees over predominantly non-native understorey. Some highly disturbed areas to be included in conservation lands and rehabilitated.	1.0	11.5	0.6
3	Smooth-barked Apple - Red Bloodwood open forest on coastal plains on the Central Coast, Sydney Basin	Moderate	Areas code Xs or Xr in Bell and Murray 2004. Also includes some areas of dense regrowth. Some areas of weed infestation, particularly *Andropogon virginicus*.	1.5	18.9	4.0
4	Smooth-barked Apple - Red Bloodwood open forest on coastal plains on the Central Coast, Sydney Basin	Good	Generally weed free, all structural layers present.	0.0	8.4	0.4
5	Spotted Gum - Grey Ironbark open forest on the foothills of the Central Coast, Sydney Basin	Moderate	Areas code Xs or Xr in Bell and Murray 2004. Also includes some areas of dense regrowth. Some highly disturbed areas to be included in conservation lands and rehabilitated. Highly disturbed in some areas by *Lantana camara*.	1.2	7.2	1.0
6	Spotted Gum - Grey Ironbark open forest on the foothills of the Central Coast, Sydney Basin	Good	Generally weed free, all structural layers present.	7.5	6.9	0.7
7	Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin	Good	Very small patch, not assessed due to area being included in retained lands.	0.0	0.0	0.1
Total	**N/A**	**N/A**	**N/A**	**12.2**	**56.6**	**8.6**

Figure 5: Vegetation Types

Figure 6: Vegetation Zones

3.3 LANDSCAPE TG VALUES

Landscape Tg values are required to calculate ecosystem credits using the Biocertification Methodology. The Landscape Tg values are generated for each vegetation type by averaging the Tg values of all species predicted to occur in each vegetation type within the study site (Table 7).

ELA calculated the Landscape Tg value for each vegetation type within the study areas using the Biobanking Credit Calculator to determine which species were predicted in each vegetation type (Appendix 4). The Tg values for these species were then averaged to calculate the Landscape Tg. The table below provides details of the landscape Tg score used for each vegetation type assessed.

Table 7: Landscape Tg assigned to each vegetation type

Vegetation Type	Landscape Tg
Blackbutt - Turpentine open forest of the foothills of the North Coast	0.54
Smooth-barked Apple - Red Bloodwood open forest on coastal plains on the Central Coast, Sydney Basin	0.55
Spotted Gum - Grey Ironbark open forest on the foothills of the Central Coast, Sydney Basin	0.56
Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin	0.55

3.4 TRANSECT/PLOT DATA AND SITE VALUE SCORES

Appendix 3 of the BCAM defines the minimum number of transects/plots required per vegetation zone area (DECCW 2011). A total of 11 Biometric vegetation transects/plots were captured across the WTC study site, with a transect/plot requirement of 9 transects/plots calculated from the combined area of conservation and development lands (Figure 7 and Table 8). The transect/plot data captured is provided in Appendix 5.

Table 8: Vegetation zones and transect/plot data

Veg Zone ID	Biometric Vegetation Type	Condition	Area to be Assessed (Development and Conservation) (ha)	Transects/ Plots Required	Transects/ Plots Collected
1	Blackbutt - Turpentine open forest of the foothills of the North Coast	Good	4.7	1	2
2	Smooth-barked Apple - Red Bloodwood open forest on coastal plains on the Central Coast, Sydney Basin	Poor	12.5	2	2
3	Smooth-barked Apple - Red Bloodwood open forest on coastal plains on the Central Coast, Sydney Basin	Moderate	20.4	2	2
4	Smooth-barked Apple - Red Bloodwood open forest on coastal plains on the Central Coast, Sydney Basin	Good	8.4	1	2
5	Spotted Gum - Grey Ironbark open forest on the foothills of the Central Coast, Sydney Basin	Moderate	8.4	1	1
6	Spotted Gum - Grey Ironbark open forest on the foothills of the Central Coast, Sydney Basin	Good	14.4	2	2

Veg Zone ID	Biometric Vegetation Type	Condition	Area to be Assessed (Development and Conservation) (ha)	Transects/ Plots Required	Transects/ Plots Collected
7	Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin	Good	0.0	0	0
	Total	**N/A**	**68.8**	**9**	**11**

Current site value and future site value scores were calculated for each vegetation zone using the transect/plot data collected. The Biobanking Credit Calculator was used to produce the current and future site value scores for both development and conservation (Table 9).

Table 9: Site value scores allocated to each vegetation zone

Veg Zone ID	Biometric Vegetation Type	Condition	Current Site Value Score	Future Site Value Score (Conservation)	Future Site Value Score (Development)
1	Blackbutt - Turpentine open forest of the foothills of the North Coast	Good	87	97	0
2	Smooth-barked Apple - Red Bloodwood open forest on coastal plains on the Central Coast, Sydney Basin	Poor	31	51	0
3	Smooth-barked Apple - Red Bloodwood open forest on coastal plains on the Central Coast, Sydney Basin	Moderate	65	78	0
4	Smooth-barked Apple - Red Bloodwood open forest on coastal plains on the Central Coast, Sydney Basin	Good	63	77	0
5	Spotted Gum - Grey Ironbark open forest on the foothills of the Central Coast, Sydney Basin	Moderate	56	59	0
6	Spotted Gum - Grey Ironbark open forest on the foothills of the Central Coast, Sydney Basin	Good	75	77	0
7	Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin	Good	N/A	N/A	N/A

Figure 7: Vegetation Zones and Transects/Plots

3.5 LANDSCAPE SCORE

3.5.1 Native Cover in Landscape

Native vegetation cover within an assessment circle was calculated for the project (Figure 8). The landscape score calculations were completed with a 1,000 hectare circle, thus a scaling factor of 1.0 was used in the assessment. The results of the circle assessment are contained in Table 10. A pre certification score of 15.0 was allocated, with a post certification score of 13 assigned.

Table 10: Native vegetation in assessment circle

	BEFORE CERTIFICATION		AFTER CERTIFICATION	
Circle	Area of Vegetation Within Assessment Circle (ha)	Native Vegetation Cover Class (%)	Area of Vegetation Within Assessment Circle (ha)	Native Vegetation Cover Class (%)
1 (1,000 ha)	421 (15)	41-50%	364 (13)	31-40%

The land subject to conservation measures (post biodiversity certification) is 12.3 hectares. Therefore (using Table 3 of the BCAM) a gain of 2.2 is recorded for the percent native vegetation score after conferral of biodiversity certification.

3.5.2 Connectivity Value

The current connectivity value of the site was assessed according to Section 3.7.2 of the BCAM. Initially, the drainage lines on site were considered to determine if any of the riparian lines on site are a State, Regional or Local biodiversity link. The connectivity of vegetation on site was then also assessed.

The streams on site meet the definition of Minor Watercourses, and require a 10m buffer either side (Figure 9). Minor watercourses are considered local biodiversity links according to Table 4 of the BCAM. Currently segments of these streams are located within development lands, and are therefore likely to be impacted by development. While development on site will require consideration of the *Water Management Act* 2000, this assessment has determined that an impact on a local biodiversity link is likely, and has therefore scored Connectivity (pre certification) 6 points.

Vegetation connectivity was also assessed. Again, local biodiversity links occur across the site, where vegetation is greater than 30ha, and has widths greater than 30m. Some of these areas are to be impacted by development, and will again result in a Connectivity (pre certification) score of 6 points.

Finally, the Connectivity (post certification) was also assessed. The proposal conserves a relatively small amount of vegetation within conservation areas. As the conservation areas total 12.3 hectares, and are not greater than 30ha, a post certification score of 0 points is recorded for this measure of connectivity. The measure of connectivity also includes an assessment of the drainage lines on site, and the conservation lands will protect sections of the Minor Watercourses identified on site. Therefore, using Table 4 of the methodology, a score of 6 is allocated for Connectivity (post certification).

Figure 8: Assessment Circle

Figure 9: Drainage Lines and Buffers

3.5.3 Adjacent Remnant Area

The maximum adjacent remnant area (ARA) was calculated for the proposal in order to determine the score to be allocated for this measure. The site predominantly occurs on the Gosford - Cooranbong Coastal Slopes Mitchell Landscape, which is 38% cleared. The vegetation on site is well connected, and as such has an ARA of 501 hectares. The pre certification score allocated, therefore, is 10 points.

Post certification the lands to be conserved continue to be well connected to the surrounding environment, and as such an ARA of 501 hectares is again recorded. The post certification score allocated, therefore, is also 10 points.

3.6 THREATENED SPECIES ASSESSMENT

Rutidosis heterogama occurs within the western conservation area (Daisy reserve), however as these individuals are being used to offset impacts on this species within the rail corridor, species credits cannot be generated under this assessment.

Wallum froglet occurs within both the development and conservation lands. 0.05 hectares occurs within development lands, with 0.13 hectares occurring within conservation lands (Figure 10). Species credits will be calculated for this species using these figures.

3.7 RED FLAGS

No red flags have been identified on the Warnervale Town Centre site. Note, however, that should the public recreation lands (which are currently identified as 'retained lands') eventually impact on the Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin community, a red flag may be triggered.

The population of *Rutidosis heterogama* located on site is not being impacted by this proposal, with all impact to be caused by the construction of the Warnervale Train Station, which lies outside of this study area. Should impacts occur to the *Rutidosis heterogama* within the BCAA a red flag would be triggered.

Finally, the threatened fauna species impacted by the proposal (Wallum froglet) is not red flagged under the BCAM.

Figure 10: Wallum froglet Habitat and Development Footprint

3.8 CREDIT CALCULATIONS

3.8.1 Ecosystem Credits

Ecosystem credits have been calculated for the impact caused by the proposed development, while also being calculated for those areas set aside for conservation (Appendix 6). As differing levels of conservation security and funding generate different credit amounts the credits generated calculations have been performed for all offsetting options. ELA have assumed, however, the credits created as managed offset (90% credit allocation) is the most likely credit outcome, however this requires confirmation from Council.

Although the assessment has included the most recent development footprint, some potential impacts (such as currently unplanned pipelines and roads etc) are not currently known. To allow for these impacts an additional 5% has been added to credit requirements for each vegetation zone. It is proposed that these additional credits be included in any offset for the project, however the 'retirement' of these credits should only occur once the final impacts are confirmed.

In total, 1,776 credits are required for the land proposed to be developed, with an additional 89 credits included using the 5% buffer described above (Table 11). The largest number of credits is required by the Smooth-barked Apple - Red Bloodwood open forest on coastal plains on the Central Coast, Sydney Basin community (1,136 credits + 57 credits). This is followed by Spotted Gum - Grey Ironbark open forest on the foothills of the Central Coast, Sydney Basin (474 credits + 24 credits) and Blackbutt - Turpentine open forest of the foothills of the North Coast (166 credits + 8 credits). None of the communities within the WTC BCAA are in credit surplus.

When assessing the conservation areas, three credit amounts are generated depending on the final management, security and funding of the offset area. In total, should the conservation lands be set aside in a funded/managed offset, 85 credits will be generated. A managed offset will generate 76 credits, while a planning scheme offset will generate 21 credits.

If we assume that the managed offset will be the final outcome, the proposal is 1,700 credits in deficit, or 1,789 credits in deficit when including the additional 5%. That includes 1,115 (+57) credits in deficit for Smooth-barked Apple - Red Bloodwood open forest on coastal plains on the Central Coast, Sydney Basin and 426 (+24) in deficit for Spotted Gum - Grey Ironbark open forest on the foothills of the Central Coast, Sydney Basin. Blackbutt - Turpentine open forest of the foothills of the North Coast is 158 (+8) credits in deficit.

Table 11: Final ecosystem credit results

Vegetation type name	Credits Required (+ 5% Addition Credit Requirement for Unknown Infrastructure)	Total credits created as managed offset (90% Credit Allocation)	Credit Status (90% Credit Allocation)	Total credits created as funded/managed offset (100% Credit Allocation)	Total credits created as planning scheme offset (25% Credit Allocation)
Blackbutt - Turpentine open forest of the foothills of the North Coast	166 (+8)	8	-158 (-8)	8	2
Smooth-barked Apple - Red Bloodwood open forest on coastal plains on the Central Coast, Sydney Basin	1,136 (+57)	20	-1,115 (-57)	23	6
Spotted Gum - Grey Ironbark open forest on the foothills of the Central Coast, Sydney Basin	474 (+24)	48	-426 (-24)	53	13
Total	**1,776 (+89)**	**76**	**-1,700 (-89)**	**85**	**21**

3.8.2 Species Credits

Species credits have been calculated for the impact caused by the proposed development, while also being calculated for those areas identified for conservation (Appendix 6). As differing levels of conservation security and funding generate different credit amounts, and as Council will consider increasing the security of the conservation lands to generate more credits, the credits generated calculations have been performed for all offsetting options, however the credits created as a managed offset (90% credit allocation) is again considered the most likely credit outcome and has therefore been used throughout the assessment.

In total, 1 Wallum froglet credit is required for the land proposed to be developed (Table 12). Three credit amounts are generated depending on the final management, security and funding of the offset area. In total, should the conservation lands be set aside in a funded/managed offset, 1 credit will be generated. A managed offset will also generate 1 credit, while a planning scheme offset will generate 0 credits.

If we assume that the managed offset will be the final outcome, the proposal is credit neutral, with the 1 credit required by development offset by the 1 credit generated within the conservation lands.

Table 12: Final species credit results

Vegetation type name	Credits Required	Total credits created as *funded/managed* offset (90% Credit Allocation)	Credit Status (90% Credit Allocation)	Total credits created as *funded/managed* offset (100% Credit Allocation)	Total credits created as planning scheme offset (90% Credit Allocation)
Wallum froglet	1	1	0	1	0
Total	**1**	**1**	**0**	**1**	**0**

Rutidosis heterogama occurs within the western conservation area (Daisy reserve), however as these individuals are being used to offset impacts on this species within the rail corridor, species credits cannot be generated under this assessment.

3.9 CREDIT PROFILES

A credit profile is the set of attributes that are used to characterise ecosystem or species credits. They form part of the rules for using ecosystem and species credits to offset the impacts on land proposed to be Biocertified. The rules ensure that the vegetation impacted by the land proposed for Biocertification is offset within the same vegetation formation and habitat suitability for threatened species.

Provided in Table 13 are the credit profile details for each of the vegetation types impacted by the WTC proposal. The geographic region able to provide an offset is quite large, with five CMA subregions able to provide the offset for all vegetation types, and several others able to provide the offset for each vegetation type.

The vegetation types able to provide the offset are more restricted. A total of eight vegetation types can provide the offset, however no vegetation types are able to provide an offset for all vegetation types impacted. Therefore, the offset site(s) will be required to contain several vegetation types to achieve the offset requirements of the methodology.

Finally, the methodology allows for the variation of offset requirements should the requirements in Table 13 prove not possible to be met. Council should investigate a variation to the offset rules if unable to satisfy the credit profiles for each vegetation type.

Table 13: Credit profiles

Vegetation type name	% Cleared in HCR CMA	Vegetation Formation	CMA Subregions Able to Receive Offset	Vegetation Types Able to Receive Offset
Blackbutt - Turpentine open forest of the foothills of the North Coast	30%	Wet sclerophyll forests (grassy sub-formation)	**Hunter Central Rivers CMA** Wyong Macleay Hastings Yengo Hunter **Hawkesbury Nepean CMA** Pittwater Yengo	Blackbutt - Tallowwood dry grassy open forest of the southern North Coast Blackbutt - Turpentine open forest of the foothills of the North Coast Small-fruited Grey Gum - Tallowwood shrubby open forest on coastal foothills of the southern North Coast Tallowwood - Small-fruited Grey Gum dry grassy open forest of the foothills of the North Coast
Smooth-barked Apple - Red Bloodwood open forest on coastal plains on the Central Coast, Sydney Basin	35%	Dry sclerophyll forests (shrubby sub-formation)	**Hunter Central Rivers CMA** Wyong Yengo Hunter **Hawkesbury Nepean CMA** Pittwater Yengo	Scribbly Gum - Red Bloodwood heathy woodland on the coastal plains of the Central Coast, Sydney Basin Smooth-barked Apple - Red Bloodwood open forest on coastal plains on the Central Coast, Sydney Basin
Spotted Gum - Grey Ironbark open forest on the foothills of the Central Coast, Sydney Basin	45%	Dry sclerophyll forests (shrub/grass sub-formation)	**Hunter Central Rivers CMA** Wyong Yengo Hunter **Hawkesbury Nepean CMA** Pittwater Yengo	Broad-leaved Stringybark - Blakely's Red Gum grassy woodlands of the gorges and upper Hunter Valley, North Coast Spotted Gum - Grey Ironbark open forest on the foothills of the Central Coast, Sydney Basin

3.10 ADDITIONAL OFFSET REQUIRED

Assuming that the offsets within the Warnervale Town Centre proposal area will be managed as a "managed offset", and will therefore receive a 10% reduction in total credit generation, the amount of additional offset has been calculated. The results are displayed in Table 14.

Table 14: Additional offset required

Vegetation Type	Credits Required	Credits Generated (Managed Offset)	Credit Status	Additional Offset Required (ha)*	Additional Offset Required (ha)**
Blackbutt - Turpentine open forest of the foothills of the North Coast	166 (+8)	8	-158 (-8)	18 (+1)	23 (+1)
Smooth-barked Apple - Red Bloodwood open forest on coastal plains on the Central Coast, Sydney Basin	1,136 (+57)	20	-1,115 (-57)	124 (+6)	159 (+8)
Spotted Gum - Grey Ironbark open forest on the foothills of the Central Coast, Sydney Basin	474 (+24)	48	-426 (-24)	47 (+3)	61 (+3)
Total	**1,776 (+89)**	**76**	**-1,700 (-89)**	**189 (+10)**	**243 (+13)**

*Assumes 9 credits per hectare are generated at the offset site in moderate to good condition
**Assumes 7 credits per hectare are generated at the offset site in moderate to good condition

The proposed certification area is, in total, 1,700 (+89) credits short of the offset required, with all vegetation types in credit deficit. Smooth-barked Apple - Red Bloodwood open forest on coastal plains on the Central Coast, Sydney Basin requires the largest possible offset (124-159 hectares + 6-8 hectares) followed by Spotted Gum - Grey Ironbark open forest on the foothills of the Central Coast, Sydney Basin (47-61 hectares + 3 hectares) and Blackbutt - Turpentine open forest of the foothills of the North Coast (18-23 hectares + 1 hectare). In total, assuming the offset site generates 7-9 credits per hectare, the total offset required is between 189-243 hectares + 10-13 hectares.

4 Cost of Additional Off-site Offset Requirements

4.1 ESTIMATED CREDIT COST

In total, assuming the offset site generates 7-9 credits per hectare, the total additional offset required off-site for the WTC project is between 189-243 hectares + 10-13 hectares (1,789 credits).

The cost to secure these additional offsets has been estimated by undertaking indicative credit pricing scenarios for a range of potential Biobank sites established in the Wyong CMA subregion using the Biobanking Total Fund Deposit spreadsheet. The BCAM requires this assessment be completed in a 'Credit Converter' developed by OEH, which at this time is not available. The results of this assessment will therefore be updated once OEH release the converter.

These cost estimates have been undertaken for Biobank sites of 10, 40, 100, 250 and 500 ha in area which represents the range of land parcels that may be available in the region and support the correct vegetation types.

A number of assumptions have been included in the credit pricing including that the sites are in moderate-good condition and will generate 9 credits per hectare, require relatively low levels of weed control, have no serious unauthorised access issues such as rubbish dumping, 4WD and trial bikes etc and are securely fenced to prevent inappropriate access.

As the Wyong CMA subregion is generally well developed and the land has been largely subdivided, there are relatively few large land parcels (>100ha) in single ownership that may be available as Biobank sites that contain the right vegetation types. Whilst there are larger properties in the west of the region, these are unlikely to generate the right credit types due to soil type and topography. Most land parcels in the eastern part of the subregion are generally 40 ha or less and have relatively high underlying land values.

The exception to this statement are the large parcels of Crown Land, land granted to Aboriginal Land Councils and/or managed by Local Government, which may be available to provide credits at more competitive prices. Council may wish to investigate the feasibility of generating the required credits on Council land, thus reducing the costs associated with any offset due as purchase of the offset site will not be required, and therefore only management costs for the offset will be incurred. However, depending on the existing obligations to manage biodiversity values, the number of credits generated will vary and may be discounted unless the site was operational land or community land not categorised for biodiversity conservation.

Table 15 provides an indication of the cost to generate credits if Biobank sites were established in these areas and are based on ELAs knowledge of the area and detailed credit pricing calculations undertaken for other projects. Credit prices have been provided as the in perpetuity cost of management only (Credit Value Part A) and with a range of opportunity costs (Credit Value Part B) included to determine the influence that the inclusion of land value may have on credit pricing. Table 15 shows that the larger Biobank sites (> 100 ha in area) are able to provide credits at significantly more competitive prices than

small Biobank sites due to a range of factors (lower underlying land value, economy of scale in land management costs and lower average administrative overheads per credit generated).

Table 15: Estimated cost of credits

	10 ha	40 ha	100 ha	250 ha	500 ha
Biobank Area (ha)	10	40	100	250	500
Land Value/ha	$25,000	$12,500	$10,000	$8,000	$5,000
Property Value	$250,000	$500,000	$500,000	$2,000,000	$2,500,000
Biometric Condition	Mod-Good	Mod-Good	Mod-Good	Mod-Good	Mod-Good
No. of credits generated per hectare	9	9	9	9	9
Total No. of credits generated	90	360	800	2,250	4,500
Total Fund Deposit	$1,000,000	$1,250,000	$2,000,000	$2,650,000	$4,625,000
Ecosystem Credit Costs (per credit)					
In perpetuity mgt costs only (Credit Part A)	$13,708	$4,284	$2,714	$1,436	$1,253
25% market land value	$15,097	$4,631	$2,991	$1,658	$1,392
50% market land value	$16,486	$4,978	$3,269	$1,880	$1,530
75% market land value	$17,875	$5,326	$3,547	$2,103	$1,669
100% market land value	$19,264	$5,673	$3,825	$2,325	$1,808

It is understood that the Warnervale Town Centre Biocertification proposal includes a $4.0M contribution to a Conservation Fund that is to be used by OEH to secure additional conservation land in the area to meet the improve or maintain requirements. Using the indicative credit pricing information in Table 15, it is clear that if the offset was obtained using a series of small (10ha) Biobank sites the $4.0M will not be adequate with costs ranging from $24.5M to $34.4M (Table 16). However, if larger sites were used as the offset, such as a 250 hectare Biobank site, the costs are within the budgeted amount, ranging from approximately $2.5M to $4.1M.

Table 16: Estimated credit cost

Offset Size	10 ha	40 ha	100 ha	250 ha	500 ha
Credits Required	1789	1789	1789	1789	1789
Ecosystem Credit Costs (Per Credit)					
In perpetuity mgt costs only (Credit Part A)	$13,708	$4,284	$2,714	$1,436	$1,253
25% market land value	$15,097	$4,631	$2,991	$1,658	$1,392
50% market land value	$16,486	$4,978	$3,269	$1,880	$1,530
75% market land value	$17,875	$5,326	$3,547	$2,103	$1,669
100% market land value	$19,264	$5,673	$3,825	$2,325	$1,808
Ecosystem Credit Costs (Total Credit Requirement)					
In perpetuity mgt costs only (Credit Part A)	$24,523,612	$7,664,076	$4,855,346	$2,569,004	$2,241,617
25% market land value	$27,008,533	$8,284,859	$5,350,899	$2,966,162	$2,490,288
50% market land value	$29,493,454	$8,905,642	$5,848,241	$3,363,320	$2,737,170
75% market land value	$31,978,375	$9,528,214	$6,345,583	$3,762,267	$2,985,841
100% market land value.	$34,463,296	$10,148,997	$6,842,925	$4,159,425	$3,234,512

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