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TVERC

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COMPARING BIODIVERSITY IMAPCT ASSESSMENT CALCULATORS

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A COMPARISON OF SEVERAL BIODIVERSITY IMPACT ASSESSMENT CALCULATORS

SUMMARY

Biodiversity Impact Assessment Calculators (BIACs) are used to determine the potential ecological costs of a development and the effect potential offsetting methods may have in limiting this biodiversity loss. This report compares the DEFRA metric, alongside calculator templates from the Environment Bank (EB), from Warwickshire, Coventry and Solihull (WCS) and from the Thames Valley Ecological Records Centre (TVERC) in calculating the impacts of an example development site. We found that the DEFRA calculator has a significantly higher prediction of biodiversity loss compared to the other three. The Environment Bank and Warwickshire calculators are very similar, with the TVERC predicting a higher loss of biodiversity units.

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INTRODUCTION

Biodiversity Impact Assessment Calculators, BIACs, are used to determine the potential ecological costs of a development and the effect potential offsetting methods may have in limiting this biodiversity loss. Offsetting is defined by the Business and Biodiversity Offsets Programme as:

"Measurable conservation outcomes resulting from actions designed to compensate for significant residual adverse biodiversity impacts arising from project development and persisting after appropriate prevention and mitigation measures have been implemented".

The BIACs present in this report use the DEFRA metric (DEFRA, 2012). This metric is based on habitats, where each habitat is assigned to a band based on its distinctiveness, which in turn is based on factors such as its biodiversity, rarity and species richness (the full list of designations can be found here). A score is then given based on that habitat classification, which will be used further during the BIA calculation.

TABLE 1. THE HABITAT BANDS BASED ON DISTINCTIVENESS.

Distinctiveness	Broad habitat type covered	Type of offset	Calculator Score
High	Priority habitat, as defined in Section 41 of the NERC Act (UK Government, 2006).	Same band type, ideally like for like.	6
Medium	Semi natural	Within band type or trade up.	4
Low	Poor quality habitat, i.e. intensive agricultural or buildings and hardstanding. Can still form an important part of the ecological network.	Trade up.	2

The second factor used to calculate biodiversity units is habitat condition. This is measured using the Higher Level agri-environment Scheme Farm Environment Plan handbook, which divides habitat into three categories based on its condition. Each of these categories has an associated score for use in the calculator, shown below in Table 2.

TABLE 2. HABITAT CONDITION AND THE ASSOCIATED BIAC SCORE.

Habitat Condition	Score
Good	3
Moderate	2
Poor	1

These two factors are then multiplied together with the size of the habitat in hectares, giving the biodiversity unit for that habitat. The biodiversity score for the site is created through the sum of the units for each habitats throughout the site. An example is shown below using Semi natural broadleaved woodland (A1.1.1) and scattered scrub (A2.2).

TABLE 3. AN EXAMPLE OF A BIODIVERSITY UNIT CALCLATION.

Habitat code	Size (ha)	Distinciveness	Condition	Score
A1.1.1	3.21	6	2	38.52
A2.2	1.99	5	2	19.9
Total				58.42

The next step is to calculate the biodiversity units for the site after development and offsetting has taken place. This will allow for a net loss/gain of biodiversity units to be determined.

Habitat can either be maintained, restored (improved to a better condition) or created (which also includes expansion of existing habitats). As the certainty of the reality of planned offsetting varies, multipliers are applied to future biodiversity units to correct for disparity/risk. For example, some habitats are more difficult to restore/create than others (see Appendix 1 for a full list of habitat's difficulty classification). The second multiplier used is determined by the expected time the habitat will take to reach it's target condition (see Appendix 2). A 3.5% discount rate is used for this multiplier.

Hedgerows are features particularly important to biodiversity, due to their role in connectivity, and therefore requires a slightly different calculation. All hedgerows are treated, in terms of the required offsetting, as a high distinctiveness band, requiring like for like offsetting. Their distinctiveness multiplier is determined through different factors such as height and gappiness, outlined in Appendix 3.

TABLE 4A AND 4B. THE MULTIPLIERS RELATED TO DIFFICULT OF RESTORATION AND YEARS TO TARGET CONDITION.

Years to target condition	Multiplier
5	1.2
10	1.4
15	1.7
20	2.0
25	2.4
30	2.8
32	3

Difficulty of recreation/restoration	Multiplier
Very High	10
High	3
Medium	1.5
Low	1

COMPARISON

This report compares the DEFRA metric, alongside calculator templates from the Environment Bank (EB), from Warwickshire, Coventry and Solihull (WCS) and from the Thames Valley Ecological Records Centre (TVERC).

USABILITY

The base DEFRA metric has a very low level of usability, as no template document is supplied, so the user must interpret the guidance and undertake the calculations themselves, which could lead to a high risk of human error. The EB calculator supplies a template document which includes a wealth of information, with useful comments and additional sheets with definitions, tips, and instructions. There is also a clear and well

written guide. The WCS calculator also has a guide, which I would argue would be beneficial for TVERC to include. However, I would argue that the structure of the "Biodiversity Impact Calculator" sheet is flawed. I believe that having the Current and Proposed habitat on the same sheet complicates matters, and I believe separating the Recreated, Created and Restored habitat so rigidly makes filling in the calculator feel convoluted. The WCS calculator takes a different approach, having to enter habitat being retained, habitat being enhanced and habitat being lost initially, then in a later adding the habitat creation, and allowing the entry of the proposed condition for the habitat to be enhanced. This is also imperfect, as the split of existing/proposed habitat is blurred. A more streamlined approach would be similar to the TVERC template, where firstly the existing and proposed habitats are found on different sheets, and secondly the habitats in the proposed sites are listed in a single section, and you select the offsetting strategy (maintenance, restoration or creation) in a further column along the same row. Each of the calculators has different phrasing of the categories of offsetting strategy, and I believe a common standard would be beneficial to improve comparisons and transferability.

Another comment on the EB and WCS templates is that the amount of habitat created, restored and enhanced must equal exactly the same as the total of the existing habitat area. In principal this should occur, as the site's area is maintained, however due to the templates having numbers automatically rounded to the two decimal points, the points may not add up and it is difficult to see where the error (often of a magnitude of 0.001) may lie.

One criticism of the TVERC calculator ease of use is the fact that in both the proposed and existing habitat spreadsheet, sections are split into separate Phase 1 Habitat Classification Bands. This can lead to some inconvenience, for example if a site contains Woodland, and Open Water, but no Scrubland, Heathland or Mire, then there are large areas of empty space that you need to scroll through to get to the desired area.

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OUTPUT POTENTIAL

Although, in my opinion, the TVERC calculator is the easiest to use out of the four calculators tested, it falls down in its output. The DEFRA guide simply gives the loss/gain of total biodiversity units, while the TVERC calculator additionally gives the loss/gain of each band of habitat, as seen in Figure 1.

Phase 1 habitat	Loss / Gain
Woodland and Scrub	-33.03
Grassland and Marsh	0.00
Tall Herb and Fern	0.00
Heathland	0.00
Mire	0.00
Swamp, Marginal and Inundation	0.00
Open Water	0.00
Rock Exposure and Waste	0.00
Hedgerows	0.22
Miscellaneous	3.70
Total biodiversity units	-29.11

FIGURE 1. THE OUTPUT FROM THE TVERC BIODIVERSITY IMPACT ASSESSMENT CALCULATOR.

Both the EB and WCS calculators give more information. The EB calculator, alongside similar output seen in Figure 1, gives a table (Figure 2) which shows the “conservation credit requirement” for each habitat distinctiveness band. This information is available from the TVERC calculator, however specifically outlining the information that the developer requires for mitigation planning would be beneficial.

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Distinctiveness	Habitat	Conservation credit requirement	
Linear Features	Hedgerows and trees	0.0	like-for-like
	Ditches	0.0	
	Other	0	
Low	**TOTAL**	**0**	Trade up
Medium	**TOTAL**	**-17.78**	Same or better
High	**TOTAL**	**4.10**	Like-for-like
	Arable: Arable field margins	0	
	Arable: Other high distinctiveness arable	0	
	Other Features: Other high distinctiveness feature	0	
	Grassland: Calaminarian grasslands	0	
	Grassland: Lowland dry acid grassland	0	
	Grassland: Other acid grassland	0	
	Grassland: Lowland calcareous grassland	0	
	Grassland: Upland calcareous grassland	0	
	Grassland: Other calcareous grassland	0	
	Grassland: Lowland meadows	0	
	Grassland: Upland hay meadows	0	
	Grassland: Marsh/marshy grassland	0	
	Grassland: Purple moor grass and rush pastures	0	
	Grassland: Other high distinctiveness grassland	0	
	Woodland: Native broadleaved woodland	4.10	

FIGURE 2. THE CONSERVATION CREDIT REQUIREMENT TABLE SHOWN IN THE EB CALCULATOR.

The WCS calculator has several additional optional sheets, where alongside hedgerows, other connectivity features can be added and the impact of the development on connectivity throughout the site will be assessed. The WCS summary will also give an estimate of the financial cost of the offsetting required, which the accuracy of which may be questioned, however if accurate this is an incredibly useful tool for all parties involved in offsetting. Furthermore, the WCS calculator includes an evaluation of the impact of the development on the ecosystem services. Ecosystem services are the benefits that the environment provide to humans and can be broadly split into Provisioning (products originating from nature, such as food, timber or medicine), Cultural (services such as recreation and education) and Regulating Services (such as pollination and carbon sequestration; Braat et al., 2012). Showing the impact of the development on these services in a graphic form, see Figure 3 could be vital. It is more likely that a company would understand and relate to ecosystem service loss than factors such as biodiversity loss or the presence of an endangered plant species.

Overall, I would suggest that the TVERC calculator is the easiest and quickest to use, but its limited output may limit its application. A document introducing the calculator and offsetting metric, and a step by step guide to filling it in, would be beneficial. Another positive change could be the addition of different output options, to improve the number of potential uses for this tool.

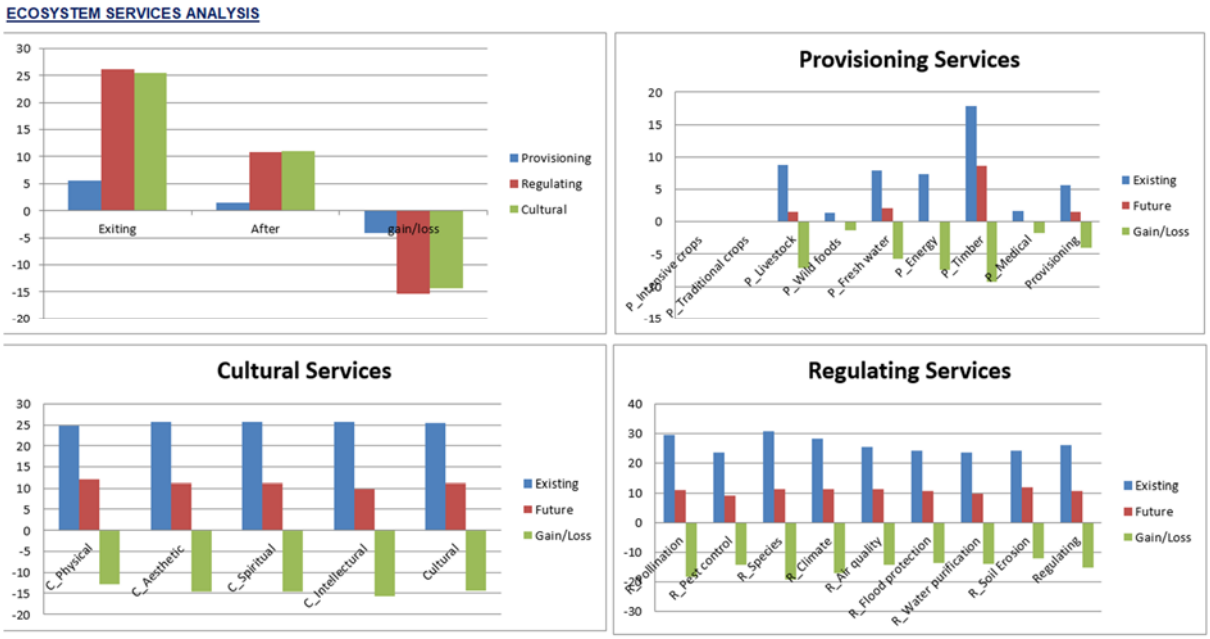

FIGURE 3. THE IMPACT OF A DEVELOPMENT ON ECOSYSTEM SERVICES, AS SEEN VIA THE WCS CALCULATOR.

FINAL RESULT

It is evident that the DEFRA calculator has a significantly higher prediction of biodiversity loss compared to the other three (Table 5). The Environment Bank and Warwickshire calculators are very similar, with the TVERC predicting a higher loss of biodiversity units. The difference primarily comes from the Units after Development phase. The primary reason behind this difference is the time and risk multipliers, which differ significantly in the DEFRA metric, hence the large difference in final result. The other 3 calculators differ for a similar reason, albeit to a lesser extent. Environment Bank and Warwickshire calculators have different values for Time to Target Condition for certain habitats. TVERC's calculator additionally has different Difficulty multipliers for some habitats, whereas Environment Bank and Warwickshire have consistent values. This explains the higher difference between TVERC and the other two calculators.

TABLE 5. COMPARISON OF NET BIODIVERSITY CHANGE FROM EACH CALCULATOR.

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Calculator	Units Before Dev	Units After Dev	Score
TVERC	71.70	42.60	-29.11
DEFRA	72.77	33.84	-38.92
Environment Bank	67.90	46.03	-21.87
Warwickshire	69.06	49.67	-19.39

As the site used as an example, Wolvercote Mill, saw no real change in in hedgerow, I recommend further investigation of the differences in calculating hedgerow gain/loss, as it is calculated separately.

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ABOUT TVERC

Thames Valley Environmental Records Centre (TVERC) is a 'not for profit' organisation covering Berkshire and Oxfordshire. We are run by a partnership and are one of a national network of local records centres. We are a member of the Association of Local Records Centres (ALERC) and the National Biodiversity Network (NBN). Our funding partners include all the local authorities in Oxfordshire & Berkshire plus the Environment Agency. We also work closely with the Berkshire, Buckinghamshire and Oxfordshire Wildlife Trust.

WHAT WE DO

We provide our funding partners with annually updated species and sites information as GIS tables, and undertake surveys of local wildlife sites. We also carry out data analysis for the monitoring of local authority Local Plans. We provide information to parish councils, local people, conservation bodies, land-owners, students and commercial organisations such as ecological consultants and utilities companies via data searches, data licensing and data exchanges. We provide other services such as ecological surveys, data analysis & presentation and training.

OUR RECORDS

We hold over 2.5 million records of flora and fauna in Berkshire and Oxfordshire plus information about Local Wildlife and Geological Sites, NERC Act S41 Habitats of Principal Importance (previously called UK Biodiversity Action Plan (BAP) habitats) and Ecological Networks (Conservation Target Areas and Biodiversity Opportunity Areas). We collect this data from the general public, skilled volunteer /amateur recorders, professionals working for wildlife charities (BBOWT and RSPB), professionals working for government agencies (the Environment Agency & local authorities) and ecological consultants. This information is used:

- by planning authorities and developers to make informed decisions on the design and location of sustainable development
- to help farmers, land-owners and conservation organisations manage land in the best way to enhance biodiversity
- by nature partnerships to direct wildlife conservation work
- by teachers, students and scientists for education and scientific research.

For more information please visit our website: www.tverc.org

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