

## Assessing the quality of the ecological component of English Environmental Statements

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## **Vitae**

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## **Abstract**

Environmental Impact Assessment (EIA) is a key tool to help ensure sustainable built development in more than 200 countries worldwide. Ecology is frequently a component of EIA and early reviews of Ecological Impact Assessment (EclA) chapters identified scope for improvement at almost every stage of the EclA process, regardless of country. However, there have been no reviews of UK EclA chapters since 2000, despite important changes in biodiversity and planning legislation, policy and guidance. In addition, no UK EclA chapter reviews have attempted to assign a grade or score to EclA chapters (as has been done for reviews of US, Finnish and Indian EclA chapters). Furthermore, no EclA chapter reviews have attempted to use a scoring system to identify which variables determine EclA chapter information content, beyond straightforward comparisons of EclA chapters before and after the introduction of guidelines.

A variant of the Biodiversity Assessment Index (BAI) was used to assign scores between zero and one to EclA chapters based on a series of 47 questions drawn from EU legislation and professional guidance. 112 EclA chapters for proposed developments that were subsequently granted planning permission in England were assessed. The mean BAI score was less than 0.5, indicating the presence of considerable information gaps in the majority of EclA chapters.

Of 13 predictor variables identified as having the potential to affect EclA chapter quality, 10 were identified as significantly related to the BAI scores. A backward stepwise Generalized Linear Model identified the use of professional guidance, the ecological consultancy type and the length of the EclA chapter as having the greatest combined explanatory power. As a result, several recommendations are made to help improve future EclA chapter content, including formal EclA chapter review, publicising the professional guidance to consultants, the provision of training and the introduction of an accreditation scheme for consultants involved in EclA.

This approach could be replicated in other countries that conduct EIA. Context-dependent EIA chapter review criteria (as in this paper) would help to identify targeted recommendations for improvement. Alternatively, a global set of review criteria could highlight areas of best practice that could then be exported to other countries.

### **Keywords**

Biodiversity, Ecology, Impact assessment, Review, Environmental Statement, EIA

# 1 INTRODUCTION

## 1.1 Environmental Impact Assessment

Environmental Impact Assessment (EIA) is legislated for, and/or conducted in, approximately 200 countries worldwide (Morgan, 2012). Its main purpose is to assess the potential environmental impacts of a proposed built development in advance (Glasson, 1994). This enables competent planning authorities (CPAs) to weigh the potential economic benefits of a proposed development (such as employment) against its likely environmental impacts, before making an informed planning decision. As a result, EIA has the potential to aid sustainable development across the globe (Glasson, 1994), but questions remain as to its effectiveness (Cashmore et al., 2004).

## 1.2 EIA Effectiveness

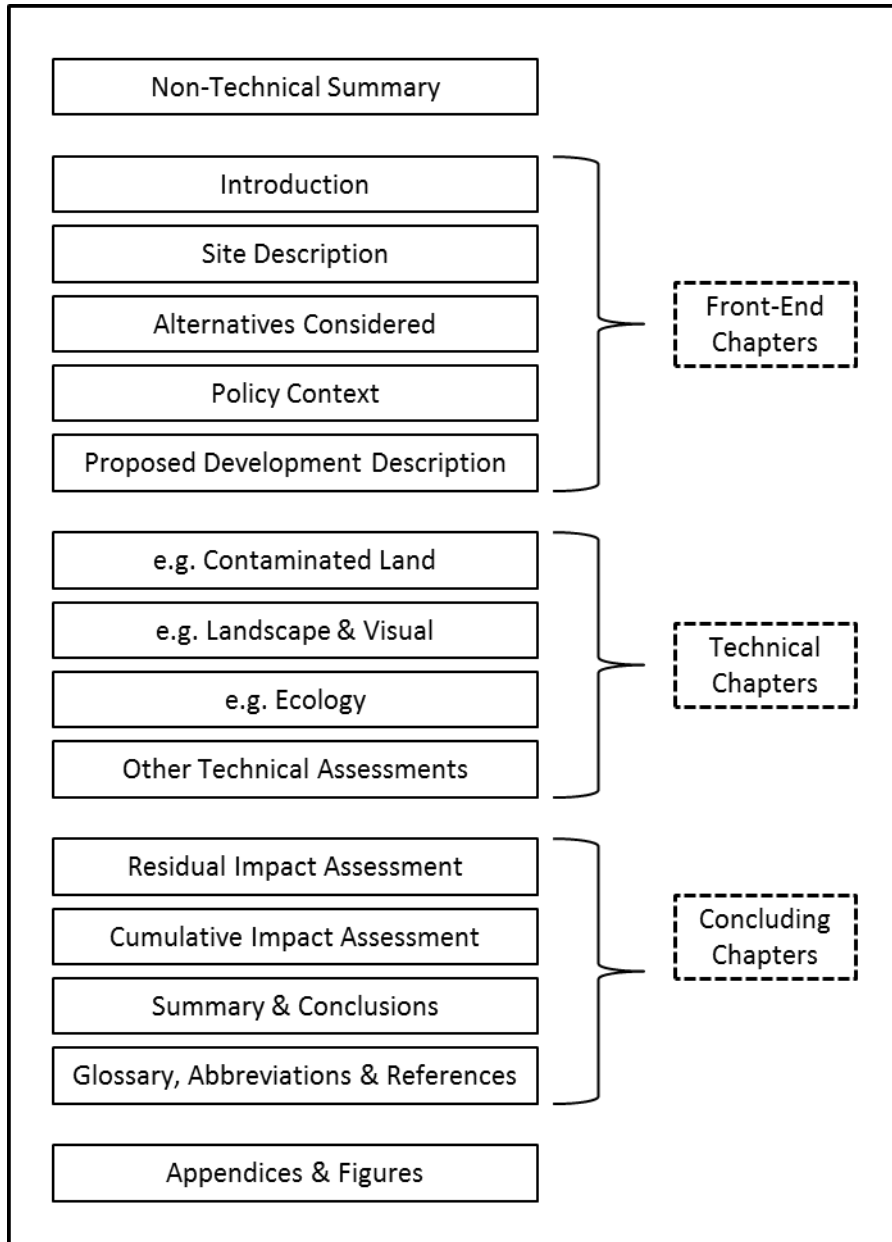
EIA was introduced to the European Union (EU) in 1985 (Council of the European Union, 1985, as amended) and was transposed into UK legislation shortly afterwards (HMG, 1988). The documentary output of EIA is a report known as an Environmental Statement (ES). This report is submitted to the CPA and an outline chapter structure for a typical ES is provided in Fig. 1. The introductory, or 'front-end', chapters are followed by technical chapters (such as ecology and archaeology) and finally the concluding chapters.

Considerable research on EIA effectiveness was conducted in the 1990s and early 2000s. EIA effectiveness studies commonly focused on:

- procedural effectiveness (whether EIA conforms to established provisions and principles); and
- substantive effectiveness (whether the purpose of EIA is achieved) (Sadler, 1996).

There is a range of different measures to determine the substantive effectiveness of EIA, including its influence on design and consent decisions, and its contribution to institutional capacity development (Cashmore et al., 2004). This has yet to be explored in the context of EclA (see Section 4.3). To help determine changes over time, however, his paper focuses on procedural effectiveness.

This has commonly been investigated through audits, for example of the documentary output of EIA/EcIA and/or of the completed development. This study uses a novel analytical approach to assess the main drivers of EcIA quality. The following sections describe the characteristics and results of document audits in EIA (Sections 1.2.1 and 1.2.2) and EcIA (Section 1.2.3).



**Fig 1:** Outline of a typical ES chapter structure

### 1.2.1 Checklist-based Audits of ESs

ES audits, or reviews, have tended to be accomplished by the use of checklists. Examples of commonly used checklist-based review packages include the European Commission's EIS Review Checklist (Environmental Resources Management, 2001) and the Environmental Statement Review Package (Lee and Colley, 1992), although bespoke checklists have also been produced (e.g. Bojorquez-Tapia and García, 1998; Ross, 1987). Whilst questionnaires, interviews and site visits may provide a higher level of detail and a richer context, checklist-based reviews tend to be relatively inexpensive and less time-consuming to conduct. In addition, they allow for detailed and systematic comparisons, and the empirical identification of patterns and trends.

Checklist-based reviews do, however, present several difficulties (Poder and Lukki, 2011). For example, they may not include key aspects of ESs in their review criteria, such as the consideration of alternatives. In addition, the most commonly used review packages require score aggregation to provide a final grade: given the issue of inter-reviewer variability, aggregation can differ between individuals. Finally, the ordinal grading system of the most commonly used review packages means that the difference in quality between grades 'A' and 'B' may be greater than the difference between grades 'B' and 'C', making interpretation more open to challenge.

Nevertheless, checklist-based reviews remain an important (although they should not be the only) tool to evaluate EIA procedural effectiveness. For example, previous checklist-based reviews have highlighted numerous flaws and shortcomings in UK ESs. These have included poor consideration of complex and interactive impacts (Jones et al., 1991), presentation bias (Lee and Colley, 1991) and poor consideration of alternatives and monitoring provisions (Wood et al., 1996), although there are indications that ESs have improved over time (Glasson et al., 1997; Lee and Brown, 1992; Wood et al., 1996). Checklist-based reviews have also established that other countries, including other EU member states and Canada have also been found to produce ESs that require improvement (Barker and Wood, 1999; Lawrence, 1997). However, previous ES audits have conducted only cursory

examinations of the variables potentially linked to ES quality (e.g. Oxford Brookes University Impact Assessment Unit, 1996), with no attempt to use statistical modelling to identify the key determinants of 'good' quality ESs.

### *1.2.2 Checklist-based Reviews of ES Technical Chapters*

Whilst checklist-based reviews of entire ESs are useful, their breadth can mask variability within and between individual technical chapters. Disaggregated studies of individual chapters can therefore provide richer detail (and potentially more targeted recommendations for improvement). For example, Badr et al. (2004) found that water impact assessment was conducted more poorly than EIA in general, and that water impact assessment quality was not as problematic as Ecological Impact Assessment (EclA). In addition, Glasson and Heaney (1993) found that socio-economic impact assessments were conducted particularly poorly in EIA.

### *1.2.3 Checklist-based Reviews of Ecological Impact Assessment Chapters*

Since the Convention on Biological Diversity in Rio de Janeiro (UNCED, 1992), there has been increasing recognition of the importance of biodiversity and ecology (UEBT, 2012). The EclA chapters of ESs for proposed developments in the UK have therefore been scrutinised several times, with six main studies having been published (Byron et al., 2000; RSPB, 1995; Spellerberg and Minshull, 1992; Thompson et al., 1997; Treweek and Thompson, 1997; Treweek et al., 1993). These early studies all conducted general thematic reviews (e.g. how well baseline data gathering was conducted, etc.), rather than systematically assessing EclA chapters and assigning grades or scores. All of these studies identified elements requiring considerable improvement in almost every section of the EclA chapter, including lack of consultation, poor baseline survey, lack of quantification (of the ecological baseline and impact predictions), inadequate cumulative impact assessment, vague mitigation measure descriptions, and low levels of commitment to mitigation and follow-up.

However, there have been considerable changes in the legislation, policy and guidance relating to biodiversity and planning since the last review was published in 2000. One of the most important changes was the introduction of the 'EclA Guidelines' by the then Institute of Ecology and



Environmental Management, the professional institute for ecological consultants in the UK (IEEM, 2006). IEEM received its Royal Charter in 2013 and is now known as CIEEM. This 67 page document provides case studies and clarifies best practice. However, with the exception of one study investigating the concept of impact significance in EclA chapters over time (Briggs and Hudson, 2013), there has been no published research on the influence that the EclA Guidelines has had on EclA chapters. As a result, and since there is a paucity of empirical results from disaggregated ES audit studies, this paper provides a novel empirical analysis of the EclA chapter of ESs, in an attempt to identify the main influences on EclA chapter quality and provide practical recommendations for improvement

## **2 METHOD**

This research follows earlier reviews of ESs, both by using information provision as a proxy for quality and by using a checklist to determine information provision.

### **2.1 EclA Chapter Sample**

The EclA chapters (including their technical appendices and figures, as well as the front-end and concluding chapters of the ESs) from 112 ESs submitted between 2000 and 2011 were selected for audit. All ESs were for proposed developments that had subsequently been granted planning permission in England (see A. 2 for a list of the EclA chapters reviewed). This ensured that any weaknesses identified had gone through the planning process without being rectified. The period 2000 to 2011 ensured no overlap in EclA chapters with the last review, which was based on ESs created between 1993 and 1997. It also ensured that changes before and after the introduction of the EclA Guidelines in 2006 could be identified. As noted in other UK ES audit studies, it is not possible to determine whether the sample of EclA chapters is representative as there is no central library or database of EIA planning applications in the UK (e.g. Badr et al., 2004).

## 2.2 Checklist and EclA Chapter Score

The process of assigning a numerical score to each EclA chapter was adapted from the Biodiversity Assessment Index (BAI) method developed by Atkinson et al. (2000) to investigate the impact of guidance on the quality of US EclA chapters. In this study, the EIA Directive's information requirements (Council of the European Union, 1985, as amended) and the EclA Guidelines' best practice recommendations were used to develop a set of 47 questions for the EclA chapter checklist, such as whether the size of the proposed development was included and whether ecological survey limitations were stated (see A. 1 for a full list of the questions used). Each of the 47 questions for each of the 112 EclA chapters was then assessed according to the following fourpoint scale:

- Completely answered;
- Not answered at all or not stated;
- Partly answered; and
- Not applicable to the EclA chapter.

The results were entered into a spreadsheet using commercially available software. The four-point scale was then used to develop a numerical score, or BAI, for each EclA chapter based on an equation devised by Atkinson et al. (2000) (see Eq. 1). The BAI calculation produces a value between zero and one for each EclA chapter. A score of zero indicates that none of the relevant questions were answered in any acceptable way within an EclA chapter, whilst a score of one indicates that every relevant question was answered fully. The index calculation takes into account partial answers and so a score of 0.5 could indicate either that every question was partially answered, or that half the questions were fully answered, or a combination of the two.

$$\text{Biodiversity Assessment Index} = \frac{(1.0 \times A) + (0.5 \times B)}{C} \quad (1)$$

where

A = the number of review questions fully addressed

B = the number of review questions partially addressed

C = the total number of relevant review questions addressed

Adapted from Atkinson *et al.* ([2000](#)).

An important modification to the Atkinson *et al.* (2000) equation was to allow 'C' (the total number of questions addressed) to vary according to whether questions were relevant to the EclA chapter. This resulted in the four-point scale described earlier, rather than the three-point scale used by Atkinson *et al.* (2000) and Soderman (2005). The advantage of this modification is that it accounts for question interdependence leading to artificially low BAI scores. For example, some EclA chapters, particularly those for proposed developments in highly urbanised areas, did not conduct ecological surveys and so could not state whether there had been any survey limitations.

In most cases, more than one reviewer is recommended for ES audit (e.g. Lee and Colley, 1992). However, due to time constraints, each EclA chapter in this study was audited by the same person. To help mitigate the lack of a second reviewer, the first five EclA chapters were subsequently re-analysed and the results compared to determine the replicability of the audit.

The use of an equation to calculate an overall score for each EclA chapter helps to reduce the subjectivity introduced by the grade aggregation methods of the most commonly used ES review checklists. A numerical score for each EclA chapter also enables statistical modelling to identify the most likely determinants of EclA chapter quality.

### **2.3 Potential Determinants of EclA Chapter Quality**

A literature review of both ES and EclA chapter review studies was conducted to identify which predictor variables were previously identified as varying with ES or EclA information content (A. 3). From these, the following predictor variables were identified as suitable for further analysis:

1. Year of planning application submission
2. Proposed development site size
3. Proposed development location (north of England and south of England)
4. CPA experience (as determined by CPA tier, e.g. County, District, Borough, etc.)
5. Ecological consultancy type (part of a multidisciplinary team or a specialist consultancy)
6. EclA chapter length
7. Planning application type (full or outline); and
8. Development sector ('waste', 'energy', 'transport', 'extraction' and 'mixed-use & residential')

Additional potential predictor variables were also identified:

9. Use of the EclA Guidelines (stated within the EclA chapter);
10. CPA involvement with the development (e.g. whether or not it proposed the development);
11. Whether or not a public inquiry was conducted;
12. Proportion of the ES occupied by the EclA chapter; and
13. Presence of designated sites on or adjacent to the proposed development site.

Statistical modelling was then used to identify the most important determinants of EclA chapter quality.

## **2.4 Data Analysis**

### *2.4.1 Replicability*

To determine whether the level of replicability between the two audits of the first five EclA chapters was acceptable, the alternative (one-tailed) hypothesis that the proportion of identical answers between the two audits was greater than 95% was tested. A one-sample binomial test procedure in SPSS was conducted for each re-reviewed EclA chapter.

#### 2.4.2 *Identifying the Key Determinants of EclA Chapter Quality*

All predictor variables, except 'year of planning application submission' were either categorical or converted into categorical variables to take into account extreme values. For example, one proposed development site was 800 ha in size, which was more than double the size of the next largest development. As a result, 'proposed development size' was split into three groups; small (less than 10 ha), medium (10-100 ha) and large (greater than 100 ha).

The relationships between the 12 categorical predictor variables and the BAI were determined using either the Kruskal-Wallis test or one-way ANOVA, depending on whether the assumption of normality was met. Where the assumption of homogeneity of variance was violated, Welch's ANOVA was used. The relationship of 'year of planning application submission' with the BAI was investigated using linear regression. Analyses were carried out using SPSS (IBM SPSS Statistics 19).

To determine which combination of predictor variables had the greatest explanatory power, a Generalized Linear Model (GLM) was used. Due to the large number of predictor variables in comparison to the sample size, interaction effects were not investigated. This analysis was conducted using Statistica (Statsoft Statistica 10). There is general consensus in the literature that the 'true', or even an 'optimal', model to explain a given dataset does not exist (e.g. Anderson and Burnham, 2002; Whittingham et al., 2006) and so this exercise is an attempt to reduce the 13 predictor variables for BAI scores to a smaller and more manageable number of predictors (principle of parsimony). As a result, backward stepwise deletion of the most non-significant predictor variables (i.e. those with a p-value of >0.05) was conducted (e.g. Guernier et al., 2004; Peltzer et al., 2008), although its limitations are recognised, (Freckleton, 2011; Mundry and Nunn, 2009; Whittingham et al., 2006).

### **3 RESULTS AND DISCUSSION**

#### **3.1 Replicability**

The null hypothesis that the proportion of identical answers is equal to 95% was rejected in favour of the alternative hypothesis that the proportion of identical answers is greater than 95%. The study therefore shows high replicability of EclA chapter analysis.

#### **3.2 BAI Score**

With a mean BAI score of less than 0.5 (Fig. 2), most of the EclA chapters reviewed contained considerable information gaps. This corresponds with the findings of other EclA chapter reviews worldwide that used the BAI (Atkinson, 2000; Soderman, 2005; Khera, 2010). Fig. 3 illustrates this with the five best and five worst answered questions amongst the 112 EclA chapters reviewed. Surprisingly, there many EclA chapters fail to state whether records from the Local Records Centre were obtained. Given that this should be a routine part of an EclA desk study, it may be that records are being obtained but simply not stated as having been obtained in the EclA chapter. The lack of consideration of future decommissioning impacts is also of concern. However, now that demolition has been included in the definition of projects potentially requiring EIA (European Commission v Ireland, 2011), it is likely that this will change into the future. Of particular concern, however, is how few EclA chapters state the significance of all the impacts identified, perhaps due to a lack of rigorous internal review. Without this information (or indeed the likely success of proposed mitigation measures) it is not possible for CPAs to make informed judgements on the likely residual impacts. Whilst genetic biodiversity surveys for EIA projects are usually unnecessary, consideration should, however, be given to the potential for population fragmentation and isolation, and the impacts this could have on genetic biodiversity. The lack of this information may be due to lack of readily available good practice on this issue.

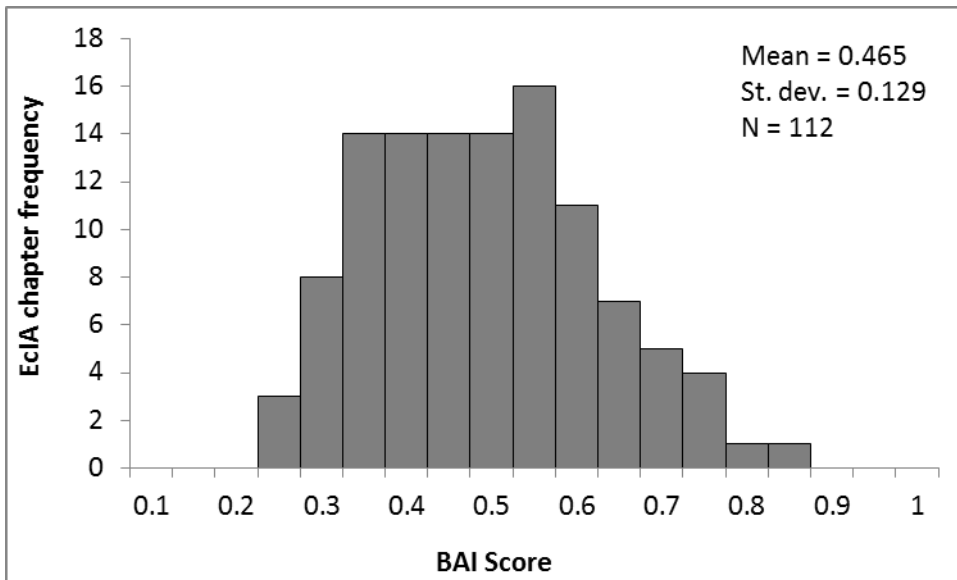


Fig 2: Frequency distribution and descriptive statistics of the BAI.

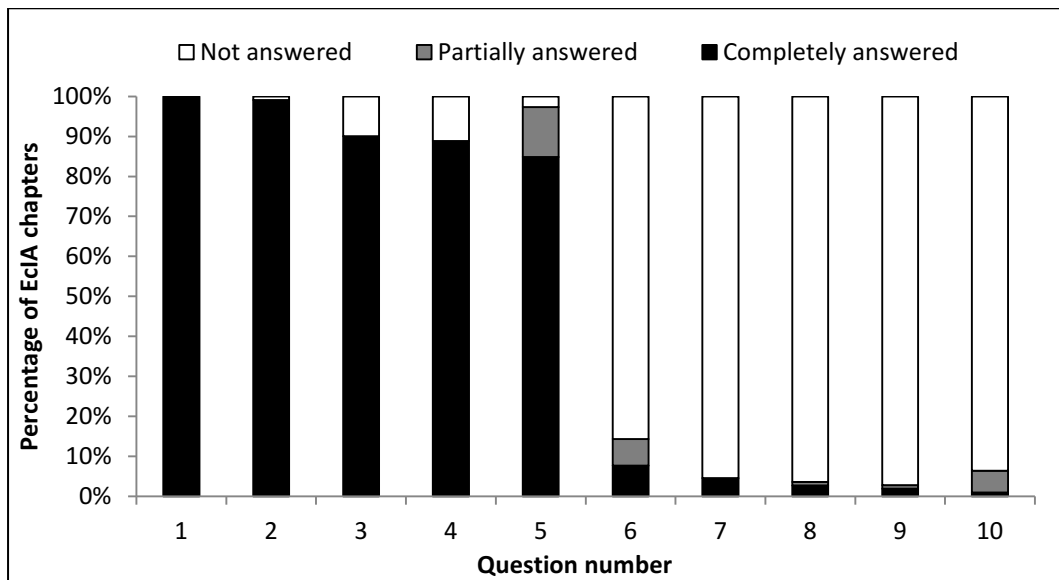


Fig 3: The five best and five worst answered questions from the EclIA chapter checklist. . N varies as not all questions were relevant to all EclIA chapters.

### 3.3 Predictor Variables Significantly Related to the BAI

#### 3.3.1 Year of planning application submission

A linear regression analysis revealed a significant relationship between planning application submission year and the BAI ( $R^2 = 0.077$ ,  $n = 112$ ,  $P = 0.003$ ). However, the variability explained by submission year was very small (7.7%) and so other predictor variables are likely to be important in

explaining the BAI scores. Whilst a small but statistically significant improvement over time was identified, this result contrasts with the “marked improvement in the proportion of satisfactory EIA” with time found in a previous study (Barker and Wood, 1999), perhaps because the learning curve for EclA practitioners may have levelled off shortly after that study was conducted.

### *3.3.2 Proposed development site size*

Proposed development size was categorised into small (100 ha). Of the 112 EclA chapters reviewed, 19 failed to state the proposed development size anywhere in the ES (i.e. failed to comply with the EIA Directive's information requirements) and were therefore removed from further analysis. There were highly significant differences in mean BAI scores depending on the size of the proposed development (Welch's ANOVA,  $F_{2,27.390} = 10.425$ ,  $P < 0.001$ ). Small developments had significantly lower BAI scores than medium and large developments (Tamhane T2 post hoc: '100 ha'  $P = 0.003$ ). However, there was no significant difference between medium and large developments (Tamhane T2 post hoc: '10-100 ha' and '>100 ha'  $P = 0.659$ ).

This echoes findings from previous studies that ESs and EclA chapters for smaller developments tended to be of lower quality (Barker and Wood, 1999; Lee and Colley, 1992; Oxford Brookes University Impact Assessment Unit, 1996). This may reflect their reduced likelihood of significant ecological impacts in comparison to larger developments and a consequent reduced concern by all those involved in the EclA process (including CPAs and consultees) that the EclA chapter content complies with guidance and legislation. However, it is not always the case that smaller developments are less likely to result in significant environmental impacts than larger developments: information is to be omitted, the reasoning should be made clear.



### 3.3.3 *Proposed development location*

There was a significant difference between the mean BAI scores for proposed developments in the North and South of England (Kruskal-Wallis test,  $H = 10.891$ ,  $df = 1$ ,  $P = 0.001$ ). The reasons for the higher quality of northern EclA chapters are unclear.

### 3.3.4 *CPA experience*

CPAs were classified into five levels: 'County', 'Unitary Authority', 'District', 'Metropolitan District', and 'London Borough'. The nine EclA chapters submitted to CPAs that did not meet these criteria (e.g. the Forestry Commission) were removed from further analysis. It was anticipated that higher tier CPAs (e.g. County) would have had the greatest number of EIA planning applications and therefore the greatest experience in assessing EIA planning applications, including ESs. It was considered that greater experience would result in greater demands in terms of information content and therefore higher BAI scores. Indeed, a one-way ANOVA identified a significant relationship between CPA tier and mean BAI score ( $F_{4,98} = 3.364$ ,  $P = 0.013$ ). However, the only significant differences were between London Borough councils and District councils, and between London Borough councils and Metropolitan Borough councils (Bonferroni post hoc: 'London Borough' and 'District'  $P = 0.023$ , London Borough and 'Metropolitan Borough'  $P = 0.045$ ). In both cases, the EclA chapters submitted to London Borough councils were of lower quality according to the BAI score than those submitted to District councils or Metropolitan Borough Councils.

Several of the EclA chapters submitted to London Borough councils were for small (less than one hectare) proposed developments in heavily urbanised sites, which were highly unlikely to have significant ecological impacts. Whilst consideration of ecology is commendable and to be encouraged, an EclA chapter in these cases was not strictly required. This may explain why many of the best practice recommendations and legislative information requirements were not included within these EclA chapters: it was likely not considered necessary by the consultants to do so, given the lack of ecological receptors.

### 3.3.5 *Ecological consultancy type*

The majority of EclA chapters were written and co-ordinated by the ecology team of a multidisciplinary environmental consultancy (79.6% of the 108 EclA chapters for which the authors could be determined). Many of these chapters included input from specialist independent ecological consultancies, and these were themselves the lead authors of 20.4% of EclA chapters. Whilst it could be theorised that specialist independent ecological consultancies would write more comprehensive EclA chapters, this was not found to be the case according to the BAI (one-way ANOVA,  $F_{1,106} = 6.077$ ,  $P = 0.028$ ,  $R^2 = 0.015$ ).

This is considered unlikely to be due to a relative lack of EclA experience: as was pointed out in an earlier study, “New consultancies may employ experienced practitioners” (Oxford Brookes University Impact Assessment Unit, 1996). This is particularly relevant now that there is a large body of experienced EIA and EclA practitioners in the UK, many of whom move from multidisciplinary consultancies to establish their own specialist independent consultancies (this trend has been exacerbated amongst EclA practitioners in recent years by the economic crisis, partly because ecology is a seasonal discipline). In multidisciplinary consultancies, each chapter is not only reviewed by senior members of the technical team but also by the ES co-ordinator. In small, specialist independent consultancies, however, the opportunities for such internal review are reduced, potentially resulting in information gaps being missed.

### 3.3.6 *EclA chapter length*

The length of the EclA chapter was split into three levels: ‘less than 20 pages’, ‘between 20 and 40 pages’, and ‘greater than 40 pages’. EclA chapters were found to range in length from four to 514 pages, with an average of 30.5 pages (excluding the 514 page EclA chapter). It was anticipated that short EclA chapters would have lower BAI scores than longer EclA chapters. This was indeed found to be the case (one-way ANOVA,  $F_{2,109} = 30.457$ ,  $P < 0.001$ ). Short EclA chapters have a greater likelihood of containing information gaps simply by virtue of their length. However, the longest

chapters were not necessarily the best in terms of addressing information gaps (Barker and Wood, 1999; Lee and Colley, 1992; Oxford Brookes University Impact Assessment Unit, 1996). For example, of the five EclA chapters longer than 75 pages, three scored less than 0.70 on the BAI.

### *3.3.7 Use of the EclA Guidelines*

Welch's ANOVA revealed that those EclA chapters that stated the use of the EclA Guidelines had significantly higher mean BAI scores in comparison with those that did not state the use the EclA Guidelines, either because they were unavailable or from choice ( $F_{1,108.105} = 19.542$ ,  $P < 0.001$ ). This is an encouraging result, as it indicates that the EclA Guidelines have had a positive effect on EclA chapter information content. The publication of the EclA Guidelines likely resulted in increased awareness amongst EclA practitioners of the importance of information provision in EclA chapters. In addition, by providing a framework against which EclA chapter content could be assessed, the EclA Guidelines likely also ensured that internal review processes could be more robust. However, this interpretation must be considered with caution, as the effect of time (although small, nevertheless significant, see Section 3.3.1) and the resultant increasing experience of developers, consultants, CPAs and consultees, as well as developments in EIA case law, also play important roles in the quality of EclA chapters

### *3.3.8 CPA involvement in the development*

The CPA was involved in 33 (29.5%) of the 112 proposed developments, most frequently proposing the development, and with the CPA owning three of the proposed development sites. It was anticipated that CPA involvement could result in EclA chapters of slightly lower quality: increased familiarity between the CPA and the consultants could result in unintentional under-reporting of information within the EclA chapter. However, the opposite was found to be the case for the BAI (one-way ANOVA,  $F_{1,110} = 3.949$ ,  $P = 0.049$ ). This may have been to help ensure that no accusations of bias, or a potential High Court challenge, could be made by the public.

### *3.3.9 Proportion of the ES occupied by the EclA chapter*

Whilst EclA chapter length was considered to be an important predictor of quality, it was possible that the emphasis given to ecology within the ES itself could be an indication of EclA quality. It was anticipated that the greater the proportion of the ES occupied by the EclA chapter, the higher the EclA chapter's quality was likely to be. A one-way ANOVA identified a significant positive relationship between the proportion of an ES occupied by the EclA chapter and the BAI ( $F_{2,109} = 11.848$ ,  $P < 0.001$ ). Whilst important, this appears to be a less powerful predictor of EclA quality than EclA chapter length, as only 17.8% of the variability in the data is explained, compared to 35.8% for the EclA chapter length. This may be because ESs for large developments (which have been shown to have significantly higher, see Section 3.3.1) may contain up to 20 technical chapters as a result of scoping, potentially (although not necessarily) reducing the proportion of the ES that can be occupied by ecology

### *3.3.10 Presence of designated sites*

It was anticipated that the presence of designated sites (whether statutory or non-statutory) on or adjacent to the proposed development site would increase the development's visibility, both to the public but also to the CPA and statutory nature conservation consultees. As a result, it was considered that a more thorough approach to the EclA and chapter would be taken, with a corresponding improvement in the BAI score. This was indeed found to be the case for the BAI scores of the 107 EclA chapters that stated whether or not designated sites were located on or adjacent to the proposed development site (one-way ANOVA,  $F_{1,105} = 5.519$ ,  $P = 0.021$ ). However, only 5% of the data's variability was explained by the presence of designated sites and so this does not appear to be a strong predictor of BAI scores.

### **3.4 Predictor Variables Not Significantly Related to the BAI**

#### *3.4.1 Planning application type*

Of the 112 EclA chapters reviewed in this study, 64 (57.1%) were submitted as part of full planning applications and 33 (29.5%) as part of outline planning applications. The application type could not be determined for six EclA chapters and nine were submitted as other planning application types (e.g. reserved matters). Due to the small numbers of unknown and other planning application types, these were removed from the analysis and only the differences in EclA chapter quality between full and outline planning applications were investigated.

Analysis revealed no significant difference in the median BAI scores for outline and full planning application EclA chapters (Kruskal-Wallis  $H = 2.322$ ,  $df = 1$ ,  $P = 0.128$ , respectively). This is a departure from the finding of the Oxford Brookes University Impact Assessment Unit (1996). It is possible that the change is due to that study being conducted over 15 years ago on a relatively small sample (25 matched pairs) of ESs rather than EclA chapters. However, it is considered likely that the change is at least partly related to case law requiring outline planning applications to provide more detail than was previously considered necessary (*R v Rochdale Metropolitan Borough Council ex parte Tew and others*, 1999).

#### *3.4.2 Proposed development sector*

Development sector was split into five levels; 'waste', 'energy', 'transport', 'extraction' and 'mixed-use & residential'. Energy developments had the highest mean BAI scores (0.53), followed by transport (0.49), extraction (0.47), mixed-use and residential (0.44), and waste (0.42). However, there was no significant difference in the mean BAI scores for different development sectors (one-way ANOVA,  $F_{4,107} = 2.073$ ,  $df = 4$ ,  $P = 0.089$ ).

This is a departure from the findings of several early studies, which identified relationships between poor quality EclA chapters and ESs for, for example, urban development and residential projects

(Barker and Wood, 1999; Oxford Brookes University Impact Assessment Unit, 1996; RSPB, 1995). An early review of EclA practice found that “ecological impact assessment has emerged as a subdiscipline which is often under-resourced” (Treweek, 1996, p. 191). However, with an increasing body of case law and with increasing public awareness of ecological issues, the standardisation of EclA chapter quality across development sectors may be due to the greater emphasis that has been placed on EIA and particularly on ecology within EIA over time.

### *3.4.3 Public inquiry*

A link was suggested between quality and development controversy in an earlier study (Barker and Wood, 1999). To help test this, the influence of public inquiry on the BAI was analysed as a proxy for controversy (the 112 EclA chapters analysed were the most recent submissions, including any amendments made by addenda or revised EclA chapters for the public inquiry). Whilst the mean BAI score was higher for those developments for which a public inquiry was conducted (0.49) in comparison to those for which a public inquiry was not conducted (0.46), the difference was not found to be significant (one-way ANOVA,  $F_{1,110} = 1.357$ ,  $P = 0.247$ ). Early research on the substantive effectiveness of EIA investigated its influence on decision-making and found it to be minimal (e.g. Wood and Jones, 1995; Wood and Jones, 1997). Further work to establish whether this remains the case would help determine whether ES quality influences decision-making.

## **3.5 Predictor Variables with the Greatest Explanatory Power**

One of the key aims of this study is to identify which predictor variables are the key determinants of EclA chapter quality. This is a novel analysis (see Section 2.4.2 for the methodology) that to the authors' knowledge has not yet been conducted on either entire ESs or ES technical chapters. Quantitative analysis of procedural effectiveness through descriptive statistics is relatively common in the literature. However, to our knowledge this is the first attempt to apply inferential statistics to explore procedural effectiveness.

Of the 13 predictor variables identified as likely to have some influence on EclA chapter quality, three were retained as significant in the final backwards stepwise GLM. It is encouraging to see the use of the EclA Guidelines in the final model (Table 1), as it indicates that professional institutions have an important role to play in improving practice. The retention of EclA chapter length highlights the importance of ensuring all information is either included, or at the least an explanation given for omissions. The inclusion of consultancy type in the final model highlights the importance of a rigorous and multi-level EclA chapter review process.

**Table 1.** BAI predictor variables with the greatest explanatory power

Predictor variable	Estimate	Wald statistic	P-value
Intercept	0.457	1580.156	<0.001
Use of the EclA Guidelines: Yes	0.039	17.115	<0.001
Use of the EclA Guidelines: No	0 <sup>a</sup>	-	-
Ecological consultancy type: Multidisciplinary	0.027	0.011	0.019
Ecological consultancy type: Specialist	0 <sup>a</sup>	-	-
EclA chapter length: <20 pages	-0.09	0.013	0.397
EclA chapter length: 20-40 pages	0.011	0.717	0.397
EclA chapter length: >40 pages	0 <sup>a</sup>	-	-
Scale	0.095	-	-

<sup>a</sup> = Set to zero because this parameter is redundant.

## 4 CONCLUSIONS

This EclA chapter audit aimed to determine the remaining weaknesses in information provision, identify any changes over time, and investigate the reasons for those changes. The main finding that, on average, EclA chapters score less than 0.5 on the BAI, is of considerable concern. Since the questions on which the BAI was based were drawn from legislation and the EclA Guidelines, it indicates that EclA chapters are routinely either lacking, or only providing incomplete information, that may be of relevance to the decision-making process (highlighted by one of the worst answered questions being the inclusion of significance for all stated impacts).

This study is the first comprehensive attempt to identify the variables linked with EclA chapter quality and to identify which are the key determinants of EclA chapter quality. Whilst not a novel approach, the BAI calculation has been applied for the first time to English EclA chapters and has been modified to address one of its main criticisms (see Section 2.2). However, the approach has some limitations (including several of those that apply to checklist-based reviews as described in Section 1.2.1) and so should not be used in isolation.

#### **4.1 Autocritique**

The use of a quantitative approach to assessing EclA chapter quality could also be questioned. The debate on which methodological perspective is preferable is an interesting parallel to the debate on EIA theory (Cashmore et al., 2004). The positivist approach, on which quantitative methodology is based, is closely related to rationalist decision-making theory (Weston, 2010). As a result, quantitative methodology and rationalist decision-making theory are subject to similar criticisms, such as being reductionist and determinist. There is growing consensus in the literature that decision-making within the context of EIA (e.g. scoping and screening decisions), as well as the 'science' in EIA, are not made in a purely rational context (e.g. Weston, 2000a; Cashmore et al., 2008). This would seem to argue in favour of the use of qualitative methodology and data analysis. However, the benefits of triangulation (Johnson and Onwuegbuzie, 2004) suggest that quantitative data analysis can also play an important role in EIA research. Given the benefits of being systematic, replicable and generalisable, this study develops and applies the quantitative approach (particularly the novel use of inferential statistics) in the fields of ES and EclA chapter audit, which have traditionally been dominated by the qualitative approach and descriptive statistics. This addresses both some of the shortcomings identified in earlier review packages and a research gap (see Section 1.2).



## 4.2 Recommendations

Given this study's finding that the provision of information in many EclA chapters is poor, the following recommendations have been proposed:

- Mandatory naming of EclA chapter authors and surveyors in the EclA chapter. Our review found that 67.9% of EclA chapters failed to include the names of any of the ecological surveyors involved in the assessment and 65.2% failed to state any of the surveyors' qualifications, such as CIEEM membership and European Protected Species (EPS) survey licence number. This would promote accountability and encourage greater responsibility in EclA chapter writing and surveying.
- Accreditation (perhaps through CIEEM) to ensure that only suitably experienced and qualified professionals can write EclA chapters (there is currently no restriction on who can write EclA chapters);
- Mandatory EclA training (e.g. via CIEEM) for individuals to be eligible for accreditation. Regular and formal review of a representative sample of EclA chapters (reflecting the finding that different ES chapters perform differently under audit) by CIEEM. The findings should be disseminated to practitioners, including examples of best practice. Examples of poor EclA chapters found in the review should trigger a requirement for further training for the authors and/or surveyors to maintain CIEEM membership;
- Regular updates of the EclA chapter guidelines by CIEEM (last published in 2006) to ensure that changes in legislation and practice (including findings from the regular EclA chapter review from the previous recommendation) over time are incorporated.
- Active (rather than the current passive) promotion of existing EclA guidance documents;

If standards are rigorously enforced, all of these recommendations can be applied to EIA systems across the globe.

### **4.3 Further Work**

Whilst this study has investigated the procedural effectiveness of EclA chapters, there is a need to investigate their substantive effectiveness, i.e. to what extent the completeness of information in EclA chapters is important in the decision-making process. There is also potential for developing a comprehensive set of basic EclA chapter review criteria that can be applied to EclA chapters worldwide, regardless of context. For example, an assessment of BAI results for EclA chapters from different countries could highlight instances of best practice, as well as identify more effective guidance documents and/or legislation, which could then be exported to other countries.

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## Appendix A. Biodiversity assessment index questions

Question Number	EclA Stage	BAI Question	EclA Guidelines Reference	EIA Directive Reference	Comments
1	Design	Were alternative sites considered with reference to ecology?	p14	Article 5 Annex IV	The EIA Directive includes a requirement to provide "An outline of the main alternatives studied by the developer... taking into account the environmental effects." Consideration of alternative sites was not always possible but it was felt that attempts to do so should be recognised. As a result, two questions regarding alternatives were included.
2	Design	Were alternative processes / designs / methods considered with reference to ecology?	p14	Article 5 Annex IV	
3	Baseline	Was the size of the site given?	p14	Article 5	Whilst explicitly included in Article 5, site size is also indirectly included under Annex IV's requirement to provide "a description of the physical characteristics of the whole project".
4	Baseline	Was the ecology for any off-site construction areas described?	p14-15	Annex IV	This comes under the EIA Directive's requirement to provide "a description of the physical characteristics of the whole project" but is considered sufficiently important and poorly addressed to warrant a separate question.
5	Baseline	Was the Phase I survey conducted according to named guidelines?	p18	N/A	"[A habitat survey] should use established methodologies"
6	Baseline	Did all surveys acknowledge limitations?	p6, p32	Annex IV	The EIA Directive requires that "difficulties (technical deficiencies or lack of know-how)" should be stated.
7	Baseline	Was the precautionary method, or worst-case scenario, stated as used?	p13	N/A	The EclA Guidelines state that "best and worst-case operating conditions" should be considered and that "In cases of reasonable doubt...a precautionary view should always be taken".
8	Baseline	Was the proposed timescale of construction activities given?	p14	N/A	The EclA Guidelines state that the "lifetime of [the] project" is required to be able to carry out effective EclA. Given that construction and operation activities may be conducted over different time frames, these should be stated.
9	Baseline	Is the proposed timescale of operation activities given?	p14	N/A	
10	Baseline	Were records from Local Records Centre/s obtained?	p17	N/A	The EclA Guidelines state that "Contextual information is essential to confirm spatial and temporal scope." Such information can be obtained readily from these sources.
11	Baseline	Were records from Local Wildlife Groups obtained?	p17	N/A	
12	Baseline	Were records from the NBN Gateway obtained?	p17	N/A	
13	Baseline	Was the Zone of Influence (Zol) identified?	p13	N/A	The EclA Guidelines define the Zol as "areas and resources that may be affected by the biophysical changes caused by the identified activities, however remote from the project site".
14	Baseline	Were the habitats and species within the Zol been characterised?		N/A	
15	Evaluation	Was the conservation status of habitats explicitly given?	p37	N/A	Whilst primarily mentioned within the EclA Guidelines with regard to determining the significance of an impact, conservation status is also important in the evaluation of a receptor.
16	Evaluation	Was the conservation status of species explicitly given?		N/A	
17	Evaluation	Were habitats given a geographical context (e.g. locally important, etc.)?	p20-21	N/A	The EclA Guidelines provide a frame of reference for this assessment of value.



Question Number	EclA Stage	BAI Question	EclA Guidelines Reference	EIA Directive Reference	Comments
18	Evaluation	Were species given a geographical context (e.g. locally important, etc.)?		N/A	
19	Impact Assessment	Were ecological impacts described within the EclA chapter?	p8, p30	Article 5 Annex IV	The EIA Directive requires “A description of the likely significant effects of the proposed project on the environment”, which includes ecology.
20	Impact Assessment	Was any mention made of population dynamics?	p31	N/A	All of these are given as “examples of aspects of ecological structure and function to consider when predicting impacts.”
21	Impact Assessment	Was any mention made of vegetation dynamics?		N/A	
22	Impact Assessment	Was any mention made of ecological relationships?		N/A	
23	Impact Assessment	Was any mention made of ecological roles?		N/A	
24	Impact Assessment	Was any mention made of ecosystem properties?		N/A	
25	Impact Assessment	Was any mention made of genetic biodiversity?	p31, p41, p44	N/A	Whilst genetic biodiversity is not used as a term in the EclA Guidelines, several references to the impacts of development on genetics are made as part of a case study example.
26	Impact Assessment	Were economic and social consequences of biodiversity loss considered in the assessment of the project’s impacts?	P18, p20, p27-28	Annex IV	This is indirectly included within the EIA Directive as a requirement to consider “aspects of the environment likely to be significantly affected by the proposed project, including...population, fauna, flora, soil, water, air...and the inter-relationship between the above factors.”
27	Impact Assessment	Were complex / interactive / cumulative impacts considered?	p30-31	Annex IV	Secondary and cumulative impacts are specified for inclusion within the “description of the likely significant effects of the proposed project on the environment” required in the EIA Directive.
28	Impact Assessment	Was any reference made to climate change / global warming (with regard to ecology)?	p23, p30-31, p34	Annex IV	This has been considered in this study to be similar to the assessment of ‘cumulative, complex and interactive effects’ but worth a separate question due to its importance as an impact on ecology. In addition, a consideration of “climatic factors” and their interaction with, for example, flora and fauna are included in Annex IV.
29	Impact Assessment	Was an explicit distinction between operational and construction impacts made?	p9, p13-15	N/A	The EclA Guidelines state that the “assessment process...should cover construction, operation and any decommissioning stages of any project”
30	Impact Assessment	Were decommissioning impacts explicitly identified?		N/A	
31	Impact Assessment	Was at least one ecological impact quantified?	p5, p10, p33	N/A	The EclA Guidelines state that the “assessment process...should...quantify the extent, magnitude, duration, timing and frequency of the impacts” and that “When describing changes/activities and impacts on ecosystem structure and function, reference should be made to the following parameters... • positive or negative; • magnitude; • extent; • duration; • reversibility; and • timing and frequency. ”
32	Impact Assessment	Were all impacts identified as positive, neutral or negative?		N/A	
33	Impact Assessment	Was the magnitude of all impacts identified?		N/A	
34	Impact Assessment	Was the physical extent of all impacts identified?		N/A	
35	Impact Assessment	Was the duration of all impacts given?		N/A	

Question Number	EclA Stage	BAI Question	EclA Guidelines Reference	EIA Directive Reference	Comments
36	Impact Assessment	Was the reversibility of all impacts considered?		N/A	
37	Impact Assessment	Were the timing and frequency of all impacts given?		N/A	
38	Impact Assessment	Were direct versus indirect impacts explicitly identified?	p17	Annex IV	Indirect effects are specified for inclusion within the "description of the likely significant effects of the proposed project on the environment" required in the EIA Directive.
39	Impact Assessment	Was the significance of all impacts stated?	p5, p35	N/A	The EclA Guidelines state that "The purpose of EclA is to provide decision-makers with clear and concise information about the likely significant ecological effects associated with a project."
40	Impact Assessment	Was the level of confidence in all impact predictions provided?	p10, p32	N/A	The EclA Guidelines state that "the degree of confidence in the assessment of the impact on ecological structure and function" should be considered.
41	Impact Assessment	Was there a summary/table of the assessment of biodiversity impacts in the report?	p46	N/A	Whilst not explicitly stated as required in the EclA Guidelines, a summary table is provided in a worked example and is considered useful.
42	Mitigation	Was ecological mitigation of impacts described?	P47-48	Article 5 Annex IV	The EIA Directive requires a "description of the measures envisaged to prevent, reduce and where possible offset any significant adverse effects on the environment", all of which is classified as mitigation.
43	Mitigation	Was the likely success of all mitigation measures indicated?	p47	N/A	The EclA Guidelines state that "evidence should be provided of the effectiveness of recommended mitigation, compensation and enhancement measures and to what extent their success can be guaranteed."
44	Mitigation	Was the time required until any mitigation would likely become effective given?	P48	N/A	Whilst not specifically recommended for inclusion, the EclA Guidelines state that "there may be a temporary or permanent loss of ecological value due to a time lag between damage occurring and the new habitat becoming fully functional" and it is considered that this is applicable to, and should therefore be acknowledged in, the majority of EclAs.
45	Mitigation	Was there any evidence of commitment from the developer that mitigation would take place in the EclA?	p47	N/A	The EclA Guidelines state that "A shopping list of 'proposed mitigation' at the end of an EclA is of very little value as it requires the competent authority to enter into discussion with the proponent to agree what will be implemented."
46	Monitoring	Was any mention made of monitoring?	p48	N/A	The EclA Guidelines state that "it is good practice to monitor the success of mitigation or compensation measures that are proposed as part of an EclA".
47	Monitoring	Was there a commitment from the developer that monitoring would take place?			

## Appendix B. List of EclA chapters reviewed

EclA chapter number	Site name	CPA the planning application was submitted to	Year of ES submission
1	Shepperton Studios	Spelthorne Borough Council	2004
2	Wave Hub	Penwith District Council	2006

<b>EclA chapter number</b>	<b>Site name</b>	<b>CPA the planning application was submitted to</b>	<b>Year of ES submission</b>
3	Heart of East Greenwich	London Borough of Greenwich	2008
4	110 Bishopsgate (Heron Tower)	City of London	2005
5	The Avenue	Derbyshire County Council	2007
6	21 Wapping Lane	Tower Hamlets Borough Council	2006
7	Enderby Park & Ride	Leicestershire County Council	2006
8	Fairfield School Sports Pitches	Bristol City Council	2005
9	399 Edgware Road	London Borough of Brent	2006
10	Ramada Deansgate	Manchester City Council	2008
11	Addenbrookes Access Road	Cambridgeshire County Council	2006
12	20 Fenchurch Street	City of London	2006
13	Westgate Centre	Oxford City Council	2006
14	Yelvertoft	Daventry District Council	2009
15	Glyndebourne Wind Turbine	Lewes District Council	2007
16	Blackburn Meadows	Sheffield City Council	2008
17	Blackstone Edge	Barnsley Metropolitan Borough Council	2008
18	Broom Hill Quarry	Bedfordshire County Council	2005
19	Burton Wold Wind Farm Extension	Kettering Borough Council	2007
20	Charlton Road Food Store	Bath and North East Somerset	2008
21	Polwell Lane	Kettering Borough Council	2008
22	Quest Pit	Bedfordshire County Council	2006
23	Heartwood Forest	Forestry Commission	2009
24	New Albion Wind Farm	Kettering Borough Council	2009
25	Loampit Vale	London Borough of Lewisham	2009
26	Fullabrook Wind Farm	North Devon District Council	2004
27	Bent Farm Quarry	Cheshire East Council	2008
28	Marriott's Walk	West Oxfordshire District Council	2006
29	Whitemoor Phase 2	Cambridgeshire County Council	2009
30	Seager Distillery	Lewisham Borough Council	2008
31	Walton Bridge	Surrey County Council	2007
32	Hellrigg Wind Farm	Allerdale Borough Council	2007
33	Watchet East Wharf	West Somerset Council	2008
34	Isham Bypass	Northamptonshire County Council	2005
35	Wycombe Marsh Paper Mills	Wycombe District Council	2002
36	White Moss Quarry	Cheshire County Council	2008
37	Winchester Silver Hill	Winchester City Council	2006
38	Corby Northern Orbital Road	Northamptonshire County Council	2007
39	Lewisham Gateway	London Borough of Lewisham	2006
40	Monksmoor Farm	Daventry District Council	2007
41	Watermark Place	City of London	2005
42	Weirside	West Berkshire District Council	2005
43	Charlestown Riverside	Salford City Council	2010
44	Teal Park	North Kesteven District Council	2009
45	A11 Fiveways to Thetford	Secretary of State for Transport	2008
46	Billingham Biomass Plant	Stockton-on-Tees Borough Council	2009
47	Little Cheyne Court Wind Farm	Shepway District Council	2002
48	London Cable Car	Greenwich Borough Council	2010
49	Teesside Gas Processing Plant	Stockton-on-Tees Borough Council	2010
50	Southall Gas Works	Ealing Borough Council	2008

<b>EclA chapter number</b>	<b>Site name</b>	<b>CPA the planning application was submitted to</b>	<b>Year of ES submission</b>
51	South Winchester Park and Ride	Hampshire County Council	2007
52	Houghton Quarry	Central Bedfordshire Borough Council	2007
53	Victoria Station Upgrade	Secretary of State for Transport	2007
54	Lower Clarence Wharf	Stockton-on-Tees Borough Council	2009
55	Merevale Lane	Warwickshire County Council	2008
56	East Cowes	Isle of Wight Council	2006
57	Land at Hill Top Farm	Cheshire County Council	2007
58	Essex University Research Park Extension	Colchester Borough Council	2005
59	King Alfred Sports Centre	Brighton & Hove City Council	2006
60	Regent's Place	Camden Borough Council	2007
61	Prospect Business Park	Purbeck District Council	2007
62	Salisbury Park & Ride	Wiltshire County Council	2006
63	Mersey Gateway	Halton Borough Council	2008
64	Exeter Science Park	East Devon District Council	2009
65	Great Western Park	South Oxordshire District Council	2005
66	Docklands Light Railway	Tower Hamlets Borough Council	2006
67	West Quay Marina	Borough of Poole Council	2008
68	Hartland Park	Hart District Council	2007
69	Hewlett Packard	South Gloucestershire District Council	2004
70	Broadgate	City of London	2010
71	London Road, Amesbury	Wiltshire County Council	2008
72	Town Farm Quarry	Devon County Council	2009
73	Jeskyn's Farm	Forestry Commission	2006
74	London Park Hotel	Southwark Borough Council	2007
75	Fairford Lakes	Cotswold District Council	2009
76	Pebsham HWRS	East Sussex County Council	2008
77	Huntsman Drive	Stockton-on-Tees Borough Council	2011
78	Drakelow CCGT	Secretary of State for Trade and Industry	2005
79	Humber Gateway Onshore Cable	East Riding of Yorkshire	2008
80	Humber Gateway Substation	East Riding of Yorkshire	2009
81	Wigmore Employment Area	Luton Borough Council	2009
82	Bathside Bay	Tendring District Council	2003
83	St Mary Axe	City of London	2008
84	London Wall Place	City of London	2010
85	East of Kettering	East Kettering Borough Council	2008
86	A23 Handcross toWarninglid	Secretary of State for Transport	2008
87	Riverbank House	City of London	2007
88	Warwick Campus Extension	Warwick District Council	2009
89	Vopak Terminal	Stockton-on-Tees Borough Council	2006
90	King's Cross Central	Camden Borough Council; Islington Borough Council	2004
91	Second Opening Bridge, Poole	Secretary of State for Transport	2004
92	Olympic Park Site Preparation	Olympic Delivery Planning Authority	2007
93	Land West of Becklees Farm	Cumbria County Council	2010
94	Stone House	City of London	2010
95	30 Old Bailey	City of London	2007
96	King's Cross Enhancement	Camden Borough Council	2006
97	Exeter Gateway	East Devon District Council	2000
98	Coolgardie Keighley Road	City of Bradford Metropolitan District Council	2006

<b>EclA chapter number</b>	<b>Site name</b>	<b>CPA the planning application was submitted to</b>	<b>Year of ES submission</b>
99	Bishopsgate Tower	City of London	2006
100	Billingham Mine Waste Management	Stockton-on-Tees Borough Council	2010
101	Cambridge Biomedical Centre Expansion	Cambridge City Council	2006
102	Guest and Chrimes Remediation	Rotherham Metropolitan Borough Council	2007
103	Lower Broughton Regeneration	Salford City Council	2006
104	Canley Regeneration Area	Coventry City Council	2009
105	Lakeside, Scunthorpe	North Lincolnshire District Council	2003
106	Northside Bridge	Cumbria County Council	2010
107	North Quay Road	East Sussex County Council	2005
108	Felixstowe South Reconfiguration	Suffolk Coastal District Council	2003
109	Edingale to Drakelow Gas Pipeline	South Derbyshire District Council	2008
110	Lower Broughton Reserved Matters	Salford City Council	2008
111	Battersea Power Station	Wandsworth Borough Council	2009
112	Brent Cross	Barnet Borough Council	2008

Appendix C: Factors identified from the literature review as varying with ES or EclA information content and quality.

Factor	Identified Relationship
Year	"The quality of statements reviewed improved (in most cases) from 1992 onwards and were generally the best in all aspects in 1994" (RSPB, 1995).
	"There has been a marked improvement in the proportion of satisfactory EIA...over the last few years" (Barker and Wood, 1999).
Proposed development size	Small projects were more likely to have 'unsatisfactory' ESs (Lee and Colley, 1992).
	"The larger the project the more satisfactory the ES tends to be" (Oxford Brookes University Impact Assessment Unit, 1996).
	"Better EIA reports tended to relate to the larger projects" (Barker and Wood, 1999).
Location of the proposed development	"Many of the statements considered to be well balanced and detailed were for developments within the south-east of England" (RSPB, 1995).
CPA and consultee experience	"Experienced decision-makers demand and usually receive better quality statements" (RSPB, 1995).
	"There is a...correlation between (review) experience and ES quality for local authorities... With a few exceptions, the review experience of county councils far exceeds that of district councils" (Oxford Brookes University Impact Assessment Unit, 1996).
Consultancy type	"ESs produced in-house by developers are on average of much poorer quality than those produced by outside consultants" (Oxford Brookes University Impact Assessment Unit, 1996).
	"[There is a] difference in quality between ESs produced by an independent applicant in comparison with those produced by the decision maker (local authority)" (Oxford Brookes University Impact Assessment Unit, 1996).
	The type of consultancy was felt to be a "significant (if minor) determinant of EIA report quality" (Barker and Wood, 1999).
ES length	Short ESs were more likely to be 'unsatisfactory' (Lee and Colley, 1992).
	"[There is] a general improvement with increased length, from an average [grade] of E/F for ESs of less than 20 pages, to an average of [grade] C for those of more than 150 pages. As ESs become much longer than 150 pages, however, quality becomes more variable" (Oxford Brookes University Impact Assessment Unit, 1996).
	There was a "generally positive relationship between EIA report length and quality" (Barker and Wood, 1999).
Developer and consultant experience	Inexperience in the preparation of ESs was found to result in higher percentages of 'unsatisfactory' ESs (Lee and Colley, 1992).
	"The best [EclAs] were those undertaken more recently by experienced assessors" (RSPB, 1995).
	"Whereas approximately only 50% of consultants with little or no prior experience produce satisfactory ESs, most of those with experience of eight or more ESs produce satisfactory statements" (Oxford Brookes University Impact Assessment Unit, 1996).
	Experience was "the single most important variable in explaining variations in the quality of EISs" (Barker and Wood, 1999).
Planning application type	"The quality of ESs for outline applications is significantly poorer than that for detailed applications" (Oxford Brookes University Impact Assessment Unit, 1996).
Proposed development sector	"ESs for landfills, mineral workings and sewage treatment works were usually good.... Afforestation and urban development projects were mainly poor" (RSPB, 1995).

Factor	Identified Relationship
	<p>“Better quality ESs are associated with developments such as windfarms, (more recent) waste disposal and treatment plants, sand and gravel extraction schemes and opencast coal; whereas generally poorer quality ESs are associated with mixed use developments, new settlements, leisure proposals and agricultural schemes” (Oxford Brookes University Impact Assessment Unit, 1996).</p>
	<p>“More controversial projects [waste and toxic waste disposal projects] generally were supported by better-quality EIA reports” (Barker and Wood, 1999).</p>