

Evaluating the Impact of East Midlands Development Agency – Annex 2: Economic Impact Assessment - Final Technical Paper

A report prepared for *emda*

Ecotec

August 2008

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**Evaluation of the East Midlands
Development Agency**
Economic Impact Assessment - Final Technical Paper

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Economic Impact Assessment - Final Technical Paper

August 2008

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1.0 Approach to Estimating Economic Impact

1.1 Scope of economic impact assessment

The key objective of the evaluation is to assess the impact of programme funding under the control of *emda* (including expenditure via Sub-regional Strategic Partnerships and other arms-length delivery bodies). Reflecting this emphasis, the analysis only includes projects funded through the Single Programme or through certain legacy programmes (Community Investment Fund, Environmental Improvement Programme, Coalfields, and Single Regeneration Budget).

The analysis includes the economic impact of various national programmes (Business Link, RSA/SFIE, Grants for R&D and the Manufacturing Advisory Service) which *emda* has had responsibility for delivering between 1999/00 and 2006/07.

It excludes any consideration of funding through the European Structural Funds (ERDP, ERDF and ESF) over which *emda* has no influence.

The analysis of impacts focuses upon:

- On-going employment impacts (permanent jobs created)
- On-going GVA impacts
- Short-term employment impacts and GVA where relevant (temporary impacts on employment and GVA)

1.2 General approach

The study adopts a bottom up approach to estimating the economic impact of *emda* expenditure. The overall impact of *emda* expenditure is estimated based on the economic impacts secured by a sample of individual projects selected to provide a reasonable coverage of expenditure and activities undertaken by *emda*. In short, the approach has involved:

- Classifying *emda*'s activities into intervention types of similar activities to provide a reasonable basis on which to generalise about the economic impact of *emda* activity.
- Selecting a sample of *emda* funded projects under each of these intervention types.
- Assessing the economic impact of the project sample on a project by project basis
- Grossing up these results to total *emda* expenditure to estimate overall economic impacts.

These steps are elaborated below.

1.3 Intervention types

The analysis starts from the types of interventions that *emda* has made in the East Midlands under the various strands. ECOTEC undertook an initial exercise to classify projects (as far as possible) into detailed intervention types for the purposes of the economic impact assessment, which revealed that a diverse range of interventions have been supported. .

To implement the economic impact assessment, all projects have been allocated as far as possible to one of five broad intervention types and one of 16 intervention sub-types based on the detailed classification of projects set out in the table below. Projects that did not fit into one of these types were assigned to a residual 'other' category where economic impacts were approximated on the basis of the information contained within PD. This applied to a range of projects, including policy development initiatives, studies, administration and marketing. Table 1.1 summarises the classification scheme.

Table 1.1 Intervention types, Intervention sub-types and detailed intervention type

Intervention Sub-Type	Detailed Intervention Type and Description
Property development related projects designed to provide floorspace of some kind: Chapter 2	
Acquisition plus	Acquisition of a plot of land with further site development
Reclamation	Reclamation of a plot of land
Reclamation plus	Reclamation of a plot of land with further site development
Site development - Commercial	Development of commercial floorspace
Site development – Industrial	Development of industrial floorspace
Site development – Mixed	Mixed use developments
Site development – Housing	Development of housing
Site development – community, sports, and training facilities	Development of community, sports and training facilities
Site servicing	Servicing of sites
Interventions designed to directly influence firm performance	

Intervention Sub-Type	Detailed Intervention Type and Description
Business support	<p><i>Business Support - Cluster Support</i> – support to businesses in priority clusters</p> <p><i>Business Support - Equalities and Diversity</i> – supporting businesses to recruit from priority groups</p> <p><i>Business Support - Farm Diversification</i> – supporting agricultural businesses to diversify their businesses</p> <p><i>Business Support - Financial and Grant Support</i> – financial and grant aid to businesses</p> <p><i>Business Support – General</i> – general support to businesses</p> <p><i>Business Support - Initiatives to Reduce Energy Consumption and Minimise Waste</i> – supporting businesses to improve resource efficiency</p> <p><i>Business Support - Innovative Approaches to Public Sector Procurement</i> – support to businesses in accessing public sector procurement opportunities</p> <p><i>Business Support - Other Support Initiatives</i> – other initiatives not elsewhere classified</p> <p><i>Business Support - Promoting Entrepreneurship</i> – promoting business start-up activity</p> <p><i>Business support - Responding to Specific Challenges</i> – helping businesses in relation to specific events (e.g. foot and mouth)</p> <p><i>Business Support - Social and Micro Businesses</i> – support to small firms (1-10 employees) and social enterprise</p> <p><i>Business Support - Start up Advice and Access to Finance</i> – advice with starting a business and assistance with access to credit</p> <p><i>Business Support - Workforce Development</i> – support to upskill employees</p>
Trade support	<p><i>Business Support - Trade Support</i> – supporting businesses to increase export activity</p>
Tourism support	<p><i>Business support – Quality Assurance</i> – supporting businesses to reach tourism related quality standards</p> <p><i>Site development – Tourist Accommodation</i> – supporting firms to improve their tourist accommodation or convert their premises to holiday lets</p>
Interventions designed to boost Inward Investment: Chapter 4	
Interventions designed to boost Inward Investment	<p><i>Marketing the East Midlands Abroad - Capitalising on Potential Links Created by Education, Tourism, Sport and Culture</i> – creating links between the East Midlands and other areas internationally through education, tourism, sport, and culture</p> <p><i>Marketing the East Midlands Abroad - Establishing Overseas Presence</i> – running overseas offices to promote the East Midlands abroad</p> <p><i>Marketing the East Midlands Abroad - Information Provision for Investors</i> – marketing materials for the East Midlands</p> <p><i>Marketing the East Midlands Abroad - Inward Investment Forum</i> – forums on inward investment</p> <p><i>Marketing the East Midlands Abroad - Inward Investment Missions</i> – missions abroad to promote investment in the East Midlands</p> <p><i>Sub-regional Inward Investment Marketing and Development</i> – promotion of inward investment at the sub-regional level</p>
Interventions based on improving the employability and skills of individuals, including facilitating their access to employment: Chapter 5	

Intervention Sub-Type	Detailed Intervention Type and Description
Interventions based on improving the employability and skills of individuals, including facilitating their access to employment	<i>Job Brokerage, Work Placements and IAG</i> – placing individuals in employment <i>Skills Development</i> – improving the skill sets of individuals <i>Training Programme Development</i> – development of training programmes to improve the skill sets of individuals
Interventions designed to boost demand for tourism: Chapter 6	
Visitor attractions	<i>Site Development - Cultural Infrastructure</i> – development of cultural infrastructure such as museums, arts and cultural centres <i>Site Development - Tourist Attraction</i> – development of tourist attractions
Tourism marketing	<i>Destination Management</i> – activities of DMPs <i>Tourism Marketing Initiative - Developing and Enhancing Key Brands</i> <i>Tourism Marketing Initiative - Developing the Role of Festivals</i> <i>Tourism Marketing Initiative - General</i> <i>Tourism Marketing Initiative - Initiatives to Capitalise on the Olympics</i> <i>Tourism Marketing Initiative - Short Breaks</i> <i>Tourism Marketing Initiative - Sport and Recreation Related Tourism</i>
Other projects: Chapter 7	

Intervention Sub-Type	Detailed Intervention Type and Description
Other projects	<p>Property development related projects <i>Acquisition</i> – acquisition of land with no development or reclamation <i>Disposal</i> – sale of a site with no associated development or reclamation <i>Site Development - Crime Reduction Initiative</i> – installation of CCTV or other development activity to improve safety <i>Site Development - Public Realm Improvement</i> – environmental improvements to open spaces</p> <p>Transport related projects <i>Transport Infrastructure Investment</i> – transport investment</p> <p>Agriculture related projects <i>Boosting Demand for the Region's Agricultural Products</i></p> <p>Capacity Building <i>Capacity Building</i> – Improving skills and capacity of the regions VCS organisations, asset development, building social network</p> <p>ICT <i>ICT Adoption and Connectivity</i> – improving connectivity to the internet and stimulating the adoption of ICT</p> <p>Environment related projects <i>Initiative to Develop Renewables</i> – encouraging the development of renewable sources of energy <i>Initiatives to Reduce Energy Consumption and Minimise Waste</i> – encouraging resource efficiency in private households</p> <p>Policy Development Initiatives and Studies <i>PDI and Studies - Feasibility Studies</i> <i>PDI and Studies - Research</i> <i>PDI and studies - Strategies, Action Plans, and Business Plans</i></p> <p>Demand side promotion for East Midlands products abroad <i>Encouraging Joint Ventures between East Midlands and Overseas Businesses</i> <i>Promoting Trade Opportunities for East Midlands Businesses through Events and Trade Missions</i></p> <p>Rural service delivery <i>Rural Service Delivery - ICT Adoption and Connectivity in Households</i> <i>Rural Service Delivery - Provision of Transport Services</i> <i>Rural Service Delivery - Public Service Delivery</i></p> <p>Tourist events <i>Tourism Events</i></p> <p>Other projects <i>Administration, Marketing and Events</i> <i>Unknown and Others</i></p>

Source: ECOTEC analysis

1.4 Expenditure covered by the economic impact assessment

The economic impact analysis covers a total of £752m of *emda* project expenditure recorded on PD between 1999/00 and 2006/07 (excluding spending on European programmes), and potential expenditure on the WP3 property projects after 2006/07 of £34.3m:

- £152m of the total (and all £34.3 potential expenditure) was spent on property development related projects
- £67m was spent on interventions designed to directly influence firm performance.
- £17m was spent on interventions designed to boost inward investment.
- £22m was spent on interventions designed to improve the employability and skills of individuals, including facilitating their access to employment.
- £32m was spent on interventions designed to boost demand for tourism.
- £212m was spent on other projects¹
- £249m was spent on delivering national programmes (National Coalfields Programme, Business Link, Grants for R&D, Single Regeneration Budget, RSA / SFIE, and the Manufacturing Advisory Service)

Table 1.2 Expenditure by intervention type, 1999/2000 to 2006/07

Intervention Type	Total 1999/00 to 2006/07 (£000s)	Potential Expenditure included in EIA (beyond 2006/07, £000s)
Property Development Related Projects		
Acquisition plus	7,380	155
Site Development – Commercial	57,728	11,668
Site Development - Community, Sports and Training Facilities	34,386	2,763
Site Development – Housing	11,266	0
Site Development – Industrial	16,370	252
Site Development – Mixed	4,500	0
Reclamation	8,449	50
Reclamation plus	8,064	8,434
Site Servicing	3,836	0
Total	151,979	23,322
Interventions designed to directly improve firm performance		
Business Support	62,433	-
Tourism Support	3,525	-

¹ Most importantly, approximately £30m was spent on administration, marketing and events, £45m on research and policy development initiatives, £40m on acquisition and disposal, £20m on capacity building, £12m on ICT adoption and connectivity, and £32m on projects we were not able to classify from the available summary descriptions. This does not include the identified £34m residual expenditure identified in Table 1.3 below.

Intervention Type	Total 1999/00 to 2006/07 (£000s)	Potential Expenditure included in EIA (beyond 2006/07, £000s)
Trade Support	566	-
Total	66,524	-
Interventions designed to boost inward investment	16,940	-
Interventions based on improving the employability and skills of individuals, including facilitating their access to employment	22,365	-
Interventions designed to increase tourist demand		
Tourism Marketing	10,735	-
Visitor Attraction	21,894	-
Total	32,629	-
Other Projects	212,441	-
Total expenditure recorded on PD	502,878	-
National Programmes		
Coal	104,023	79,539
SRB	95,427	-
Business Link	22,362	-
Grants for R&D	4,272	-
MAS	5,045	-
RSA/SFIE	18,175	-
Total	249,304	-
Grand Total	752,182	114,116

Source: PD and ECOTEC analysis

PD was introduced in 2002/03 and does not have a complete record of *emda* project expenditure between 1999/00 and 2001/02. Consultations with the finance team indicate that discrepancies between total spending recorded in the Annual Accounts and projects on PD from 2002/03 are a result of non-cash costs taken into account in the Annual Accounts which would not appear as a project cost on PD.

However, between 1999/00 and 2001/02, the Annual Accounts record total expenditure of £213m (net of administrative and non-cash costs), while PD records a total expenditure of £73m. During this period *emda* spent £106m on delivering SRB schemes (which is not captured on PD), leaving total project expenditure £34m which is not accounted for on PD (termed here residual expenditure).

Table 1.3 Estimated Residual Expenditure not captured on PD (1999/00 to 2001/02)

Intervention Type	Expenditure (£000s)
Total expenditure 1999/00 to 2001/02 (Annual Accounts, net of administrative and non-cash costs)	212,660
Expenditure recorded on PD, 1999/00 to 2001/02	73,169
Single Regeneration Budget expenditure, 1999/00 to 2001/02 (Annual Accounts)	105,630
Estimated residual project expenditure	33,861

1.5 Evidence base

Evidence for the economic impact assessment comes from three sources:

- **Detailed programme review** – a detailed analysis of the profile of expenditure, activities and outputs held in *emda*'s project management system Portfolio Director (PD).
- **Project assessments** – 248 project assessments were conducted. Details of the coverage of the sample in terms of the number of projects and expenditure are provided in Annex A.
- **Beneficiary surveys** – we were able to obtain beneficiary contact details for 49 projects in the project sample and 10 additional projects that were subject to a beneficiary booster survey, as well as for 151 of the 172 inward investment successes recorded by *emda* between 2001 and 2007 (COP database). A total of 1,013 interviews were successfully completed as follows:
 - ▶ Projects designed to directly influence firm performance – business support - 710 interviews
 - ▶ Projects designed to directly influence firm performance – trade support – 11 interviews
 - ▶ Projects designed to directly influence firm performance - tourism support – 33 interviews
 - ▶ Projects based on improving the employability and skills of individuals, including facilitating their access to employment – 126 interviews
 - ▶ Projects designed to attract inward investment – 33 interviews
 - ▶ Physical development projects providing business floorspace – 100 interviews

1.6 Overall approach to estimating economic impacts

This section sets out the overall approach to implementing the framework for estimating the economic impact of *emda* projects.

1.6.1 General impact model

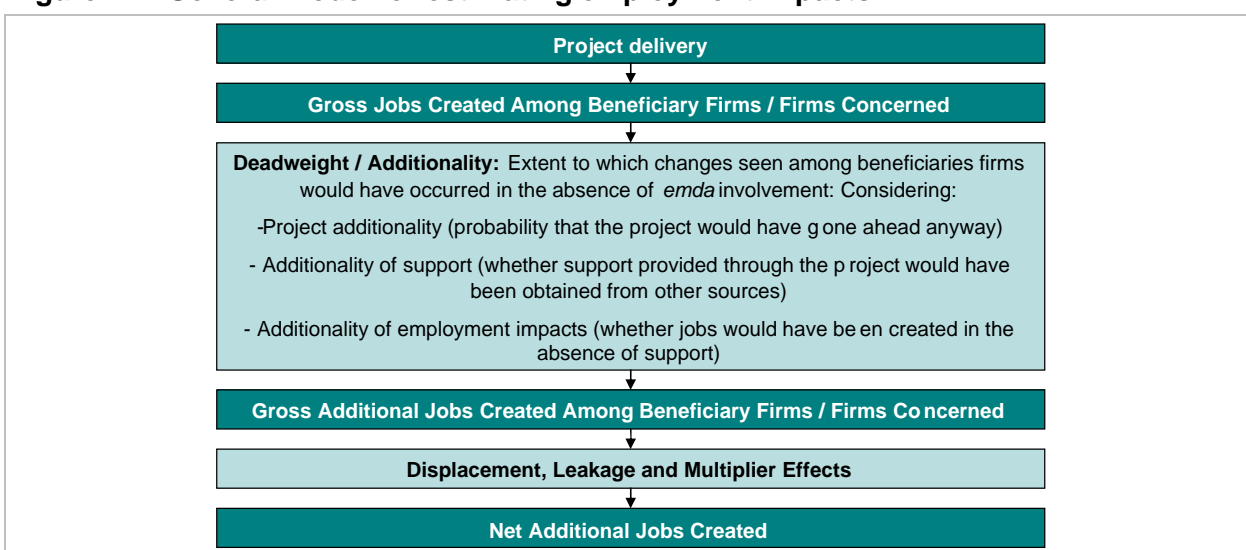
The general model used for estimating the economic impacts of projects funded by *emda* is set out in Figure 1.1 below. To estimate the number of jobs that would not have been created in the

absence of the project (gross additional jobs created) the probability that the project would not have gone ahead in the absence of *emda* involvement was estimated along with the probability that the support would have been obtained elsewhere, and how far the jobs would have been created in the absence of *emda* support. This gives us an estimate of the counter-factual (deadweight changes).

To move from gross additional to net additional impacts the analysis considers how far the employment benefits of projects have gone outside the region (leakage)² and how far jobs created within/for by project beneficiaries are resulting in fewer jobs among firms elsewhere in the region (displacement). The information was also used to assess how far the increased incomes (wages, profits, and procurement spend) created by projects would be spent within the region, causing other firms to increase employment (multiplier effects). Where relevant, the analysis also considers crowding out (or in) (where *emda* expenditure is likely to have reduced (or increased) the spending of other agents) and substitution effects (where vacancies filled by beneficiaries would have been filled by non-beneficiaries in the absence of support).

Net GVA impacts are derived from our estimates of net additional employment.

Figure 1.1 General model for estimating employment impacts



Source: ECOTEC

Implementing this model requires consideration of different factors depending on the type of intervention under consideration. Table 1.4 below sets out the factors under consideration in implementing the general impact model, and the intervention types to which each applies.

Table 1.4 Factors considered in establishing net additionality of employment impacts

Aspect	Terminology used in this report	Intervention types to which it applies
Gross to Gross Additional Adjustments		

² Applied to employment but not to GVA impacts.

Deadweight	Project additionality – the probability or extent to which the project would have gone ahead in the absence of <i>emda</i> support.	All intervention types
	Additionality of support – the extent to which beneficiaries would have been able to obtain analogous support from a different source.	All intervention types except physical development projects and projects designed to boost demand for tourism where direct advice and guidance is not provided to beneficiaries
	Additionality of demand – the probability that visitors would have come to the region in the absence of <i>emda</i> projects.	Projects designed to boost demand for tourism
	Additionality of employment impacts – the probability that jobs would have been created or safeguarded if beneficiaries had not received the support they received.	All intervention types except projects, although this effect is modelled as substitution effects in the case of interventions designed to improve employability and skills (see below). In the case of projects designed to boost demand for tourism, jobs are derived from estimated additional expenditure in the region.
Substitution Effects	Substitution Effects – where beneficiary individuals have moved into employment, the probability that the firms concerned would otherwise have filled vacancies with non-beneficiaries.	Projects designed to improve employability and skills only
Crowding In / Out	Crowding In / Out – where project expenditure has either increased or reduced the expenditure on analogous activity by other agents (private or public sector).	<p>We have considered this only in relation to the net floorspace created by physical development projects.</p> <p>In theory, expenditure on support services may have discouraged or encouraged other providers from undertaking similar activities. However, the analysis does not include the jobs involved in the delivery of projects such as business support in the assessment of economic impact, so there is no need to consider the extent to which these jobs are offset in other agencies or private sector providers.</p>
Gross Additional to Net Additional Adjustments		
Displacement	Displacement – the extent to which the additional sales (and jobs created in order to satisfy this increase in demand) secured by beneficiary firms as a result of the project has taken away sales from other firms, causing them to reduce employment. Displacement of employment is considered at the level of the region in accordance with the objective of this evaluation to estimate the regional economic impact of <i>emda</i> activity.	All intervention types
Leakage	Leakage – the extent to which economic benefits have gone to areas outside the region in accordance with the objective of this evaluation to estimate the regional economic impact of <i>emda</i> activity. GVA estimates are estimated on a workplace basis, so no account is taken of leakage.	All intervention types
Multiplier Effects	Multiplier Effects – the extent to the additional inputs used to satisfy the increase in demand	All intervention types

	<p>secured among beneficiary firms have been procured from beneficiary firms in the region (indirect effects) and the extent to which wages and profits have been spent within the region (induced effects). These effects will cause other firms to increase their employment.</p>	
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Source: ECOTEC Analysis

1.7 Implementing the general impact model

The procedure in 1.7.1 below is adopted for estimating the economic impact of *emda* expenditure for the following types of projects:

- Physical development related projects providing business floorspace
- Physical development related projects providing community, sports and training facilities
- Projects designed to directly influence the performance of firms (business support, tourism support, and trade support)
- Projects based on improving the skills and employability of individuals, including facilitating their access to employment
- Interventions designed to boost tourism demand (visitor attractions only)

Different approaches are used to estimate the economic impact of projects designed to attract inward investment, and the impact of tourism marketing initiatives.

1.7.1 Estimating employment impacts (project sample)

The first step to estimating economic impacts is to estimate the net number of jobs created by projects sampled for project assessments. This is done in three steps:

- **Gross jobs created in sampled projects:** The number of jobs reported by projects (as recorded in PD) was verified and/or estimated by ECOTEC/GVA Grimley project assessors. The beneficiary survey established how far business beneficiaries (for a proportion of sampled projects³) have expanded their employment. This information provides estimates of the total gross jobs created by projects, either directly through providing business space, or indirectly by improving firm performance or the skills and employability of individuals.
- **Gross additional jobs created in sampled projects:** An estimate of the proportion of gross jobs (and floorspace in the case of property projects) that would have occurred in the absence of *emda* support is made using information from the project assessments and the beneficiary survey.
- **Net additional jobs created in sampled projects:** Information from the beneficiary survey is used to estimate how far the benefits of projects sampled are going outside the region (leakage) and how far jobs created by project beneficiaries would result in fewer jobs among firms

³ Determined by the availability of beneficiary contact details among the project assessment sample.

elsewhere in the region (displacement). The information is also used to assess how far the increased incomes (wages, profits, and procurement spend) created by projects would be spent within the region, causing other firms to increase employment (multiplier effects).

1.7.2 Application of Multiplier Effects

ECOTEC has been provided with a range of East Midlands specific sector level multipliers derived from the input-output tables that drive Experian's regional economic model, covering:

- Type I Multipliers – include indirect effects of increased final demand for a product
- Type II Multipliers – includes indirect and induced effects of increased final demand for a product

The analysis uses the broad sector based Type II multipliers to estimate the indirect and induced effects of the gross additional employment generated by *emda* expenditure. Where there is specific evidence on the composition of beneficiaries by sector a weighted average multiplier value across the relevant sectors is used (detailed in later chapters); elsewhere, the analysis uses an appropriate multiplier value based on the type of project in question.

1.7.3 Cost per Job Estimates

The second stage in the process is to create estimates of the cost per gross, gross additional, and net additional jobs created for the seven intervention sub-types. This is done in two steps:

- **Project level cost per job:** Cost per job estimates are generated for each of the 69 projects assessed by dividing *emda*'s expenditure on the project by the number of gross, gross additional, and net additional jobs created.
- **Cost per job estimates:** Average cost per job estimates for the seven intervention types are estimated by averaging the cost per job estimates (weighted by expenditure) across projects of each type.

1.7.4 Total employment impacts

Estimates of total employment for the seven intervention sub-types are calculated by applying the cost per job for each project type to the total *emda* expenditure on that intervention sub-type.

1.7.5 Actual and potential impacts of site development projects

Project assessments of property development related projects have been undertaken in each of the three phases of evaluation work.

Larger capital programmes of site development work were investigated during 2005/06 that in some cases spanned a number of years and were either incomplete at the time of assessment, or

private sector developers had not come forward to complete the development. In these cases the analysis estimates potential employment impacts based on the projected quantity of floorspace associated with the project, and estimated cost per job based on projected expenditure associated with the project.

In the remaining two phases (WP4 and WP5), both undertaken during 2006/07, the study examined a range of further industrial and commercial developments, ranging from innovation centres and science parks through to refurbishments of industrial buildings. All projects were complete at the time of assessment, and did not tend to involve substantial reclamation and servicing costs or involve disposal of sites to the private for development. Cost per job estimates are based on actual employment impacts in these cases.

In estimating the overall economic impact of site developments:

- Cost-per-job estimates are applied to the actual expenditure on site development projects (up to the end of 2006/07) covered during Work Packages 3 and 4 to estimate the total economic impact of these projects to date⁴.
- Where projects remain incomplete, estimates of cost-per-job are applied to the remaining forecast expenditure in relation to these projects to estimate the remaining potential jobs these projects are likely to deliver.
- It is assumed that the economic impact of site developments that have come on stream since Work Package 3 and 4 was undertaken will not come forward until after the end of 2006/07 given the lengthy duration of these types of projects. The analysis applies the relevant cost-per-job estimates to actual expenditure recorded against these projects, but these jobs are treated as potential jobs.

Site developments in Work Package 5 tended to be small scale projects that will realise their impact quickly and all projects assessed were complete at the time of assessment. Cost per job estimates have been applied to total actual expenditure between 1999/00 and 2006/07 to estimate the on-going employment effects of these projects.

1.7.6 Employment impacts of interventions designed to boost inward investment

emda supplied the team with data on 151 out of 172 recorded inward investment successes which *emda* had some involvement in securing. The estimates of economic impacts presented in this paper are based solely on the results of a beneficiary survey, and adopting this method means that there is no need to estimate cost per gross, gross additional and net additional jobs at a project level.

⁴ This approach was necessary as a large number of the site development project reviews were conducted in 2005/06 where projects involving large programmes of capital spend were not complete, and these projects have not been revisited. By assuming that actual expenditure has led to actual jobs there is the possibility that this leads to an over-statement of the ratio of actual to potential jobs created in the case of incomplete developments.

1.7.7 Employment impacts of tourism marketing projects

By agreement, the study did not sample tourism marketing projects as part of the evaluation. East Midlands Tourism (EMT) has conducted research into the net effects of a sample of their marketing campaigns, and the analysis uses this evidence to estimate the economic impact of these interventions.

1.7.8 Projects not allocated to the 9 intervention sub-types

Some projects could not be allocated to one of the nine intervention sub-types but recorded employment impacts in PD. In these cases, the gross jobs created by these projects are estimated using the number of jobs created as recorded in PD. Net additional employment is estimated by applying employment weighted average values for additionality, displacement, leakage, and multiplier effects from the intervention types which were subject to primary research.

1.7.9 Economic impact of residual expenditure

There is no evidence in relation to the type of projects on which residual expenditure has been spent, and there is no record of the number of gross jobs that have been created by these projects. To take account of the impact of the estimated £33m of project-level expenditure which is not captured on PD records between 1999/00 and 2001/02 results are grossed up from the overall economic impact assessment across all intervention types (including 'other projects') for the strand expenditure which is captured on PD. The emerging estimate is inevitably subject to a large degree of uncertainty.

1.7.10 Economic impacts of National Programmes

The economic impact of national programmes delivered through *emda* (National Coalfield Programme, Business Link, RSA / SFIE, Grants for R&D, Manufacturing Advisory Service, and SRB) is estimated separately. Details of the estimates of the economic impacts of these projects are outlined in Chapter 9.

1.7.11 GVA impacts

Net additional employment is used as the basis for calculating GVA impacts. The ratio of GVA to employment in the East Midlands is applied to net additional employment to estimate the GVA per year generated by projects. East Midlands GVA per worker in 2006 is estimated using the following: UK GVA per workforce job in 2006 was £42,851, and productivity per filled job in the East Midlands was 97.1 percent of the UK average (Blue Book and Productivity datasets, National Statistics), so GVA per worker is estimated to be £41,600.

Some projects only have GVA effects, such as training schemes for the employed. The GVA impact of these projects is estimated separately. This is done by estimating the total increase in earnings created by these projects as a proxy measure for productivity. This estimate is then used to estimate the percentage increase in earnings created (and by extension, GVA) per pound of *emda* expenditure. Total GVA impacts are calculated by applying this percentage to total spending on this type of project.

It is recognised that some enterprise initiatives will also generate GVA effects without employment effects, although we have not been able to quantify these impacts from the findings of the beneficiary survey.

1.8 Approach to Combining Evidence across Evaluation Phases

Evidence gathered during the three periods of evaluation work are combined as far as appropriate to improve the robustness of cost per job estimates for each intervention type.

Project assessment evidence is combined to generate cost-per-job estimates for similar projects:

- Property development projects show sufficient similarity across the three phases of the evaluation, so evidence is combined to estimate cost-per-job figures for industrial and commercial site developments. Projects involving large acquisition, reclamation, and servicing costs were only included in Work Package 3 and cost per job estimates for these are kept separate.
- Projects designed to influence firm performance and to assist individuals with employability and skills show enough commonality across Work Packages to combine project assessment evidence.

Beneficiary surveys were undertaken as part of the study in four stages as follows:

- Businesses benefiting from property development related projects under Work Package 3 during quarter 2 2006/07.
- Individuals and businesses benefiting from projects designed to directly influence firm performance and projects designed to improve the employability and skills of individuals under Work Package 4, during quarter 4, 2006/07.
- Individuals and businesses benefiting from all intervention types (except interventions designed to boost tourism demand) under Work Package 5, during quarter 4 2007/08.
- A booster survey of beneficiaries of projects covered under Work Packages 3 and 4 was conducted during quarter 1 2008/09.

Evidence from the four beneficiary surveys is pooled throughout to increase the robustness of the estimates of additionality, displacement, and leakage.

2.0 Property developments designed to provide business floorspace of some kind

2.1 Analytical approach

Over the duration of the evaluation of *emda* the following broad categories of property development projects designed to provide floorspace of some kind have been identified.

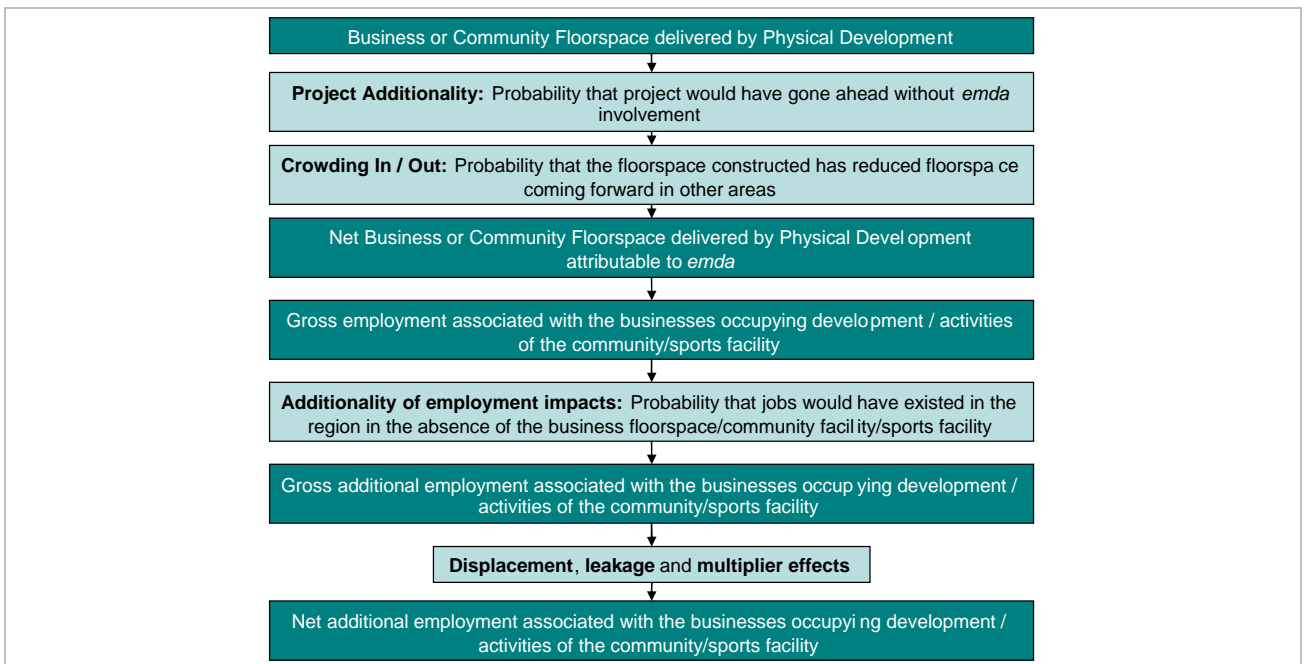
Table 2.1 Property development related projects – intervention sub-types

Intervention sub-type	Description
Acquisition plus	Acquisition of a plot of land, together with subsequent development activity
Reclamation	Reclamation of a plot of land
Reclamation plus	Reclamation of a plot of land, and subsequent development activity
Site servicing	Provision of infrastructure at a development site
Site development – commercial	Construction of commercial floorspace
Site development – industrial	Construction of industrial floorspace
Site development – housing	Construction of housing
Site development – mixed	Construction of a mixed use development
Site development – community, sports, and training facilities	Construction of community, sports and training facilities

The impact analysis considers:

- How far projects may have influenced the generality of development activity (positively through demonstrating the existence of demand or negatively through pre-empting sites or depressing rentals – i.e. crowding out);
- In the case of schemes with a very specific market orientation, how far a scheme with a more general focus might have been brought forward by the market on the site concerned in the absence of *emda* involvement.
- The two points above together feed into the assessment of the scale and type of net additional floorspace created (which considers type as well as volume).
- How far occupiers' performance has been influenced specifically by the availability of the *type* of floorspace provided.

Figure 2.1 Overall approach to estimating economic impacts - physical development related projects providing business floorspace or premises



Source: ECOTEC analysis

The economic impact of these projects is estimated in terms of:

- On-going employment associated with any employment floorspace generated by the project, either developed directly by *emda*, or by subsequent development activity undertaken by property developers in the private sector following the *emda* funded reclamation and servicing of a site.
- Where projects are the subject of prolonged periods of capital expenditure, and are incomplete, the potential of these sites to accommodate employment in the future is estimated.
- Construction employment and output generated in the reclamation, site servicing, and construction of the developments.

2.2 Construction Impacts

Typically, *emda* does not report the number of construction jobs created through its expenditure. Nevertheless, the scale of the *emda* expenditure across the four Work Package 5 strands means that there is a significant short term impact on construction employment. The approach to estimating construction impacts is outlined below:

2.2.1 Cost per gross, gross additional, and net additional construction job created (project sample)

- The analysis begins by estimating the number of **gross construction years created** among the projects sampled. The costs of site developments were collected through the project assessments. It is assumed that capital expenditure of £100,000 for reclamation will create one year of construction employment, and £80,000 of servicing and construction expenditure will generate one year of construction employment⁵.
- Where developments were incomplete, the number **gross potential construction years created** by sampled projects is estimated based on the projected construction cost of the development.

Table 2.2 Gross construction years (project sample)

Intervention sub-type	Total reclamation cost (£s) ⁶	Total / projected development and servicing cost (£s) ⁷	Gross Construction years
Acquisition plus	1,345,562	1,514,237	32
Reclamation	1,121,135	90,750	12
Reclamation plus	3,697,055	5,853,670	110
Site development - commercial	599,140	22,146,333	283
Site development - community, sports and training	0	6,937,940	87
Site development - Housing	1,052,216	975,494	23
Site development - industrial	1,762,015	14,832,483	203
Site development - Mixed	5,750,247	8,757,091	167
Grand Total	15,327,370	61,107,997	917

⁵ English Partnerships propose a construction cost per job of £50,000 for development expenditure. Information from the Annual Business Inquiry (National Statistics) suggests that turnover per employee in the construction sector has been substantially higher at an average of £104,000 between 1999 and 2006. Average turnover per employee for site preparation was higher at £122,000.

^{6 & 7} This includes *emda*, other public sector, and private sector (modelled where no specific information was available) spending on reclamation and development where relevant.

To move from gross construction jobs to gross additional construction jobs, gross construction jobs are adjusted to account for:

- ▶ **Project additionality:** the probability that the project would not have gone ahead without *emda* spending.
- ▶ **Crowding In/Out:** the probability that the additional supply of floorspace reduced or increased floorspace coming forward in the region under other developments (crowding out / in). It is assumed these effects are minimal in the case of community, sports, and training facilities.
- **Gross additional construction years created:** This provides an estimate of the number of construction jobs among the firms delivering the construction that would not have been created in the absence of *emda* support.

Table 2.3 Gross Additional Construction Years (Project sample)

Intervention sub-type	Gross Construction Years	Average Crowding Out*	Project Additionality*	Gross Additional Construction Years
Acquisition plus	32	0.06	0.88	21
Reclamation	12	0.20	0.69	10
Reclamation plus	110	0.00	0.12	13
Site development – commercial	283	0.18	0.93	182
Site development - community, sports and training	87	0.06	0.85	66
Site development – Housing	23	0.00	1.00	23
Site development – industrial	203	0.15	0.94	146
Site development – Mixed	167	0.35	0.55	117
Grand Total	917	0.14	0.86	577

* note that these are sample averages, deadweight assumptions were applied on a project by project basis

- **Net additional construction years created:** It is assumed that the work involved was within the capability of East Midlands' companies so that most or all of the major contracts have been placed locally. Leakage and displacement are assumed to be negligible. A composite

construction multiplier of 0.51 is assumed, derived from Experian’s model of the East Midlands economy.

Table 2.4 Net Additional Construction Years (Project sample)

Intervention sub-type	Gross Additional Construction Years			Multiplier Effects	Net Additional Construction Years
		Displ.	Leakage		
Acquisition plus	21	0.00	0.00	1.51	31
Reclamation	10	0.00	0.00	1.51	15
Reclamation plus	13	0.00	0.00	1.51	20
Site development - commercial	182	0.00	0.00	1.51	275
Site development - community, sports and training	66	0.00	0.00	1.51	99
Site development - Housing	23	0.00	0.00	1.51	34
Site development - industrial	146	0.00	0.00	1.51	220
Site development - Mixed	117	0.00	0.00	1.51	177
Grand Total	577	0.00	0.00	1.51	872

- **Cost per Gross, Gross Additional, and Net Additional Construction Years** – these were estimated by dividing *emda*’s expenditure on the physical development projects providing business floorspace or premises by the estimated number of gross, gross additional and net additional construction years created.

Table 2.5 Cost per gross, gross additional, and net additional construction job

Intervention sub-type	Total <i>emda</i> actual / projected expenditure	Cost per gross construction year (£s)	Cost per gross additional construction year (£s)	Cost per net additional construction year (£s)
Acquisition plus	4,361,561	134,684	212,204	140,533
Reclamation	931,842	75,479	94,976	62,898
Reclamation plus	1,954,000	17,741	147,840	97,907
Site development - commercial	11,166,292	39,482	61,321	40,610
Site development - community, sports and training	4,123,300	47,545	62,582	41,445
Site development - Housing	1,385,000	60,971	60,971	40,378
Site development - industrial	8,470,333	41,720	58,165	38,520
Site development - Mixed	9,988,778	59,825	85,192	56,418
Average	42,381,106	46,211	73,431	48,630

2.2.2 Total construction employment impacts

Costs per gross, gross additional, and net additional construction year are applied to actual expenditure between 1999/00 and 2006/07 to estimate total actual construction impacts. Average cost-per-job figures are used to estimate the construction impacts of site servicing projects.

Table 2.6 Total actual construction years

Intervention sub-type	Total <i>emda</i> expenditure (£000s)	Gross construction years	Gross additional construction years	Net additional construction years
Acquisition plus	7,380	55	35	53
Reclamation	8,449	112	89	134
Reclamation plus	8,064	455	55	82
Site development - commercial	57,728	1,462	941	1,422
Site development - community, sports and	34,386	723	549	830

training				
Site development - Housing	11,266	185	185	279
Site development - industrial	16,370	392	281	425
Site development - Mixed	4,500	75	53	80
Site servicing	3,836	83	52	79
Grand Total	151,979	3,542	2,240	3,383

Costs per gross, gross additional, and net additional construction year are applied to projected expenditure beyond 2006/07 for incomplete developments from Work Packages 3 and 4 (including new projects) to estimate total potential construction impacts. Average cost-per-job figures are used to estimate the construction impacts of site servicing projects.

Table 2.7 Total potential construction years

<u>Intervention sub-type</u>	Total <i>emda</i> expenditure (£000s)	Gross potential construction years	Gross additional potential construction years	Net additional potential construction years
Acquisition plus	155	1	1	1
Reclamation	50	1	1	1
Reclamation plus	8,434	475	57	86
Site development - commercial	11,668	296	190	287
Site development - community, sports and training	2,763	58	44	67
Site development - Housing	0	0	0	0
Site development - industrial	252	6	4	7
Site development - Mixed	0	0	0	0
Site servicing	0	0	0	0
Total	23,322	837	297	449

2.3 On-going employment impacts

The analysis considers permanent employment linked to the on-going activities in the organisations which have moved to the new development as 'on-going employment'. With commercial developments this will arise through businesses moving into the accommodation provided, and with community, training, and sports facilities through the jobs required to run the activities of the centre.

As noted in the analytical framework, on-going employment impacts are estimated in two stages. First the net floorspace that can be attributed to *emda* is estimated, before estimating the net employment impacts attributable to the provision of floorspace.

2.3.1 Floorspace impacts (project sample)

- The starting point for estimating the employment impacts of physical development projects in the project sample is **gross floorspace created**. The project assessments provide evidence on the total quantity of floorspace provided by developments.
- In some cases, projects were incomplete at the time of assessment, particularly where large quantities of capital spend has been required in order to bring land forward to a developable state. In addition, some reclamation projects were complete, although the private sector had not come forward to develop the land at the time of assessment. In these cases the quantity of **gross potential floorspace created** is estimated on the basis of project assessment evidence, or where unavailable, on standard values for plot ratios.
- To move to net floorspace attributable to *emda*, the analysis estimates:
 - ▶ **Project additionality**: the probability that the project would not have gone ahead without *emda* spending, derived from project assessment evidence.
 - ▶ **Crowding In/Out**: the probability that the additional supply of floorspace reduced or increased floorspace coming forward in the region under other developments. It is assumed that these effects have been minimal in the case of community, sports, and training facilities.
- **Net floorspace attributable to *emda***: the quantity of actual and potential floorspace that can be attributed to *emda*'s involvement.

Estimates of gross and net actual and potential employment floorspace for the project sample by intervention sub-type are set out in the table below.

Table 2.8 Gross and Net Actual and Potential Floorspace by Intervention Sub-Type (project sample)

Intervention Sub-Type	Total Gross Floorspace (m2)	Total Gross Potential Floorspace (m2)	Project Additionality (Sample average)	Crowding In/Out (Sample Average)	Total Net Actual Floorspace Attributable to <i>emda</i> (m2)	Total Net Potential Floorspace Attributable to <i>emda</i> (m2)
Acquisition plus	1,795	11,633	0.88	0.06	1,795	10,472
Reclamation	0	804	0.69	0.20	0	161
Reclamation plus	0	35,000	0.12	0.00	0	4,200
Site development – commercial	29,835	0	0.93	0.18	20,985	0
Site development - community, sports and training facilities	12,766	0	0.85	0.06	10,238	0
Site development – Housing	0	0	1.00	0.00	0	0
Site development – industrial	25,506	0	0.94	0.15	20,655	0
Site development – Mixed	3,663	8,740	0.55	0.35	183	6,992
Total	73,565	56,177	0.86	0.14	53,856	21,825

2.3.2 Cost per gross, gross additional and net additional jobs created (project sample)

- The number of **gross actual and potential jobs accommodated** by projects in the project assessment sample is estimated. Where the project assessment provided evidence on the employment density of the development (actual or projected), these figures are used to estimate the number of jobs that either have been or will be accommodated on floorspace that can be attributed to *emda*. If this was not available, standard employment densities based on English Partnerships guidance are utilised, with an assumed 90 percent occupancy rate.
- **Gross created and safeguarded:** The beneficiary survey revealed that 4% (weighted by employment) of firms relocated from within the region without expanding, and 96% relocated due to an expansion or moved from outside the East Midlands. It is assumed that 4% of total gross and actual jobs accommodated were jobs safeguarded, and 96% were jobs created.

Table 2.9 Gross Jobs Accommodated

Intervention Sub-Type	Total Gross Actual Jobs Accommodated	Gross Potential Jobs Accommodated	Total Gross Employment Accommodated
Acquisition plus	21	291	285
Reclamation	0	5	4
Reclamation plus	0	27	27
Site development – commercial	523	0	507
Site development - community, sports and training facilities	58	0	55
Site development – Housing		0	0
Site development – industrial	533	0	500
Site development – Mixed	6	310	316
Total	1,140	633	1,694

- **Additionality of employment impacts:** The beneficiary survey suggests that 59 percent of respondents (weighted by employment) felt there was a shortage of similar premises in the area. It is assumed that the employment associated with the 41 percent of respondents that reported no shortage of similar premises in the area would have been present in the region in the absence of the property development.

The 59 percent of beneficiaries reporting a shortage of similar premises were asked how important the availability of the premises was in order for them to form the firm, survive, expand, or move to the region. The analysis assumes 100 percent additionality of employment impacts for those reporting the premises was ‘Crucial’ to their ability to form, survive, expand, or move to the region, 80 percent if they reported the premises were ‘Very Important’, 20 percent if they reported the premises were of ‘Some importance’, and 0 percent if they reported the premises were ‘Irrelevant’. This analysis suggests that an overall value for the additionality of employment impacts of 45 percent is appropriate, except where specific evidence from project assessments evidence suggested a more appropriate value for additionality.

The assessment of the additionality of the jobs accommodated by community, sports, and training facilities is based on evidence from the project assessments.

- **Gross additional jobs accommodated:** The number of jobs in firms occupying physical developments in the project sample, which would not have occurred without the development or *emda's* involvement in funding the development.

Table 2.10 Gross Additional Jobs Accommodated (Project Sample)

Intervention Sub-Type	Total Gross Jobs Accommodated	Average of Additionality of Employment impacts	Total Gross Additional Jobs Accommodated
Acquisition plus	285	0.45	128
Reclamation	4	0.45	2
Reclamation plus	27	0.45	12
Site development – commercial	507	0.45	228
Site development - community, sports and training facilities	55	0.80	41
Site development – Housing	0	0.45	0
Site development – industrial	500	0.41	188
Site development – Mixed	316	0.45	142
Total	1694	0.51	742

- ▶ **Displacement:** The beneficiary survey suggests that 46 percent of respondents sales (employment weighted) are generated within the East Midlands, and 20 percent of their main competition (employment weighted) are based within the East Midlands. This suggests a value of 10 percent for displacement (46 percent multiplied by 20 percent). Displacement is assumed to be minimal for community, sports, and training facilities.
- ▶ **Leakage:** The beneficiary survey indicates that 5 percent (employment weighted) of beneficiary firms' employees lived outside the East Midlands. It is assumed that 5 percent of gross additional jobs accommodated are filled by residents of areas outside the region.
- ▶ **Multiplier Effects:** The sectoral mix of respondents to the beneficiary survey indicates a value of 1.39 for multiplier effects is appropriate.

Table 2.11 Percentage of Beneficiaries by Sector and Assumed Multiplier Effects

Sector	Multiplier effect	Percentage of beneficiaries
Private services	1.40	73
Public services	1.42	3
Manufacturing	1.35	22
Construction	1.51	1
Primary industries	1.33	1
Overall multiplier effect	-	1.39

- **Net additional jobs accommodated:** The net employment effects of *emda* funded physical development projects (in the project sample).

Table 2.12 Net Additional Jobs Accommodated

Intervention Sub-Type	Gross additional jobs accommodated	Displ.	Leakage	Multiplier effects	Net additional jobs accommodated
Acquisition plus	128	0.1	0.05	1.39	153
Reclamation	2	0.1	0.05	1.39	2
Reclamation plus	12	0.1	0.05	1.39	14
Site development – commercial	228	0.1	0.05	1.39	271
Site development - community, sports and training facilities	41	0.1	0.05	1.39	47
Site development – Housing	0	0.1	0.05	1.39	0
Site development – industrial	188	0.1	0.05	1.39	223
Site development – Mixed	142	0.1	0.05	1.39	169
Total	742	0.1	0.05	1.39	880

- **Cost per gross, gross additional, and net additional jobs accommodated** – these are estimated by dividing *emda*'s expenditure on the intervention sub-types by the estimated number of gross and gross additional jobs accommodated and net additional jobs created. Where developments were incomplete or development from the private sector was yet to come forward, cost per job estimates are generated by using total projected *emda* expenditure and net potential jobs created.

Table 2.13 Cost per Gross, Gross Additional and Net Additional Job Accommodated (project sample)

Intervention Sub-Type	<i>emda</i> total actual and potential expenditure	Cost per gross job accommodated (£s)	Cost per gross additional job accommodated (£s)	Cost per net additional job accommodated (£s)
Acquisition plus	4,361,561	15,288	33,974	28,587
Reclamation	931,842	218,924	486,497	409,354
Reclamation plus	1,954,000	73,663	163,695	137,738
Site development – commercial	11,166,292	22,035	48,967	41,203
Site development - community, sports and training facilities	4,123,300	74,453	99,374	87,272
Site development – Housing	1,385,000	-	-	-
Site development – industrial	8,470,333	16,957	45,057	37,912
Site development – Mixed	9,988,778	31,595	70,211	59,078
Total	42,381,106	25,020	57,116	48,172

2.3.3 Total On-going Employment Impacts

Costs per on-going gross and gross additional job accommodated and net additional job created are applied to the following categories of *emda* spending on these types of projects to estimate the total employment impacts of *emda* expenditure:

- **Actual expenditure 1999/00 to 2006/07 on site developments reviewed during Work Packages 3, 5 and 5:** cost per job estimates are applied to this expenditure to update the estimates of **actual jobs created and safeguarded** in the light of expenditure that has been defrayed since the reviews.
- **Forecast expenditure post 2006/07 on site developments reviewed during Work Package 3:** cost per job estimates are applied to remaining forecast expenditure post 2006/07 to update the estimates of the number of **potential jobs created** by these projects.
- **Actual expenditure of new projects under the Site Provision and Development strand (since Work Package 3):** cost per job figures are applied to the expenditure on new site

provision and development projects. These jobs are assumed to be **potential jobs created**, as the employment impacts of site developments will not be realised yet as they tend to be characterised by lengthy programmes of investment.

- **Average cost per job estimates across intervention types are applied to site servicing**, as no site servicing projects were included in the project assessment sample due to practical constraints.
- The beneficiary survey evidence suggests that 4 percent of respondents (weighted by employment) moved into premises without expanding, so it is assumed that 4 percent of total jobs accommodated are jobs safeguarded.

The results are set out in Table 2.14 and Table 2.15 below.

Table 2.14 Employment Impacts – Actual

Intervention Sub-Type	Total emda expenditure (£000s)	Gross Jobs Created	Gross Additional Jobs Created	Net Additional Jobs Created	Gross jobs safeguarded	Gross Additional Jobs Safeguarded	Net Additional Jobs Safeguarded
Acquisition plus	7,380	463	209	248	19	9	10
Reclamation	8,149	36	16	19	1	1	1
Reclamation plus	7,484	98	44	52	4	2	2
Site development – commercial	42,523	1853	834	991	77	35	41
Site development - community, sports and training facilities	30,895	398	298	340	17	12	14
Site development – Housing	11,266	0	0	0	0	0	0
Site development – industrial	15,700	889	335	398	37	14	17
Site development – Mixed	1,593	48	22	26	2	1	1
Site Servicing	2,060	79	35	41	3	1	2
Total*	127,050	3,864	1,792	2,114	161	75	88

* Note that actual expenditure by new projects not covered in Work Package 3 are assumed to be generating employment in the future, so this expenditure is included in Table 2.15 below.

Table 2.15 Employment Impacts – Potential

Intervention Sub-Type	Total emda expenditure (£000s)	Gross Jobs Created	Gross Additional Jobs Created	Net Additional Jobs Created	Gross jobs safeguarded	Gross Additional Jobs Safeguarded	Net Additional Jobs Safeguarded
Acquisition plus	155	10	4	5	0	0	0
Reclamation	350	2	1	1	0	0	0
Reclamation plus	9014	117	53	63	5	2	3
Site development – commercial	26,873	1,171	527	626	49	22	26
Site development - community, sports and training facilities	6,254	81	60	69	3	3	3
Site development – Housing	0	0	0	0	0	0	0
Site development – industrial	922	52	20	23	2	1	1
Site development – Mixed	2,907	88	40	47	4	2	2
Site Servicing	1,776	68	30	35	3	1	1
Total*	48,251	1,589	734	870	66	31	36

* Note that actual expenditure by new projects not covered in Work Package 3 is assumed to be generating employment in the future, so actual expenditure by these projects is included in the table above.

3.0 Interventions designed to directly influence firm performance

This chapter estimates the economic impact of projects designed to directly improve firm performance.

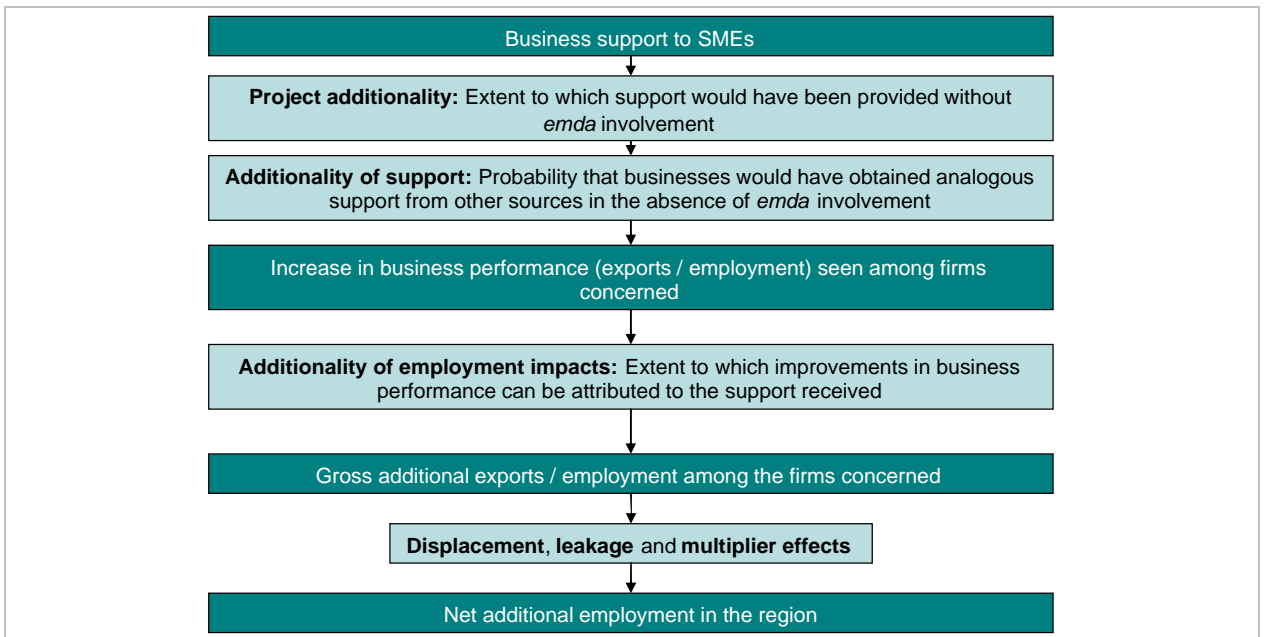
3.1 Analytical framework

The study identified 3 types of intervention designed to influence the performance of firms, requiring a broadly similar approach in terms of estimating economic impact: business support to SMEs in the region; support to SMEs to increase their exports; and support to tourism SMEs to improve their accommodation or achieve quality standards. Issues considered include:

- How far support to firms would have been provided in the absence of *emda* involvement (project additionality), and how far firms would have obtained this support from other sources (additionality of support).
- Extent to which performance improvements (employment or export growth) seen in the firms concerned can be attributed to the support they received.

The key features of the approach are set out in Figure 3.1 below:

Figure 3.1 Overall approach to estimating economic impacts – projects designed to directly influence the performance of firms



There are three aspects that have proved difficult to capture within the analysis framework in practical terms:

- The long lags involved in the potential impacts of some –particularly Innovation – projects, with many of the expected effects lying some years in the future;
- The potential beneficial externalities as innovation related changes diffuse through the regional economy;
- The likelihood that some projects are designed to produce diffused effects on business behaviour rather than specific effects on an identifiable group of beneficiary firms.

3.2 Cost per gross additional and net additional job created (project sample)

The number of gross jobs or exports created is not estimated for interventions designed to influence firm performance as respondents to the beneficiary survey were asked directly to estimate the number of jobs or exports that were a direct result of the support they received.

Beneficiary surveys of recipients of business support were conducted at three different points over the course of the evaluation and, where appropriate, evidence is pooled across projects.

The starting point for our analysis is:

- **Growth in employment attributable to support received:** Respondents benefiting from business support and tourism support were asked to estimate how far employment growth could be attributed to the support they received (where they had seen an increase in employment). This is used to estimate the total employment growth among respondents that could be attributed to *emda*.
- **Jobs safeguarded attributable to support received:** Respondents benefiting from business support and tourism support who had seen no change or a fall in employment were asked how much lower employment would have been in the absence of the support received. This is used to estimate the total number of jobs safeguarded among respondents that could be attributed to *emda*.
- **Growth in exports attributable to support received (trade support only):** Respondents to the beneficiary survey who had benefited from trade support were asked to estimate how far their growth in exports could be attributed to the support they received. This is used to estimate the total export growth among respondents that could be attributed to *emda* support. Growth in employment was estimated by dividing growth in exports attributable to the support received by the ratio of total turnover to employment (sourced from the Annual Business Inquiry) within the relevant sectors.

To estimate gross additional jobs created, the following information is used:

- ▶ **Project additionality:** the probability that the project would have gone ahead in the absence of *emda* funding, based on evidence collected through the project assessment. Some projects were subject to a beneficiary survey, but were not to a project assessment. For these projects, average project additionality (weighted by project expenditure) across the remainder of the project sample is applied .
- ▶ **Additionality of support:** respondents to the beneficiary survey were asked to estimate whether they would have been able to obtain similar support elsewhere. It is assumed the impacts were additional where respondents would not have been able to obtain similar support elsewhere. The results from the beneficiary survey indicate that the following values for the additionality of support are appropriate (employment weighted averages):

Table 3.1 Additionality of support

Intervention sub-type	Percentage reporting that they would not have been able to obtain a similar level of support elsewhere	Value used for additionality of support
Business support	53	55
Trade support	78	80
Tourism support	68	70

Source: Beneficiary Survey (these assumptions are rounded due to the variability / uncertainty associated with survey based estimates in this case)

- This gave an estimate of the number of **gross additional jobs created** created by firms that were surveyed in the beneficiary survey. To estimate the total number of gross additional jobs created by the projects with an associated beneficiary survey, the analysis considers:
 - ▶ **Response rates to beneficiary survey:** Estimates of the gross additional jobs created by firms responding to the beneficiary survey are grossed up to the project population based upon response rates to the survey at a project level to estimate the total number of gross additional jobs created among the projects within the project sample that were able to provide beneficiary data.
- This gives an estimate of the number of **gross additional jobs created** by projects in the project sample (projects that were able to provide beneficiary data). These are adjusted using the following to estimate the net additional employment impacts of *emda*:
 - ▶ **Displacement:** This is estimated for the Business Support and Trade Support project types by multiplying the average (employment weighted) reported proportion of sales within the East Midlands, by the average proportion of respondents' main competition (by market share) that is based in the East Midlands. Displacement is estimated for the tourism support

projects as the average proportion of respondent's main competition which is based within the East Midlands.

Table 3.2 Displacement

Intervention sub-type	Average percentage of sales within the East Midlands	Average percentage of competition (by market share) within the East Midlands	Implied displacement	Value for displacement used
Business support	50	43	21	20
Trade support	19	7	1	1
Tourism support	-	82	82	80

Source: Beneficiary Survey

- **Leakage:** As in other cases, the proportion of employment benefits going to non-East Midlands residents is estimated as the proportion of their employees that live outside the region. The following values for leakage are assumed:

Table 3.3 Leakage

Intervention sub-type	Average percentage of employees living outside the East Midlands	Value used for Leakage
Business support	4	5
Trade support	1	1
Tourism support	0	1

Source: Beneficiary Survey (these assumptions are rounded due to the variability of survey based estimates, although a minimum leakage of 1 percent is assumed)

- **Multiplier effects:** Multiplier effects are estimated using sectoral Type II multipliers (which incorporate indirect and induced effects) at the regional level, based on the Experian model of the East Midlands economy, applied to the sectoral profile of beneficiaries from the beneficiary survey. In the case of tourism, the Type II multiplier for the Hotels and Catering sector is used.

Table 3.4 Percentage of Beneficiaries by Sector and Assumed Multiplier Effects

Sector	Multiplier effect	Business support	Trade support	Tourism support
Private services	1.40	58	13	-

Public services	1.42	7	-	-
Manufacturing	1.35	28	85	-
Construction	1.51	6	1	-
Primary industries	1.33	2	-	-
Hotels and catering	1.48	-	-	100
Assumed value for multiplier effects	-	1.39	1.36	1.48

Source: Experian and Beneficiary Survey

- **Net additional jobs created and safeguarded** – using the above, the net additional jobs created by projects in the project assessment sample are estimated.
- **Cost per Gross Additional and Net Additional Job Created and Safeguarded:** The cost per gross additional and net additional job created are estimated by dividing *emda's* expenditure on projects for which beneficiary information is used by the total estimated gross and net additional jobs created by these projects⁸.

Table 3.5 Cost per gross, gross additional, and net additional jobs created – project sample

Intervention sub-type	Business Support	Trade Support	Tourism Support
Total Expenditure by <i>emda</i> by projects with beneficiary surveys	11,420	206	415
Number of jobs attributed to support by beneficiaries	374	-	43
Number of jobs safeguarded attributed to support by beneficiaries	356	-	0
Increase in exports attributed to support by beneficiaries	-	£144,500	-
Project additionality (sample average)*	0.84	1.00	0.80
Additionality of support	0.55	0.80	0.70
Response rates to beneficiary survey**	18.3	4.6	41.8
Total exports attributed to support	-	£3,165,900	-
Total jobs created attributed to support	1,549	-	101
Total jobs safeguarded attributed to support	2,069	-	0
Total gross additional exports created ***	-	£2,532,691	-
Total gross additional jobs created ***	781	17	51

⁸ Additional evidence from the beneficiary booster survey gathered in relation to *emda's* enterprise programmes initially covered in Work Package 4 suggested a more favourable perception of the impact of the Agency on the part of beneficiaries, reflected in the lower cost per gross additional and net additional jobs created. This is due in part to the coverage of projects in the initial Work Package 4 beneficiary survey, which tended to be on projects providing softer support to businesses such as trade networks and seminars, rather than intensive one to one support.

Total gross additional jobs safeguarded ***	1,143	-	-
Cost per gross additional job created	£14,631	£11,921	£8118
Cost per gross additional job safeguarded	£9,995	-	-
Gross additional exports per £1 emda spend	-	£12	-
Displacement	0.20	0.01	0.80
Leakage	0.05	0.01	0.01
Multiplier Effects	1.39	1.36	1.48
Net additional exports	-	£3,362,285	-
Net additional jobs created	825	23	15
Net additional jobs safeguarded	1,207	-	-
Cost per net additional job created	£13,849	£8,980	£27,703
Cost per net additional job safeguarded	£9,461	-	-
Net additional turnover for £1 emda spend	-	£16	-

Source: ECOTEC analysis * Note that additionality is applied on a project by project basis – the figures presented are averages across the sample and their application will only provide an approximation of the results presented, particularly where there is variance in the additionality of projects of differing scales ** Owing to DPA restrictions, in most cases we could not obtain a full sample of the population of beneficiaries supported by projects – the response rates here show the number of interviews with valid responses achieved divided by the total population, *** response rates are applied on a project by project basis to gross up estimates to the project population, so their application will only provide an approximation of the results presented.

3.3 SSP Contributions to Business Link Projects (Universal Business Start-up Offer)

During the course of the evaluation, 7 SSP projects were identified as contributions to the Universal Business Start-up Offer operated by East Midlands Business, a service that replaced the Business Link service offer in 2005/06. It was agreed that it would be most appropriate to apply the estimates of the cost per gross additional jobs created generated by the national evaluation of Business Link (£11,578) to the expenditure of these projects.

The national evaluation did not make allowances for displacement, leakage, or multiplier effects. We have adopted the same gross to net adjustments as suggested by the beneficiary survey evidence for those surveyed under business support:

- Displacement – 0.20
- Leakage – 0.05
- Multiplier effects – 1.39

3.4 Total employment impacts

The estimated cost per gross additional and net additional jobs created derived from the project sample are then applied to overall emda spending on these initiatives to estimate the total employment impacts of these intervention sub-types. Estimated employment impacts are set out in Table 3.6 below.

Table 3.6 Economic Impact of Interventions Designed to Directly Influence Firm Performance

Data	Business Support	Trade Support	Tourism Support	Business Link	Grand Total
Total <i>emda</i> expenditure (PD, £000s)	60,508	566	3,525	1,925	66,524
Gross Additional Jobs Created	4,136	47	434	166	4,784
Net Additional Jobs Created	4,369	63	127	176	4,735
Gross Additional Jobs Safeguarded	6,054	0	0	0	6,054
Net Additional Jobs Safeguarded	6,395	0	0	0	6,395
Gross Additional Exports (£s)	0	6,958,753	0	0	6,958,753
Net Additional Turnover (£s)	0	9,238,123	0	0	9,238,123

Source: ECOTEC analysis

4.0 Interventions designed to boost inward investment

emda undertakes a range of inward investment activities. These include funding overseas offices to generate interest in the East Midlands among potential foreign investors through to actively assisting potential inward investors obtain locations. *emda* also provides a range of aftercare services both to assist firms expand their operations in the region, and provide to support to inward investors considering the closure of their East Midlands operations.

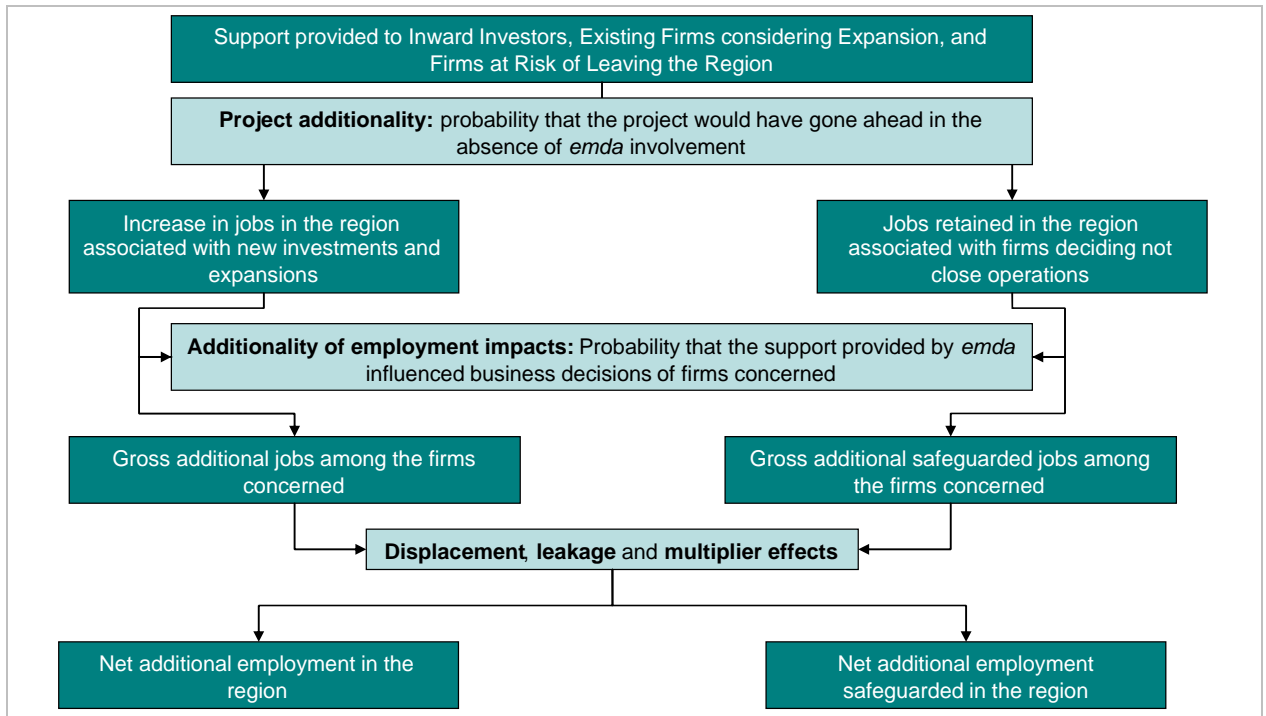
4.1 Analytical approach

Interventions to attract inward investment were designed to increase the number of firms establishing a new location in the East Midlands, to assist existing firms expand their operations in the Region, or to provide support to inward investment projects at risk of closing their operations in the Region.

The main issue involved in assessing the impact of these interventions is establishing the probability that the firms concerned would have established an East Midlands location (or expanded or retained their operations) in the absence of the involvement of *emda*. This is complicated by the fact that firms consider a range of factors, such as availability of premises, availability of labour and skills, wage rates, as well as the specific support provided by *emda*. To some extent, *emda* is responsible for these external factors, but it is impracticable to determine *emda*'s influence over these in implementing the analytical framework.

The key features of the analytical approach are set out in Figure 4.1 below:

Figure 4.1 Overall approach to estimating economic impacts - projects designed to boost inward investment



4.2 Approach to estimating economic impacts

The approach to estimating the economic impacts of *emda's* inward investment activities is distinct from the project based approach taken for the other project types. *emda* was able to provide a list of 151 of 172 the inward investment successes recorded with some involvement from the Agency between 2001 and 2007 on the Committees for Overseas Promotion (COP) database. A survey focusing on the impact of *emda* support was conducted of these 151 inward investment successes, largely obviating the need to gross up employment impacts on the basis of a project sample.

The sampling frame⁹ consisted of 151 inward investment successes. Within this 4 different types of success have been identified:

- 57 companies were reported to have made new investment in the region since 2001/02
- 76 companies were reported to have expanded their operations once or more times since 2001/02
- 4 companies were reported to have made a new investment and subsequently expanded their operations since 2001/02.
- 14 companies were reported to be considering the closure of their operation in the East Midlands but were supported to remain in the region, since 2001/02 (retentions).

⁹ The list of businesses from which the beneficiary survey sample was drawn.

Questionnaires were developed for each of the 4 groups of respondents. 13 interviews were achieved with companies making new investment in the region, 17 interviews were achieved with expanding companies, and 3 interviews were achieved with companies retained in the region. No interviews were secured with companies that had made a new investment and subsequently expanded their operations. This equates to a 22 percent response rate. It has been difficult to obtain some named contacts within the timeframe. In addition, in some cases contacts have left the company, and it proved difficult to obtain a contact with sufficient knowledge of the company investment or expansion to undertake an interview.

4.2.1 Estimates of gross jobs created or safeguarded

Estimates of gross jobs created by inward investment projects are derived from *emda*'s database and responses to the survey of beneficiary companies.

- The starting point for estimating **gross projected jobs created or safeguarded** in the data provided for the sampling frame of 151 recorded inward investment successes. The estimates of new jobs created for recorded inward investment and expansion successes is used to estimate the total number of gross jobs created. The estimate of jobs safeguarded for retentions as recorded in the COP database is used to estimate the total number of gross jobs safeguarded.
- **Verified original projected gross jobs created or safeguarded** is calculated based on the data obtained from the beneficiary survey where valid responses could be obtained. Respondents to the beneficiary survey were asked to confirm the details held by *emda*. In some cases, respondents reported that these figures were incorrect (for example, some firms reported that the number of projected jobs associated with the inward investment success were incorrect (both too low or too high), while some firms recorded as having expanded since 2001/02 reported that this was not the case and were not interviewed). The total number of estimated projected gross jobs created or safeguarded is revised to reflect this. The beneficiary survey revealed that some firms have closed down or relocated outside of the East Midlands since receiving support. Again, the total number of projected gross jobs is adjusted in light of these findings.
- **Current projected gross jobs created or safeguarded among respondent firms** is estimated based on evidence from the beneficiary survey where this indicated that some firms have changed the initial forecasts of jobs created (both upwards and downwards).
- **Actual and potential jobs to be created or safeguarded among respondent firms:** Respondents were asked to estimate how far the number of jobs associated with inward investments, expansions, and retentions have come forward to date, and how many are expected to come forward in the future.

- **Actual and potential jobs to be created or safeguarded among sampling frame:** The results are grossed up to the project sample, based on the proportion of jobs (as recorded in COP) covered by the respondent firms
- The **total actual and potential jobs to be created or safeguarded** is estimated by grossing up on the basis of the total employment in the COP database covered by the sampling frame.

Table 4.1 Projected, actual and potential gross jobs created or safeguarded

Success Type	Inward Investments	Expansions	Retentions
Total gross project jobs created or safeguarded (COP data, all 172 firms)	2,393	5,538	2,846
Gross projected jobs created or safeguarded (COP data, sampling frame of 151 firms)	2,393	4,195	2,396
Corrections to initial projected jobs created / safeguarded (as reported by beneficiaries)	0	42	-32
Total jobs associated with inward investment successes that were reported not to have occurred since 2001/02, or where beneficiaries have reported closure or relocation out of the East Midlands (not surveyed) ¹⁰	0	290	40
Verified projected jobs created or safeguarded (sampling frame of 151 firms)	2,393	3,944	2,364
Verified original projected jobs created or safeguarded among respondent firms	205	839	446
Verified current projected jobs created or safeguarded among respondent firms	224	807	410
Actual jobs created or safeguarded among respondent firms	123	396	410
Potential jobs to be created or safeguarded among respondent firms	101	411	0
Employment weighted response rate	0.09	0.21	0.19
Actual jobs created or safeguarded among sampling frame	1436	1864	2173
Potential jobs to be created or safeguarded among sampling frame	1179	1930	0
Coverage of total jobs (as recorded on COP) by sampling frame of 151 firms	1.00	0.76	0.84
Total actual jobs created or safeguarded	1,436	2,460	2,581
Total potential jobs to be created or safeguarded	1,179	2,548	0

Source: ECOTEC analysis

¹⁰ This includes adjustments on the basis of contacts made by the survey team where it was not appropriate to conduct an interview, for example where a firm had moved outside the East Midlands. No adjustment has been made for beneficiaries that did not provide specific information in relation to the information held on the COP database.

4.2.2 Gross additional jobs created

To move from gross jobs created or safeguarded to gross additional jobs created or safeguarded, the following is considered:

- **Project additionality:** The project assessments also provided evidence on the extent to which inward investment projects (across the strand) would not have gone ahead without *emda* funding. The evidence suggested that a small proportion of activity would have been funded in the absence of *emda* support. For example, at Invest Northamptonshire, the then ODPM was funding a single post to undertake inward investment activities. *emda* enabled the activities of the Agency to be significantly increased in scale. In addition, UKTI may also have given support to some inward investors in the absence of *emda* funded support. Project assessment evidence suggested that 90 percent of activity would not have gone ahead in the absence of *emda* support.
- **Additionality of support:** The infrastructure providing support for inward investment is complex in the region, and it would have been difficult to establish from beneficiaries whether they would have gone to another Agency to obtain support as they would not necessarily know what organisations have had *emda* funding. Evidence from the stakeholder consultations suggests that provision is filling a gap, so it is assumed that all support has been additional.
- **Additionality of employment** is assessed using the beneficiary survey. The beneficiary survey is used to establish how far the jobs created and safeguarded by firms could be attributed to the support received from *emda*. Beneficiary firms were asked to confirm:
 - ▶ that they had received support from a relevant agency;
 - ▶ how likely they would have been to make their decision to undertake an inward investment, expansion, or retain their operations in the region if they had not received the support of the agencies concerned.
- A number of respondents could not recall the support they had received from *emda* or reported that they had not received any support from a relevant agency. A significant amount of time has elapsed since some respondents have received support, and in some cases, the individuals in receipt of support have subsequently moved on. Employment impacts are estimated both on the basis that firms have forgotten the support they received (and average additionality from the rest of the sample applies) and that the firms concerned did not receive noteworthy support (with the implication of zero additionality in these cases).
- The estimate of the additionality of employment impacts is estimated based on beneficiaries' estimates of the probability they would have made an inward investment, expansion or retained their operations in the region if they had not received support from *emda*. These responses are set in Table 4.2 below, and indicate an average of 43 percent of the employment impacts can

be attributed to *emda* support (broadly in line with the results for other intervention types). This varied by success type: while inward investments and expansions reported higher rates of additionality, the small sample of retentions indicated that the support received was largely irrelevant in their decision to remain within the region.

Table 4.2 Responses to: How likely would you have been to make an inward investment/expansion/retain your operations in the region if you had not received support from a relevant agency?

Response	Inward Investments	Expansions	Retentions
Very Unlikely (100% additional)	0	8	0
Unlikely (75% additional)	25	41	0
Likely (50% additional)	25	8	0
Very Likely (25% additional)	0	25	0
Irrelevant – outcome would have been the same (0% additional)	50	16	100
Average Additionality of Inward Investment successes among respondents reporting they had received support from a relevant agency	0.31	0.50	0.00
Number of respondents to the beneficiary survey	13	17	3
Number of respondents that reported they had received support from a relevant agency	4	12	2

Our estimates of gross additional employment impacts are set out in Table 4.3 below.

Table 4.3 Gross Additional Jobs Created

Success Type	Inward Investments	Expansions	Retentions
Actual gross jobs created or safeguarded among respondent firms	123	396	410
Potential gross jobs to be created or safeguarded among respondent firms	101	411	0
Average Additionality of Employment Impacts	0.31	0.5	0.00
Project additionality	0.9	0.9	0.9
Additionality of support	1.0	1.0	1.0
Overall additionality (assuming zero additionality where firms reported no support from a relevant agency)	0.09	0.36	0.00
Overall additionality (assuming average additionality where firms reported no support from a relevant agency)	0.27	0.45	0.00
Assuming zero additionality where firms reported no support from a relevant agency			
Gross additional jobs created (sample)	40	73	0

Success Type	Inward Investments	Expansions	Retentions
Gross additional potential jobs to be created (sample)	45	109	0
Sample coverage of total population (in terms of employment)	0.09	0.16	0.16
Total gross additional jobs created	461	450	0
Total gross additional potential jobs to be created	522	678	0
Assuming average additionality where firms reported no support from a relevant agency			
Gross additional jobs created (sample)	56	125	0
Gross additional potential jobs to be created (sample)	50	177	0
Sample coverage of total population (in terms of employment)	0.09	0.16	0.16
Total gross additional jobs created	653	776	0
Total gross additional potential jobs to be created	580	1,097	0

Source: ECOTEC analysis

4.2.3 Net additional jobs created

The following assumptions are used to convert gross additional employment impacts to net additional employment impacts:

- **Displacement:** Respondents reported that an (employment weighted) average of 30 percent of their sales was within the East Midlands, and an (employment weighted) average of 2.0 percent of their main competition was based in the East Midlands. Taking these two figures together (30% multiplied by 2%) indicates minimal displacement (less than 1 percent). A value of 1 percent for displacement is therefore assumed.
- **Leakage:** Respondents reported that an (employment weighted) average of 2.4 percent of employees reside outside the East Midlands. It is assumed that 2.5 percent of gross additional jobs created are filled by residents of areas outside the East Midlands.
- **Multiplier Effects:** A multiplier effect of 1.36 is used, based on the Experian model of the East Midlands economy, applied to the sectoral profile of beneficiaries based on the beneficiary survey.

Table 4.4 Percentage of Beneficiaries by Sector and Assumed Multiplier Effects

Sector	Multiplier effect	Percentage of beneficiaries
Private services	1.40	58
Manufacturing	1.35	82
Assumed value for multiplier effects	-	1.39

Source: Experian and Beneficiary Survey

- The estimates of net impact are set out in the table below.

Table 5.5 Total Net Employment Impacts

Success Type	Assuming zero additionality where firms reported no support received	Assuming average additionality where firms reported no support received
Total gross actual jobs created*	3,896	3,896
Total gross potential jobs to be to be created	3,727	3,727
Gross additional jobs created	911	1,429
Gross additional potential jobs to be created	1,200	1,678
Displacement	0.01	0.01
Leakage	0.025	0.025
Multiplier Effects	0.36	0.36
Net additional jobs created	1,195	1,875
Net additional potential jobs to be created	1,575	2,201

** note that this excludes 2,340 jobs safeguarded by reported retention successes – the beneficiary survey found no additionality associated with these jobs.*

5.0 Interventions based on improving the employability and skills of individuals, including facilitating their access to employment

This chapter sets out the economic impact of projects designed to improve employability and skills.

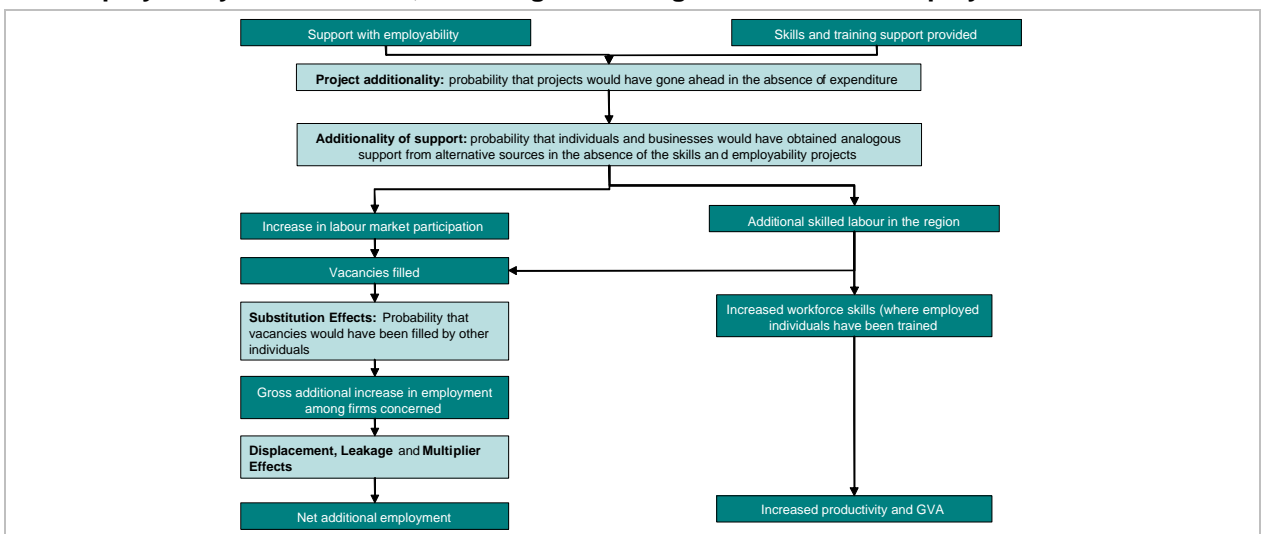
5.1 Analytical approach

In estimating the impacts of projects based on improving the skills and employability of individuals, including facilitating their access to employment, the analysis needs to take into consideration the impact of this type of project at three levels:

- For those already in employment, there is a need to consider the extent to which the upgrading of skills has had an impact on their earnings and hence GVA.
- For the unemployed who are actively seeking work (those attached to the labour force), there is a need to assess the extent to which improvements in skills levels have enhanced the employment prospects of those involved. There is also a need to consider the extent to which projects that are focused on job search affect the employment prospects of participants.
- Finally, there is a need to consider the impact that projects have had on beneficiaries who were not economically active. This needs to consider the extent to which each project has moved people into employment or from being economically inactive to active.

There is also the possibility that additional skilled labour will attract firms to the region – this is not included in the analysis.

Figure 5.1 Overall approach to estimating economic impacts - projects based on improving the skills and employability of individuals, including facilitating their access to employment



5.2 Cost per gross, gross additional, and net additional persons into employment (project sample)

Employment impacts of interventions designed to improve the employability of individuals are estimated in the following way:

- **Gross persons into employment:** the estimates of gross jobs created by the project sample are based on the output figures reported by projects verified through the project assessments. This includes the number of jobs created, people assisted to gain employment and graduates employed in SMEs. As there were similarities between the projects reviewed in Work Packages 4 and 5, evidence has been combined.
- **Gross jobs safeguarded:** the estimates of gross jobs safeguarded and created by the project sample are based on the output figures reported by the projects and verified through project assessments.
- To move from gross jobs created to gross additional jobs created the analysis considers:
 - ▶ **Project additionality:** the probability that the project would have gone ahead in the absence of *emda* support, based on the findings of the project assessment.
 - ▶ **Additionality of support:** surveys of beneficiaries of *emda*'s employability and skills projects indicate that 33 percent of beneficiaries would have been able to obtain similar support elsewhere. It is assumed that 65 percent of the training would not have been delivered to beneficiaries in the absence of *emda* support.
 - ▶ **Substitution effects:** In assessing the impact of labour market interventions, there is a need to consider the extent to which firms employing those trained would have employed others who had not received training. Some characteristics of the East Midlands labour market are particularly relevant to the assessment of the economic impact of *emda* funded employability and skills projects.
 - The East Midlands' labour market has been relatively tight with rising employment helping to reduce unemployment. Economic activity and employment rates have been consistently high in the East Midlands between 1996 and 2007. At the same time, unemployment in the East Midlands has remained below the national average.
 - Employment demand was greatest at the higher end of the skills spectrum. According to the Labour Force Survey, employment was primarily at NVQ 3 or above whilst – a significant proportion has been at NVQ 4 or above. Only a relatively small, but still a large share, proportion of employment was at NVQ 1 or lower. In contrast, the workforce of the East Midlands' was more evenly spread among skill levels. However, a significant proportion of its workforce has no qualifications or low skills. Taken with the evidence on

general labour market conditions the indications are that substitution is likely to be low in relation to projects providing high level skills but relatively high in relation to projects providing more basic skill or helping to place people with such skills into employment.

- Evidence from a review of the Workstart programmes found a substitution effect of between 20 and 40 percent¹¹. Factors that influence this rate were the type and size of the intervention. Project assessment evidence indicated that *emda* has funded a broad range of interventions, from projects aimed at filling higher level skills shortages in regionally important industries and placing graduates in SMEs through to schemes designed to assist those with low level skills or in disadvantaged areas into employment. A substitution effect of 30 percent is assumed to reflect this broad mix of projects.
- **Gross additional persons into employment and jobs safeguarded:** the total number of people assisted into employment or jobs safeguarded by projects in the sample that could be attributed to *emda* support.
- **Net additional persons into employment and jobs safeguarded:** The estimate of gross additional jobs created provides an estimate of the net increase in employment in the firms hiring beneficiaries. To move to net additional jobs created, there is a need to consider possible displacement, leakage and multiplier effects. However, evidence from beneficiaries has been gathered in relation to the individuals rather than the firms concerned, so these effects have been approximated using the ratio of net additional to gross additional jobs estimated from interventions designed to influence firm performance (105 percent).
- **Cost per gross, gross additional, and net additional persons into employment and job safeguarded** are estimated by dividing *emda*'s total expenditure on the project sample by the estimated number of gross, gross additional and net additional jobs created.

Table 5.1 Cost per gross, gross additional, and net additional jobs created – project sample

Type of Project	Skills and Employability Projects
Total expenditure by <i>emda</i>	£4,146,807
Gross jobs created or safeguarded (sum of verified numbers of jobs created, people assisted into employment, and graduates employed in SMEs)	948
Cost per gross person into employment	£4,374
Project additionality (sample average)*	0.82

¹¹ Institute for Employment Research (IER) Bulletin, Number 49, 1999.

Additionality of support (sample average)	0.65
Substitution effects ¹²	0.3
Gross additional jobs created or safeguarded	420
Cost per gross additional person into employment	£9,878
Ratio of net additional jobs created to gross additional jobs created under interventions designed to influence firm performance	1.05
Net additional jobs created or safeguarded	441
Cost per net additional person into employment	£9,408

* Note that additionality is applied on a project by project basis – The figures presented are averages across the sample and their application will only provide an approximation of the results presented.

5.3 Estimates of Gross, Gross Additional and Net Additional Persons into Employment

Costs per gross, gross additional and net additional jobs created are applied to total *emda* spending on these types of projects to estimate the total employment impacts of *emda* spending. The results are set out in the table below. 6 percent of gross jobs were gross jobs safeguarded, so it is assumed that 6 percent of the net additional impact comprises safeguarded jobs.

Table 5.2 Economic Impact of Interventions designed to improve the employability and skills of individuals, including facilitating their access to employment

Data	Employability and Skills
Total <i>emda</i> expenditure (£000s, PD)	22,365
Gross persons into employment	4,806
Gross additional persons into employment	2,135
Net additional persons into employment	2,236
Gross jobs safeguarded	307
Gross additional jobs safeguarded	135
Net additional jobs safeguarded	142

¹² Note that substitution effects are subtracted from gross jobs, so gross additional jobs = gross jobs * project additionality * additionality of support * (1 – substitution effects)

6.0 Interventions designed to boost tourism demand

This chapter sets out the economic impacts of interventions designed to boost tourism demand.

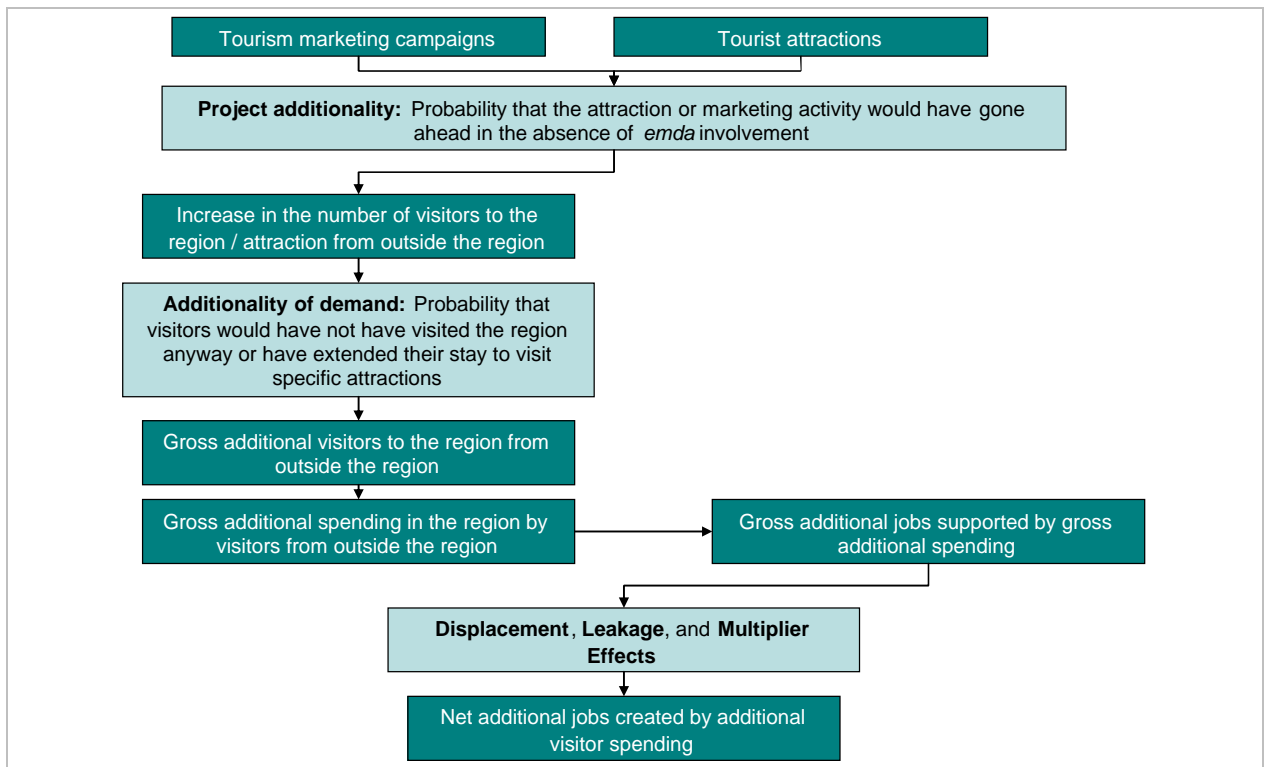
6.1 Analytical approach

Two types of intervention designed to boost tourism demand in the East Midlands are identified – marketing campaigns designed to increase interest in visiting the region and investment in tourist attractions, again to increase the numbers of visitors to the region. There are a range of issues to consider in estimating the impact of tourism interventions on the demand side:

- To assess the impact of such interventions on the number of visitors to the region there is a need to consider how far these visitors would have visited the region in the absence of the marketing campaign or attraction. With attractions in particular, consideration needs to be given to whether staying visitors have extended their stay to visit the attraction or whether day visitors have come to the region specifically to visit the attraction.
- Displacement in this model is considered within the context of the tourism industry – for example, where a marketing campaign or attraction has diverted visitors from one part of the region to another.
- Translating the impact of additional visitors to the region into employment and GVA requires estimates of the additional spending in the region associated with those additional visitors and the extent to which that spending has supported additional jobs in the sector.

The key features of the approach are set out in Figure 6.1.

Figure 6.1 Overall approach to estimating economic impacts - interventions designed to boost tourism demand



6.2 Estimating the economic impact of visitor attractions

Eight interventions that aimed to either construct a new - or enhance an existing - visitor attraction were sampled. In order to make a full assessment of the economic impacts of tourist attractions, the normal approach would be to conduct a survey of visitors. This was not feasible given the constraints of timetable and resources, so the assessment is based on secondary evidence available from projects.

6.2.1 Cost per gross additional and net additional job (project sample)

Cost per gross additional and net additional jobs for the projects assessed are estimated in the following way:

- The analysis begins by assessing the **gross increase in visitors**: the study was able to collect information on the number of visitors to an attraction before the enhancement and in 2007 for four of the projects assessed. This forms the estimate of the gross increase in visitors to attractions. To estimate the number of gross additional visitors adjustments are made to reflect:
 - ▶ **Project additionality**: the probability that the project would have gone ahead in the absence of *emda* funding.

- ▶ **Additionality of demand:** To assess the additionality of visitors and associated expenditure, the analysis considers:
 - **Percentage of visitors coming from outside the East Midlands:** It is assumed that all visitor expenditure by residents of the East Midlands would still have been spent in businesses within the Region in the absence of the attraction and is therefore deadweight. Information on the location of residence of visitors was sourced from surveys undertaken by the attractions concerned.
 - **Percentage of visitors coming specifically in order to visit the attraction:** It is assumed that visitor expenditure by those not coming to the East Midlands specifically to visit the attraction would have been incurred in the absence of the project and is therefore deadweight. This information was sourced from existing visitor surveys.
- The above provides estimates of the **gross additional increase in visitors** seen among the visitor attractions in the project assessment sample,
- **Gross additional visitor expenditure:** Average spend per day and staying visitor (per night) figures are taken from the 2006 STEAM results published by EMT. These are applied to the gross additional increase in visitors to estimate to gross additional visitor expenditure. Information on the proportions of day and staying visitors is sourced from the existing visitor surveys.
- **Gross additional jobs created:** The average ratio of tourism expenditure to tourism jobs is taken from the 2003 to 2006 STEAM results published by EMT to estimate the level of tourism spend required to sustain 1 full-time equivalent employee (£56,435¹³). This is applied to gross additional visitor expenditure to estimate gross additional jobs created.
- **Net additional jobs created:** In moving from gross additional to net additional jobs created, the following assumptions are made:
 - ▶ **Displacement:** As noted above, only residents from outside the East Midlands who came specifically to visit the attraction are included in the estimates of gross additional expenditure. It is assumed that these residents would not have come to the region in the absence of the attraction, so there is no issue in relation to whether attractions have shifted demand from one area of the region to another. Zero displacement is therefore assured.
 - ▶ **Leakage:** Following the survey of tourist accommodation providers, it is assumed that 1 percent of the jobs created are filled by residents outside the East Midlands.

¹³ Higher than assumed in many studies.

- ▶ **Multiplier effects:** Indirect and induced effects are accounted for by the ratio of expenditure to employment in the STEAM model.
- **Cost per gross additional and net additional jobs created:** Cost per gross additional and net additional job created are derived for the project sample by dividing *emda* expenditure on the project sample by the estimated number of gross additional and net additional jobs created in the sample.

Table 6.1 Cost per Gross, Gross Additional, and Net Additional Jobs Created – Project Sample

Type of Project	Visitor Attractions
Total <i>emda</i> expenditure*	£3,787,400
Gross increase in visitors	103,735
Project additionality **	0.81
Percentage of visitors from outside the East Midlands ***	18%
Percentage of visitors coming specifically for the attraction ***	34%
Gross additional visitors ***	16,600~
% day visitors ***	90%
Average spending per day visitor	£27
% staying visitors ***	10%
Average nights spent by staying visitors	2.9
Average spending per staying visitor per night	£48
Gross additional visitor expenditure	£573,400
Gross additional jobs created	10
Cost per gross additional job created	£372,800
Displacement	0.00
Leakage	0.01
Multiplier effects	N/A
Net additional jobs created	10
Cost per net additional job created	£376,500¹⁴

* for the four projects the team was able to obtain sufficient secondary information ** Note that additionality is applied on a project by project basis – the figures presented are averages across the sample and their application will only provide an approximation of the results presented (~) in this case, there was substantially higher additionality associated with one of the project that had seen the greatest increase in visitors (the Space Centre), which is not reflected in the averages presented *** the parameters presented are averages, but in implementation, these values are applied on a project by project basis, so replication will only provide an approximation of the results presented

¹⁴ The cost per job estimates here seem high. This was mainly due to the inclusion of the Royal and Derngate Theatre refurbishment project. *emda* invested £2m in this project, but evidence from the project assessments revealed that there has been no discernable increase in the number of visitors (and by extension, jobs).

6.2.2 Total employment impacts

Estimated costs per gross additional and net additional jobs created are applied to total *emda* spending to estimate the overall employment impacts under this intervention type. Table 6.2 below shows our results.

Table 6.2 Economic Impact of Visitor Attractions

Data	Visitor Attractions
Total <i>emda</i> expenditure (£000s, PD)	£21,894
Gross Additional Jobs Created	59
Net Additional Jobs Created	58

6.3 Estimating the employment impacts of tourism marketing

Preliminary consultations undertaken indicated that EMT undertakes substantial evaluation of its marketing activities, and it was agreed that the approach would be to synthesise the evidence already obtained in Work Package 5. Research undertaken by EMT estimating the return on marketing investment in terms of visitor spending has enabled an estimate to be made of the economic impact of these interventions.

EMT commissioned Nottingham University to estimate the numbers of additional visitors and associated visitor spending that were attracted to the region due to the marketing campaigns undertaken by the DMPs in 2005/06 and 2006/07. Surveys of respondents to marketing campaigns were undertaken to assess the extent to which the campaigns influenced visitor decisions to come to the East Midlands. The survey results are used to estimate the total visitor expenditure attracted to the region as a result of DMP marketing. Research was undertaken into 18 of 31 campaigns in 2005/06 and 9 of 24 campaigns in 2006/07.

6.3.1 Cost per gross additional and net additional job created

The employment impacts of tourism marketing are estimated in the following way:

- **Gross expenditure in the region:** EMT research estimated additional expenditure attracted to the region by 27 of the 55 marketing campaigns. Using the total spending on this sample of marketing campaigns and the estimated total benefits, on average, £1 of spending resulted in a £12.5 return in terms of visitor spending.
- **Project additionality and additionality of demand** – EMT research estimates the additionality of visitors attracted to the region, but not the additionality of the marketing campaigns. While DMP marketing campaigns would have been unlikely to have been undertaken in the absence of *emda* funding, EMT also purchases an East Midlands component to national campaigns run by Visit Britain. To some extent, the benefits of these national campaigns would probably have been realised in the absence of *emda* involvement. To account for this the economic impacts

are estimated based on alternative scenarios assuming that 100%, 50% or 25% of these benefits would not have been realised in the absence of emda funding¹⁵.

- **Cost per gross additional job created:** Using the ratio of total visitor expenditure to total tourism employment estimated in the STEAM model (£56,435 per tourism job), it is estimated that £4,531 spending on tourism marketing would generate 1 tourism job. This ratio includes implicitly the impact of multiplier effects in the tourism sector.
- **Cost per net additional job created:** The following adjustments were made to cost per gross additional job to estimate the cost per net additional cost per job.
 - ▶ **Displacement:** Zero displacement is assumed (i.e. marketing campaigns do not cause visitors just to be diverted from one part of the region to another).
 - ▶ **Leakage:** Following the survey of tourism accommodation providers, it is assumed that 1 percent of the employment benefits leak outside the region.
 - ▶ **Multiplier Effects:** The estimate of the visitor expenditure required to support 1 tourism job derived from STEAM are believed to include those jobs created through multiplier effects, so no further additional adjustments are made.

Table 6.3 Cost per gross additional, and net additional job created – Project Sample

Type of Project	Visitor Attractions
Total Cost of Marketing Initiatives in Sample (Source: EMT)	£1,512,869
Total Return on Investment (Source: EMT)	£18,928,174
Average return on investment per £1 expenditure	£12.50
Additional return on investment per £1 expenditure:	
<i>100% additionality of Visit Britain campaigns</i>	£12.50
<i>50% additionality of Visit Britain campaigns</i>	£10.64
<i>25% additionality of Visit Britain campaigns</i>	£9.71
Cost per Gross Additional Job Created¹⁶:	
<i>100% additionality of Visit Britain campaigns</i>	£4,500
<i>50% additionality of Visit Britain campaigns</i>	£5,300
<i>25% additionality of Visit Britain campaigns</i>	£5,800
Displacement	0

¹⁵ EMT contributions to Visit Britain campaigns only represent a share of total marketing campaigns so the figures in Table 6.3 represent weighted averages.

¹⁶ Calculated using £56,435 divided by additional return on investment per £1 of emda expenditure

Leakage	0.01
Multiplier Effects	N/A
Cost per Net Additional Job Created	
100% additionality of Visit Britain campaigns	£4,600
50% additionality of Visit Britain campaigns	£5,400
25% additionality of Visit Britain campaigns	£5,900

Source: ECOTEC analysis

6.3.2 Total employment impacts

The estimates of the cost per gross additional and net additional are applied to total *emda* spending (including marketing schemes implemented by other agencies or before the establishment of DMPs) to estimate the total economic impact of tourism marketing initiatives. The results are set out in Table 6.4 below.

The effects of tourism marketing initiatives are likely to decay rapidly – additional employment is likely to be sustained for only a short period of time once the marketing campaign has finished. The gross additional and net jobs created are therefore temporary in nature rather than permanent positions (unlike with tourist attractions where the impact on employment is assumed to be permanent). It is assumed that the impacts represent job years (which would be the worst case scenario).

Table 6.4 Economic Impact of Tourism Marketing (assuming 50% additionality of Visit Britain Campaigns)

Data	Visitor Attractions
Total <i>emda</i> expenditure (£000s, PD)	10,735
Gross Additional Jobs Created	2,024
Net Additional Jobs Created	2,004

7.0 Impact of other projects and residual expenditure

7.1 Impacts of other projects

The employment impacts of projects which do not fall into the five project types outlined above are estimated as follows:

- The analyses begins by estimating **gross jobs created**: It is assumed that the estimates of jobs created recorded on PD for other project types are correct and these have been used to estimate gross jobs created.
- **Gross additional jobs created**: It is assumed that 40 percent of gross jobs would not have occurred without *emda* support, which broad reflects the rate of deadweight under other intervention types.
 - ▶ **Displacement**: An estimate of displacement is made by taking a weighted average (by total *emda* project expenditure) of displacement under each intervention type excluding interventions designed to boost tourism demand. This is estimated to be 0.13.
 - ▶ **Leakage**: The evidence gathered through the evaluation suggests that approximately 5 percent of the jobs are taken up by non East Midlands residents.
 - ▶ **Multiplier Effects**: A multiplier of 1.40 is used as a general multiplier in the East Midlands economy, based on Experian's regional economic model and the balance of regional employment in the Primary, Manufacturing, Construction, Private Services and Public Services industries.
- **Net Additional Jobs Created**: the net number of jobs created by *emda* expenditure.

Using these assumptions, the employment impacts are calculated as shown in the table below.

Table 7.1 Economic Impact of Other Projects

Data	Visitor Attractions
Total <i>emda</i> expenditure (£000s, PD)	212,441
Gross Jobs Created	3,288
Gross Additional Jobs Created	1,315
Net Additional Jobs Created	1,522

7.2 Impact of Residual Expenditure

To estimate the impact of the £34m residual expenditure not recorded on PD, general cost per gross additional and net additional job across all of *emda's* activity is estimated.

Across all 9 intervention sub-types and other projects, *emda* spent £474m on strand level projects (excluding the cost of new site development projects which have been excluded as their jobs are expected to come in the future) and created 13,094 net additional on-going jobs. This gives an average cost per gross additional job of £38,856.

Using these figures to estimate the impact of residual expenditure not recorded on PD, it is estimated that this expenditure generated 875 net additional jobs.

8.0 Impacts of National Programmes

8.1 National Coalfield Programme

The estimates of the economic impact of the National Coalfield Programme are based on monitoring data provided by EP for 1999/00 to 2004/05, data recorded by *emda* on PD, and consultations undertaken as part of the evaluation.

Estimates of the economic impact of the NCP between 1999/00 and 2004/05 have been made on the basis of NCP monitoring data. Discussions with *emda* staff indicate:

- No update to the NCP monitoring data is available post 2004/05, and PD is the most reliable source of information on outputs achieved since 2004/05.
- Monitoring data (on PD) has focused on the direct outputs of the programme (such as land remediated and floorspace created) rather than the indirect jobs created by the programme.
- PD does not provide a reliable record of the outputs achieved prior to 2005/06.

In light of the above, estimates of the economic impact of the NCP between 2005/06 and 2006/07 are based on monitoring data held on PD, to estimate how far projected outcomes (as recorded on the NCP) have come forward to date.

8.1.1 Construction impacts

- **Gross actual and potential construction years** associated with the NCP programme are estimated in the following way:
 - ▶ Consultations indicate that 80 percent of actual and forecast *emda* spending on the National Coalfield Programme has been on reclamation and servicing of coalfield sites. £100,000 of reclamation spending is assumed to generate one construction year of employment. *emda* actual and forecast expenditure on the Coalfield Programme is drawn from PD.
 - ▶ Development activity is assumed to be undertaken by private sector developers. Actual and potential development costs are based on actual and forecast housing and floorspace outputs (as recorded on PD) and standard values for the cost per square metre of development type (provided by GVA Grimley). £80,000 of development spend is assumed to generate one construction year of employment. A cost of £700 per square metre is assumed for employment land between 1999/00 and 2004/05, based on consultations undertaken during the evaluation.
 - ▶ Employment floorspace is assumed to be 50% industrial and 50% commercial in 2005/06 and 2006/07 based on evidence on the sites that have come forward in these two years. Based on BICS Tender Price Survey evidence, the cost per square metre of industrial

floorspace is assumed to be £667 per square metre, and £1,132 per square metre for commercial floorspace.

- NCP monitoring data provides information on actual outputs achieved between 1999/00 and 2004/05, and projected outputs beyond 2004/05. Estimates of actual outputs achieved in 2005/06 and 2006/07 are based on actual outputs recorded on PD. Potential outputs beyond 2006/07 are estimated by subtracting actual outputs achieved in 2005/06 and 2006/07 (PD) from projected outputs beyond 2004/05 (NCP data).

Table 8.1 Gross actual and potential construction impacts of the National Coalfield Programme

Data	Reclamation	Housing	Employment Floorspace
Actual construction expenditure 1999/00 to 2004/05 based on NCP data			
Quantity of development constructed between 1999/00 and 2004/05 (NCP)	-	296 homes	77,507 sq metres
Unit cost of development	-	£80,000 per home	£700 per sq metre
Total actual cost of development 1999/00 to 2004/05	-	£23.7m	£54.3m
Potential construction expenditure beyond 2004/05 based on NCP data			
Quantity of development projected beyond 2004/05	-	2,608 homes	514,160 sq metres
Unit cost of development	-	£80,000 per home	£700 per sq metre
Total potential cost of development 1999/00 to 2004/05	-	£208.6m	£359.9m
Actual construction expenditure 1999/00 to 2004/05 based on PD data			
Quantity of development constructed between 2005/06 and 2006/07 (PD)	-	11,626	13,092
Unit cost of development	-	661 per m2	667 per sq metre – industrial 1,132 per sq metre - commercial
Total actual cost of development 2005/06 to 2006/07	-	£7.7m	£11.8m
Gross actual construction jobs 1999/00 to 2006/07			
Total actual spending on development 1999/00 to 2006/07	£83.2m	£31.4m	£66.0m
Cost per gross construction job	£100,000	£80,000	£80,000
Gross construction jobs	832	392	825
Gross potential construction jobs 2006/07 onwards			

Total potential spending on development	£63.6m	£201.0m	£348.1m
Cost per gross construction job	£100,000	£80,000	£80,000
Gross potential construction jobs	636	2,512	4,352

- **Gross additional actual and potential construction years:** gross additional construction years are estimated using:
 - ▶ **Additionality of actual development activity:** all reclamation and development activity is assumed to have been 100% additional between 1999/00 and 2006/07.
 - ▶ **Additionality of potential development activity:** all reclamation activity is assumed to have been 100% additional beyond 2006/07. Owing to the potential impact of future excess supply of development sites, floorspace impacts are assumed to be 25% additional beyond 2006/07.
- **Net additional actual and potential construction years** assume a regional construction multiplier of 1.51 from Experian's regional economic model, and assuming leakage and displacement were minimal.

Table 8.2 Gross additional and net additional construction years, National Coalfield Programme

	Actual	Potential
Gross construction years	2,050	7,500
Gross additional construction years	2,050	2,352*
Leakage	0	0
Displacement	0	0
Multiplier effect	1.51	1.51
Net additional construction years	3,095	3,552

* Note that construction jobs associated with reclamation are 100% additional

8.1.2 On-going employment

- **Gross actual and potential on-going jobs created** are driven by the estimates of actual and potential floorspace floorspace achieved:
 - ▶ For developments over the period 1999/00 to 2004/05, employment density was estimated at 40 metres squares per job in the light of evidence gathered through the evaluation, except for the Manton Wood site, where one business that remained open 24 hours was able to sustain a much higher employment density. In this case total employment is estimated based on the NCP monitoring returns for this particular site.

- ▶ Evidence on the sites that came forward between 2005/06 and 2006/07 suggested that around 50 percent of floorspace was industrial floorspace and 50 percent was commercial floorspace. Appropriate employment densities, based on EP guidance¹⁷ have been used to estimate gross employment.
- ▶ An employment density of 40 metres per square metre for potential floorspace coming forward post 2006/07, in line with the 1999/00 to 2004/05 evidence. An occupancy rate of 90 percent is assumed for potential development activity.
- ▶ Again, NCP monitoring data provide information on actual outputs achieved between 1999/00 and 2004/05, and projected outputs beyond 2004/05. Estimates on actual outputs achieved in 2005/06 and 2006/07 are based on actual outputs recorded on PD. Potential outputs beyond 2006/07 are estimated by subtracting actual outputs achieved in 2005/06 and 2006/07 (PD) from projected outputs beyond 2004/05 (NCP data).

Table 8.3 Estimates of gross actual and potential jobs accommodated¹⁸

Period	1999/00 to 2004/05	2005/06 to 2006/07	Post 2006/07
Quantity of employment floorspace	77,507	13,092	501,068
Employment density	40	34 – industrial 19 – commercial	40
Gross employment accommodated	3,772	537	11,274¹⁹

- **Gross additional actual and potential jobs created** are estimated using:
 - ▶ **Additionality of floorspace:** 100 percent of employment floorspace is assumed to be additional between 1999/00 and 2006/07 in line with the project assessment evidence. 25 percent of employment floorspace is assumed to be additional beyond 2006/07 reflecting the lower expected level of additionality as the supply of development land increases.
 - ▶ **Additionality of employment:** 45 percent of jobs are assumed to be additional based upon the beneficiary survey for property interventions.

¹⁷ English Partnerships Additionality Guide: Industrial developments, 34 square metres per employee; Commercial developments, 19 square metres per employee.

¹⁸ Here we have assumed that future employment densities return to their long term average, rather than reflecting the near term past.

¹⁹ A 90% occupancy rate is assumed

- **Net additional actual and potential jobs created** are estimated using:
 - ▶ In line with beneficiary survey, **leakage** of 5%
 - ▶ **Displacement** of 10% based on results of the beneficiary survey for property development related projects.
 - ▶ A **multiplier effect of 1.375** was used to reflect the mix of industrial and commercial development on Coalfield sites (50 percent each), and the multipliers from Experian's regional economic model for the manufacturing and private services sector.

Table 8.4 Gross additional and net additional actual and potential jobs created

	Actual	Potential
Gross jobs created	4,309	11,274
Additionality of floorspace	1.00	0.25
Additionality of employment impacts	0.45	0.45
Gross additional jobs created	1,939	1,268
Leakage	0.05	0.05
Displacement	0.10	0.10
Multiplier Effects	1.375	1.375
Net additional jobs created	2,280	1,491

8.2 Business Link

The estimates of the economic impact of Business Link activity delivered by *emda* between 2005/06 and 2006/07 are based on the national evaluation of Business Link undertaken by the University of Warwick, Aston Business School and Kingston University in 2006 for DBERR²⁰.

The study estimated that every £11,578 of spending on local Business Link services generated 1 additional job. The study was undertaken at national level, and as such did not model leakage effects. Adjustments for displacement and multiplier effects were not made in the national study (leakage did not apply due to the national scope of the study). We have assumed that the values for displacement and multiplier effects estimated from the beneficiary survey for interventions designed to influence firm performance also apply to Business Link provision in the region:

- Displacement of 0.20

²⁰ Economic Impact Study of Business Link Local Service, University of Warwick, Aston Business School, Kingston University, 2006

- Multiplier effects of 1.39
- Leakage of 0.05

Using these findings, it is estimated that *emda* spending on Business Link activity between 2005/06 and 2006/07 of £22.4m involved:

- 1,931 gross additional jobs created among firms within the region; and,
- 2,040 net additional jobs created among firms within the region.

8.3 Grants for R&D

Estimates of the economic impact of the Grants for R&D programme have been based on the national evaluation of the Grants for R&D programme undertaken in 2001 by PACEC for the then DTI²¹. This study provided regional estimates of the cost per net additional job created by the programme of £18,349, and noted that impacts may take a number of years to arise (and is likely to fade quickly).

emda assumed control of the programme in 2005, and awarded grants totalling £6,591,000 between 2005/06 and 2006/07, and defrayed an estimated £4.1m on grant expenditure (including awards approved by the SBS). There was evidence that the programme had a substantial effect at firm level, and signs were encouraging that a number of the projects would eventually have market outcomes through increased turnover and job creation. However, the time lags involved in the fruition of these projects (as highlighted by PACEC) suggest that it is unlikely that the programme will achieve employment and GVA impacts until post 2007. In addition, total grant values had not been awarded by the end of 2006/07. We have therefore treated all economic impacts of the Grants for R&D as potential impacts on the regional economy.

To estimate the impact of the Grants for R&D programme, we:

- Assume that *emda* awarded grants (£6.6m) are paid in full;
- Applying PACEC's estimate of cost per job, the potential impact of grants awarded by *emda* by the end of 2006/07 amount to 359 net additional potential jobs created.

8.4 Manufacturing Advisory Service

To estimate the economic impact of MAS, the analysis uses information supplied by *emda* relating to GVA and the value of contracts with MAS beneficiaries. It is estimated that in terms of rate of return for £1 allocated to the delivery of the MAS in the Region *emda* spend has generated:

²¹ Evaluation of SMART grants for Innovation, PACEC, 2001

- £4.45 of benefits for companies assisted in the first phase, 2002-05;
- £5.76 of benefit for firms assisted in the second phase (excludes MAS+ funding)

On this basis, it is estimated that:

- The £3.1m spent delivering MAS between 2002 and 2005, which will have generated £13.9m of GVA amongst beneficiary firms over 2002 to 2005.
- The £1.9m spent delivering MAS in 2005/06 and 2006/07 will have generated £10.9m of GVA amongst beneficiary firms over the period.

No evaluation evidence was available on the employment effects of the MAS service. However, assuming GVA per worker of £41,600, we estimate that MAS created:

- 334 jobs between 2002 and 2005, and a further 262 in 2005/06 and 2006/07 – a total of 596 jobs.

8.5 RSA / SFIE

The estimates of the economic impact of Regional Selective Assistance (RSA) and Selective Finance for Investment in England (SFIE) administered by *emda* are based on a survey of East Midlands firms conducted as part of the national evaluation of RSA and SFIE by OMB Research²²:

- **Gross jobs created and safeguarded** are estimated based on the responses of beneficiaries as to how far their expected employment impacts have come forward since receiving support.
 - ▶ **Additionality of employment impacts:** respondents to the survey were asked how far the total business outcomes they achieved through RSA / SFIE grants would have come forward in the absence of RSA / SFIE support. Beneficiary survey evidence is applied on a respondent by respondent basis to generate estimates of gross additional employment impacts (average additionality of employment outcomes was 50 percent)
- **Gross additional jobs created and safeguarded:** jobs created and safeguarded among beneficiaries that could be attributed directly to the RSA / SFIE grant received.
 - ▶ **Displacement** is applied on a respondent by respondent basis based on the proportion of respondents' turnover generated and competition based in the East Midlands. Average displacement across the beneficiary sample is 5%.
 - ▶ **Leakage** is assumed to be 5 percent in line with the survey of beneficiaries of projects designed to influence firm performance.

²² Performance Impact and Monitoring Survey, OMB Research, 2006

- **Multiplier effects** is assumed to be 1.36 to reflect the sectoral profile of respondents to the beneficiary survey.

Table 8.5 Percentage of Beneficiaries by Sector and Assumed Multiplier Effects

Sector	Multiplier effect	Percentage of beneficiaries
Manufacturing	1.40	80
Private services	1.35	20
Assumed value for multiplier effects	-	1.36

Source: Experian and OMB Research

- Estimates of **net additional jobs created and safeguarded**: the net employment effects of RSA / SFIE grants in the project sample.
- **Cost per net additional job created** among beneficiary firms is estimated on the basis of forecast total grant spending of £14.7m (as RSA and SFIE grants are claimed after the initial capital investment). Data containing information on actual RSA and SFIE expenditure of the firms interviewed was unavailable.

Table 8.6 Economic Impacts of RSA and SFIE (beneficiary survey sample)

Data	RSA / SFIE
Gross jobs created	2,078
Gross jobs safeguarded	681
Additionality of employment impacts (sample average*)	0.50
Gross additional jobs created	324
Gross additional jobs safeguarded	503
Leakage	0.05
Displacement (sample average) **	0.05
Multiplier effects	1.36
Net additional jobs created	396
Net additional jobs safeguarded	583
Forecast total grant spending (£s)	14,762,000
Cost per net additional job created (£s)	37,256
Cost per net additional job safeguarded (£s)	25,324

Source: ECOTEC analysis * note that application of this figure to gross jobs created or safeguarded do not approximate gross additional jobs or safeguarded, this is due to two RSA grant recipients with substantial numbers of gross jobs created reported low additionality associated with the business outcomes of the grant. ** Displacement was applied on a respondent by respondent basis, which was subject to variation

- **Cost net additional job created and safeguarded** is applied to total *emda* spending on RSA / SFIE between 2001/02 and 2006/07 (£18.2m) to generate net impacts.

Table 8.7 Economic Impacts of RSA and SFIE (total *emda* spending)

	RSA / SFIE
Net additional jobs created	488
Net additional jobs safeguarded	718

8.6 SRB

The approach to estimating the economic impact of SRB expenditure between 1999/00 and 2006/07 draws on evidence presented in the National Evaluation of the Single Regeneration Budget (2005)²³. This study estimated the net economic impact of SRB programmes based on 20 case studies of schemes around the country at the local level.

Relevant assumptions from the national evaluation include:

- Average proportion of gross jobs created (as reported by SRB schemes) that would not have occurred in the absence of *emda* intervention, net of displacement, leakage and multiplier effects – 41%; and,
- Average proportion of gross jobs safeguarded (as reported by SRB schemes) that would not have occurred in the absence of *emda* intervention, net of displacement, leakage and multiplier effects – 43%.

These findings were based on 20 case studies of SRB schemes across the country. The sample was too small to generate regionally specific findings.

The table below shows the estimates of the economic impact of SRB in the East Midlands. The results are based on:

- The number of jobs created and safeguarded between 1999/00 and 2001/02. These figures are taken from *emda's* Annual Reports and Accounts. Jobs created and safeguarded were presented together in 1999/00 and 2000/01 –the split between the two is estimated based on the ratio of jobs created to safeguarded under the Tier 3 and SRB reporting frameworks.
- The number of jobs created and safeguarded reported under the SRB reporting framework between 2002/03 and 2006/07 as recorded on PD.

²³ National Evaluation of the Single Regeneration Budget, Department of Land Economy, University of Cambridge, 2005

- The number of jobs created and safeguarded reported under the Tier 3 framework between 2002/03 and 2006/07 as recorded on PD (net of double counting against the SRB reporting framework)

There is clearly a question of whether regional effects can be taken to be the same as local impacts. Displacement and multiplier effects would be expected to be significantly higher at regional level but leakage will clearly be lower.

Table 8.8 Gross and Net Additional Outputs Achieved

Indicator	Gross	Additionality Ratio	Net Additional
Outputs as recorded in the Annual Report and Accounts (1999/00 to 2001/02)			
Jobs created	10,035	41%	4,110
Jobs safeguarded	8,524	43%	3,670
Tier 3 Framework (PD, 2002/03 to 2006/07)			
Jobs created	150	41%	62
Jobs safeguarded	26	43%	11
SRB Reporting Framework (PD, 2002/03 to 2006/07)			
Jobs created	2,248	41%	920
Jobs safeguarded	1,621	43%	700
Total			
Jobs created	12,971	41%	5,092
Jobs safeguarded	10,730	43%	4,381

8.7 Summary of Employment Impacts

A summary of net employment impacts of national programmes administered by *emda* is set out in Table 8.9 below.

Table 8.9 Net employment impacts of National Programmes

Programme	Net additional jobs created	Net potential jobs created	Net jobs safeguarded
National Coalfields Programme	2,280	1,491	-
Business Link	2,040	-	-
Grants for R&D	-	359	-
MAS	596	-	-

RSA / SFIE	488	-	718
SRB	5,092	-	4,381

9.0 The overall impact of *emda*

9.1 Short-term employment impacts

Table 9.1 below summarises the estimates of short-term employment and GVA generated by *emda* activity. Construction GVA is estimated using GVA per worker in the construction industry of £48,700 drawn from the Annual Business Inquiry (2006). GVA per worker is estimated on a workplace basis, and so leakage is added back in to these estimates.

The GVA of tourism marketing is based on average GVA per worker (£41,600) as estimated in section 1.7.11.

Table 9.1 Net additional actual and potential short-term employment and GVA (workplace based) impacts

Intervention type	Net Additional Years of Employment	Temporary GVA (£ms)
Construction impacts		
Property development projects – actual	3,383	165
Coalfields – actual	3,095	151
Total actual construction	6,478	315
Property development projects – actual	449	22
Coalfields – potential	3,552	173
Total potential construction	4,000	195
Short-term Tourism Impacts		
Tourism Marketing	2,004	84

9.2 Actual On-going Employment and GVA Impacts

Table 9.2 summarises the estimates of net additional jobs created and safeguarded by *emda* single programme and National Programme activities. This includes figures for productivity impacts among those in employment which are estimated to be £3m per annum.

Table 9.2 Net additional actual employment and GVA (workplace based) impacts

Intervention type	Net additional jobs created	Net additional jobs safeguarded	Net additional GVA per year	Net additional GVA safeguarded per year
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Property Development Projects	2,114	88	93	4
Interventions Designed to Influence Firm Performance	4,735	6,395	207	280
Interventions designed to improved the employability and skills of individuals	2,235	143	93	9
Inward Investment (mid-point of upper and lower estimates)	1,535	0	65	0
Intervention designed to boost visitor demand	58	0	2	0
Other projects	1,522	0	67	0
Residual expenditure	875	0	38	0
Total single programme impacts	13,074	6,626	564	293
National Coalfields Programme	2,280	-	100	-
Business Link	2,040	-	89	-
MAS	596	-	25	-
RSA / SFIE	488	718	21	31
SRB	5,092	4,381	212	182
Total impact of national programmes	10,496	5,099	447	214

9.3 Potential Net Employment and GVA Impacts

Table 9.3 summarises the estimates of the potential impacts of *emda's* property and inward investment projects, as well the potential impacts of the Coalfield and Grants for R&D programme.

Table 9.3 Net additional potential employment and GVA (workplace based) impacts

Intervention type	Net additional jobs created	Net additional jobs safeguarded	Net additional GVA per year	Net additional GVA safeguarded per year
Property Development Projects	870	36	38	2
Inward Investment (mid-point of upper and lower estimates)	1,888	0	93	0
Total single programme impacts	2,757	36	131	2
National Coalfields Programme	1,491	0	65	0
Grants for R&D	359	0	15	0
Total impact of national programmes	1,850	0	80	0

Appendix One: Coverage of the Project Sample

Appendix 1: Coverage of the Project Sample

9.4 Sampling of projects

The number of projects sampled under each Work Package was agreed between ECOTEC and *emda* during the inception phase for each strand based on the distribution of resources across strands.

Projects were selected by ECOTEC at random from the population of projects under each strand as recorded on PD, the Agency's management information system. The sample was stratified by project expenditure in each case to secure a relative concentration on larger projects in order to secure satisfactory coverage of expenditure and to avoid dissipating disproportionate effort on small projects with few economic outputs. In each case it was also as far as possible chosen to be representative of *emda*'s expenditure by intervention type, location and for single programme projects, year of implementation.

While some smaller projects were included in the sample, these were generally SAV interventions, often generating only limited economic impacts.

Projects in the project assessment sample were replaced as necessary in light of the following practical issues:

- Paper files for some projects were unavailable which made it difficult for assessors to assess a project. In most cases, these projects were replaced.
- *emda* staff responsible for older projects had frequently left the Agency. Where project owners had left the Agency, the project was replaced.

Projects were as far as possible replaced with analogous projects. However, in some cases there were no similar projects available for this purpose. In general, where projects had to be replaced, this involved reducing the overall coverage of expenditure in the sample.

9.5 Sampling of beneficiaries

All projects in the project assessment sample with beneficiaries were approached for beneficiary contact details. However, in many cases beneficiary contact details were unavailable. This would be for a variety of reasons: some projects did not record contact details, and frequently issues in relation to data protection arose. All beneficiaries for which

contact details were obtained were included in the beneficiary sample and target numbers of interviews were set on a project by project basis.

In addition, to those projects covered in the project assessment sample, we approached all business support projects securing more than 70 job creation outputs, and all property projects securing more than 20 job creation outputs, for beneficiary data to undertake a booster survey to maximise coverage of those benefitting from property development projects and interventions designed to directly improve firm performance (the two largest categories of *emda* spending).

Data was secured from 10 of 33 projects identified (beneficiary data was either unavailable from other projects or the project was unsuitable for a beneficiary survey – e.g. a crime reduction initiative project recorded a large number of job outputs (jobs safeguarded), but was not surveyed as there was no adequate method for capturing the economic impacts of these types of projects).

9.6 Sample Coverage by Intervention Type

Table 4 below sets out our coverage of *emda*'s total expenditure by intervention type based on total spending between 1999/00 and 2006/07 (rather than at the time of assessment). Overall, the sample covered:

- 31 percent of total expenditure
- 27 percent of expenditure on property development projects;
- 35 percent of expenditure on interventions designed to influence firm performance.
- 19 percent of expenditure on employability and skills.
- 74 percent of expenditure on the National Coalfields programme

The inward investment team were able to provide a full record of inward investment successes in the region, and 100 percent coverage of inward investment activities in the economic impact assessment was achieved (in terms of a beneficiary sample). 27 percent of inward investment expenditure was covered through project assessments.

While 19 percent of expenditure in relation interventions designed to boost visitor demand was covered through the project assessments, this was focussed almost exclusively on the construction of visitor attractions (25 percent of this intervention type was covered by project assessments). Estimates of the economic impact of Tourism Marketing were based on research into campaigns undertaken by East Midlands Tourism, which covered around 50 percent of EMT's campaign expenditure.

15 percent of expenditure on projects for which it was not possible to estimate economic impact (SAV interventions, administrative expenditure and so on) was covered by the projects assessed, reflecting the low emphasis on these types of projects in the study.

Table 4 Coverage of Expenditure by Intervention Type based on Total Spending

Project Intervention Type	Booster Survey	Coalfield Projects	Project Assessment	Total Expenditure in Sample	Total emda spending	% coverage
Property development projects	15,150	0	25,354	40,504	150,104	27
Interventions designed to directly influence firm performance	3,750	0	20,265	24,015	67,753	35
Employability and Skills	0	0	3,934	3,934	20,921	19
Inward Investment	0	0	4,563	4,563	16,636	27
Interventions designed to Boost Visitor Demand	0	0	6,244	6,244	32,629	19
Coalfields	0	77,332	0	77,332	104,023	74
Economic Impacts Not Estimated	0	0	31,456	31,456	214,835	15
Total	18,900	77,332	91,816	188,048	606,901	31

Source: PD, emda

Table 5 below shows coverage of expenditure by intervention type at the time projects were assessed. Project assessments were conducted in three phases, the first in 2005, the second during mid 2006, and the third after the end of 2006/07.

At the time sampling was undertaken, emda had generally incurred less expenditure than at the end of 2006/07, and the project assessment sample covered a greater proportion of emda expenditure than it did at the end of 2006/07, as illustrated in the table below.

Table 5 Coverage of Expenditure by Intervention Type at the Time Projects were Assessed

Project Intervention Type	Booster Survey	Coalfield Projects	Project Assessment	Total Expenditure in Sample	Total emda spending	% coverage
Property development projects	12,365	0	25,035	37,400	109,367	34
Interventions designed to directly influence firm performance	4,408	0	21,501	25,909	54,666	47
Employability and Skills	0	0	3,644	3,644	16,898	22
Inward Investment	0	0	4,563	4,563	16,367	28
Interventions designed to Boost Visitor Demand	0	0	6,245	6,245	26,850	23
Coalfields	0	58,653	0	58,653	75,657	78
Economic Impacts Not Estimated	0	0	25,531	25,531	153,760	17
Total	16,773	58,653	86,519	161,944	453,565	36

Source: PD, emda

9.7 Coverage of expenditure in the project assessment sample

Table 6 below sets out the coverage of the project assessment sample by year (including expenditure of the National Coalfields programme, but not expenditure of projects covered in the booster survey). Sampled projects accounted for 28 percent of *emda's* expenditure between 1999/00 and 2006/07. Coverage of the sample falls in 2005/06 and 2006/07; the majority of project assessments were undertaken before the end of 2006/07, and assessments of property projects with large amounts of expenditure were undertaken in 2005/06.

Table 6 Coverage of Expenditure by Year

Year	Total emda Expenditure	Expenditure in Sample	% coverage
1999/00	16,914	4,238	25
2000/01	22,407	8,290	37
2001/02	33,291	9,842	30
2002/03	71,610	25,435	36
2003/04	89,892	32,873	37
2004/05	98,002	31,214	32
2005/06	134,439	33,545	25
2006/07	140,346	23,711	17
Total	606,901	169,148	28

Source: PD - note that this represents spending by sampled projects as recorded in PD, not spending as verified in project assessments used to generate cost-per-job figures.

Table 7 below shows coverage of expenditure and projects by stand. Coverage of the sample ranged of 11 percent (Economic Growth and the Environment) and 39 percent (ICT and Enterprising Communities) of total expenditure, and between 5 to 10 percent of projects.

Where coverage of expenditure is particularly high, this is generally due to the inclusion of a large project that accounts for a substantial proportion of expenditure under the strand. Under some strands coverage of expenditure is low, particularly where the strand was characterised by a large number of small scale interventions (e.g. Rural).

Table 7 Coverage of Expenditure and Projects by Strand

Strand	Total emda Expenditure (£000s)	Expenditure of Sample (£000s)	% coverage	Number of Projects	Number of projects in sample	% coverage of projects
Economic Growth, Energy & the Environment	45,174	5,004	11	459	23	5
Employment, Learning & Skills	47,679	6,455	14	449	25	6
Enterprise and Business Support	74,829	9,177	12	531	43	8
Enterprising Communities	30,907	12,161	39	283	21	7
Information & Comms Technology	10,657	4,186	39	70	7	10
Innovation	48,469	8,418	17	211	15	7
International Trade/Inward Inv	20,333	4,769	23	84	8	10
Rural Development	24,299	3,973	16	607	23	4
Site Provision & Development	117,879	22,093	19	333	32	10
Tourism	35,291	7,886	22	289	7	2
Transport & Planning	4,643	1,190	26	52	17	33
Urban Regeneration	38,711	6,504	17	181	22	12
Coalfields	104,023	77,332	74	20	5	25
Strategic Programme Activity	4,007	0	0	16	0	0
Total	606,901	169,148	28	3,585	248	7

Source: PD, note that this represents spending by sampled projects as recorded in PD, not spending as verified in project assessments used to generate cost-per-job figures

Coverage of emda expenditure at a sub-regional area was highest in the Alliance Coalfield areas and of regional projects. A large number of the high spending land and property projects were concentrated in the Coalfield area, while regional projects tended to be larger than sub-regional projects.

Table 8 Coverage of Expenditure and Projects by sub-region

Sub-region	Total emda expenditure (£000s)	Expenditure of sample (£000s)	% coverage	Number of projects *	Number of projects in sample *	% coverage of projects *
Alliance	178,086	93,987	53	421	33	8
Derbyshire	36,747	4,221	11	428	21	5
Greater Nottingham	51,720	6,764	13	368	25	7
Leicestershire	68,230	9,827	14	366	32	9
Lincolnshire	34,516	2,629	8	349	16	5
Northamptonshire	32,936	4,063	12	187	9	5
Regional	193,690	45,958	24	1,246	94	8
Welland	10,976	1,699	15	200	13	7
Total	606,901	169,148	28	3,565	243	7

Source: PD, note that this represents spending by sampled projects as recorded in PD, not spending as verified in project assessments used to generate cost-per-job figures - * does not include Coalfield projects

Table 9 below shows the coverage of the project assessment sample in terms of the size of projects. As noted above, there was an emphasis on ensuring a reasonable coverage of emda's larger project investments.

Table 9 Coverage of Projects by Expenditure

Project expenditure	Number of projects *	Number of projects in sample *	% coverage
£0-25k	1,308	18	1
£25-50k	689	25	4
£50-100k	634	45	7
£100-250k	541	72	13
£250-500k	189	36	19
£500k-£1m	124	25	20
£1-5m	105	27	26
£5-10m	6	2	33
£10m or more	3	2	67
Payment Received / Clawback	8	1	13
Total	3,607	253	7

Source: PD, note that this represents spending by sampled projects as recorded in PD, not spending as verified in project assessments used to generate cost-per-job figures - * Totals do not match other tables as Coalfield projects are included as projects as defined by PD, rather than as sites (as used by the Coalfield team and in the evaluation) – one Coalfield site may have a number of PD projects.

Appendix Two: Probit Analysis

Appendix 2: Probit Analysis

NOTE: This Appendix is currently being independently reviewed by an external academic and results should be treated as provisional

One element of statistical variability introduced to the overall findings by the economic impact analysis is the sampling of *emda* projects. While every effort has been made to secure a representative sample of projects (intervention type, location, and project size), the grossing up procedure used to estimate total net additional impacts), bias in the project sample could result in bias in the estimates of overall economic impact if these independent factors could be shown to have an influence on project performance.

This paper provides an econometric analysis of the project assessment findings, using an ordered probit model to ascertain the influence of independent factors of intervention type, location, and project size over project effectiveness and value for money. This forms one part of our exploration of the factors that influence value for money and effectiveness. The analysis also gives some indication of whether the findings are significantly distorted by biases in the project samples for assessment (where as noted there was some focus on larger projects), or in a wider sense, the projects for which it was possible to obtain beneficiary contact details.

9.8 Data and Methodology

Using data on up to 244 sampled projects we estimate models of three categories of determinants (project location, project type and project size) of two performance measures of these projects being: effectiveness, denoted $Effect_i$, and value for money, VM_i . These dependant variables are ordinal and have three ranked categories that are assigned integer values from 1 to 3, such that lower values indicate a lower effectiveness and value for money, respectively. Due to missing observations on certain variables the sample size is 234 for the model for effectiveness and 211 for the model of value for money.

We apply ordered choice estimation techniques to the models of this ordinal dependent variable because, as is well known, they are the appropriate method to use in this case. The ordered dependent variable model assumes the following latent variable form (see Greene 2008):

$$Y_i^* = \sum_{k=1}^K \beta_k X_{ik} + u_i \quad (1)$$

where, X_{ik} are the explanatory variables, u_i is a stochastic error term and Y_i^* is the unobserved dependent variable that is related to the observed dependent variable, Y_i , (assuming three categories) as follows:

$$\begin{aligned} Y_i &= 1 && \text{if } Y_i^* \leq \lambda_1 \\ Y_i &= 2 && \text{if } \lambda_1 < Y_i^* \leq \lambda_2 \\ Y_i &= 3 && \text{if } \lambda_2 < Y_i^* \end{aligned} \quad (2)$$

where λ_1 and λ_2 are unknown parameters (limit points) to be estimated with the coefficients (the β_k s). Our interest is primarily confined to the general direction of correlation between the dependent and independent variables. Therefore, we use the sign of β_k to provide guidance on whether the estimated signs of coefficients concur with our *a priori* expectations. This is instead of looking at the marginal effects which indicate the direction of change of the dependent variable (for each value of the dependent variable) to a change in X_{ik} . For ordered choice models these marginal effects are difficult to interpret.

The probit form of this model assumes that the cumulative distribution function employed is based upon the standard normal random variable while the logit form assumes a logistic distribution. Greene (2008) suggests that probit and logit models yield results that are very similar in practice. Hence, we focus on the results of the probit form of this model.

The variables used as potential determinants are divided in to three categories: project type, project size and project location. There are six project type dummy variables bus_i , emp_i , inw_i , imp_i , $prop_i$ and tou_i , however, because including all six in the model would cause perfect multicollinearity we only consider the latter five in our regressions. There are nine project size dummy variables, $size_j_i$, $j = 1,2,3,\dots,9$. Once again, because including all nine in the model would cause perfect multicollinearity we only use the latter eight in our regressions. There are eight project location variables: $alliance_i$, $derb_i$, $leics_i$, $lincs_i$, $north_i$, $notts_i$, reg_i and $well_i$. All eight location variables are included in our regressions.¹

¹ Normally, using all dummy variables in an econometric analysis causes the problem of perfect multi-collinearity as all the dummy variables sum to 1 for each observation (meaning that the regression problem cannot be solved). One dummy variable is usually dropped to avoid this problem, and the dropped variable becomes the reference case against

For both dependent variables we report a general model (including all twenty one potential explanatory factors). A cross-sectional variant of the general-to-specific method was employed to produce a parsimonious model. If there was more than one potential parsimonious model the one that was favoured for reporting was chosen upon the basis having the lowest SBC.¹

Our tests focus on the statistical significance of individual regressors using z-statistics and groups of variables using likelihood ratio tests.

9.9 Empirical Results

The ordered probit regressions for both dependent variables are reported in Table 1. For both dependent variables we report a general model (including all variables) and a parsimonious specification obtained using the general-to-specific methodology.

In both cases the favoured parsimonious model only includes individually significant variables (according to z-statistics) at the 5% level (all inference employs the 5% level unless otherwise stated²). Further, and in both cases, the restrictions placed on the general model to obtain the parsimonious model cannot be rejected according to a likelihood ratio test [LR(general→)]. We further test whether all variables in a particular category (project type, project size or project location) are jointly significant in the general model using likelihood ratio tests, denoted LR(type), LR(size) and LR(location), respectively. For all three categories and both dependent variables we find that all of the sets of variables are jointly insignificant. Further, for both the general models and the

which the estimated co-efficients are benchmarked. However, as there were missing observations in some cases, the dummy variables did not sum to 1 for all observations, meaning there was no need to drop a dummy variable. In short, the missing observations were used as the reference case.

¹ In this method we first delete all variables with z-statistics below one (or, exceptionally, 0.5 if the z-statistics are very small for a large number of variables) and apply a Likelihood Ratio, LR, test relative to the general model. If the restrictions cannot be rejected we then delete all variables with z-statistics below 1.5 and then all explanatory factors with z-statistics below 1.96 (applying LR tests relative to the general model). If any LR test for joint restrictions is rejected we experiment to find the variable(s) that cause this rejection and retain it (them) in the model.

² Our aim here is to undertake a statistical test of the null hypothesis that the independent factors of intervention type, location, and project size have no influence on project effectiveness or value for money, and have been tested at the 5% level. Our aim elsewhere (Appendix 3) is to show the dispersion of our overall estimates of economic impact, and 90% confidence intervals have been utilised to illustrate this dispersion. However, the relevant t-values and standard errors have been presented throughout, and tests and confidence intervals can be replicated at differing levels of significance and confidence levels.

parsimonious models the included variables are jointly insignificant at the 5% level, according to a likelihood ratio test, denoted LR statistic. These joint tests clearly suggest that the explanatory factors included all models do not have any significant explanatory power (or correlation) with either of the dependent variables.

This conclusion suggests that the independent factors of project size, location, and independent are poor predictors of project effectiveness and value for money. As such, any bias in the project assessment sample in relation to these factors are unlikely to lead to a meaningful bias in the overall estimates of economic impact.

Reference

Greene W H, *Econometric Analysis*, Pearson, Prentice Hall, 6th edition, 2008.

Table 1: Ordered Probit models of $Effect_i$ and VFM_i

Variables	Models of $Effect_i$		Models of VFM_i	
	General	Parsimonious	General	Parsimonious
<i>emp_i</i>	-0.377 (-1.188)		-0.347 (-1.049)	
<i>inw_i</i>	-0.461 (-1.218)		-0.517 (-0.805)	
<i>imp_i</i>	0.075 (0.350)		-0.345 (-1.447)	
<i>prop_i</i>	0.406 (1.595)		-0.010 (-0.035)	
<i>tou_i</i>	0.985 (2.085)		0.827 (1.314)	
Project size				
<i>size _2_i</i>	0.080 (0.193)		0.243 (0.646)	
<i>size _3_i</i>	0.530 (1.413)		0.193 (0.623)	
<i>size _4_i</i>	0.428 (1.212)		0.173 (0.548)	
<i>size _5_i</i>	-0.178 (-0.462)		-0.538 (-1.478)	
<i>size _6_i</i>	-0.122 (-0.286)		-0.541 (-1.354)	
<i>size _7_i</i>	0.262 (0.644)		-0.110 (-0.274)	
<i>size _8_i</i>	-0.532 (-1.694)	-0.768 (-8.849)	-0.959 (-3.451)	-0.970 (-10.080)
<i>size _9_i</i>	9.738	16.363	8.164	0.159

	(24.508)	(158.359)	(23.717)	(45.700)
Project location				
<i>alliance_i</i>	-1.430 (-2.336)		-1.274 (-1.873)	
<i>derb_i</i>	-1.256 (-2.050)		-0.711 (-1.029)	
<i>leics_i</i>	-0.896 (-1.501)		-1.014 (-1.551)	
<i>lincs_i</i>	-0.930 (-1.534)		-0.400 (-0.565)	
<i>north_i</i>	-1.186 (-1.736)		-1.227 (-1.644)	
<i>notts_i</i>	-1.116 (-1.798)		-1.067 (-1.592)	
<i>reg_i</i>	-1.131 (-2.036)		-0.779 (-1.238)	
<i>well_i</i>	-0.994 (-1.485)		-1.105 (-1.632)	
Fit Measures				
Pseudo R ²	0.074	0.005	0.076	0.005
SBC	2.082	1.753	2.091	1.724
LR statistic	28.961 [0.115]	2.138 [0.343]	26.020 [0.206]	1.763 [0.586]
LR(type)	10.919 [0.053]	NA	6.090 [0.298]	NA
LR(size)	11.729 [0.164]	NA	12.779 [0.120]	NA
LR(location)	7.380 [0.496]	NA	9.072 [0.336]	NA
LR(general→*)	NA	26.823 [0.109]	NA	24.320 [0.184]
Observations	234	234	211	211

Table 1 notes. The dependent variables $Effect_i$ and VFM_i which have of three ranked categories that correspond to the integer values in the range of 1 to 3 and yield two (unreported) limit points, $\lambda_i, i = 1, 2$ (the intercept is not separately identified from the limit points). Z-statistics (in parentheses) are based upon Huber-White standard errors. Also reported are the Pseudo R^2 , Schwartz's information criterion, SBC, and likelihood ratio tests for the model's explanatory power, LR Statistic, and the deletion of variables from the general model to obtain the parsimonious model, LR(general→*). Likelihood ratio tests for the exclusion of all project type variables, LR(type), all project size factors, LR(size) and all project location terms, LR(location) are also reported. Probability values are given in square parentheses. All regressions were estimated using E-Views 6.0 and STATA 10.

Appendix Three: Monte Carlo Analysis and Confidence Intervals

Appendix 3: Monte Carlo Analysis and Confidence Intervals

NOTE: This Appendix is currently being independently reviewed by an external academic and results should be treated as provisional

The approach taken to estimate the economic impact of *emda* introduces two sources of statistical variation:

- variation due to the sampling of projects in estimating project additionality and through grossing up to the project population; and,
- variation due to the sampling of beneficiaries in estimating key parameters of the micro-economic model such as components of deadweight, displacement, leakage and multiplier effects.

The probit models set out in Annex 1 found no evidence that independent factors such as location, size, and intervention type had an influence over the effectiveness and value for money of projects. This suggests that although every practical effort was made to secure a representative sample of projects, any bias in the characteristics of the project sample is unlikely to result in meaningful bias in the aggregate level results when generalising the findings of the economic impact assessment to the project population.

This Annex deals with the uncertainty associated with the parameters of the micro-economic model used to estimate economic impact through the project assessments and the beneficiary surveys (as described in the Economic Impact Estimate – Final Technical Paper). Confidence intervals are estimated for all parameters derived from a sampling approach. Where parameters are based on assumption (e.g. substitution effects), a probability distribution for the parameter is based on the known range of likely values. Confidence intervals are then estimated for overall estimates of cost per job and total economic impact for the four intervention types covering the greatest percentage of expenditure:

- Property development projects;
- Projects designed to influence firm performance;
- Projects based on improving the employability and skills of individuals; and,
- Projects designed to boost inward investment.

There are two ways in which overall confidence intervals for the estimates of total economic impact can be estimated: analytically or through simulation (Monte Carlo analysis). The micro-economic model is multiplicative in nature and it would be difficult to analytically derive and implement a probability distribution for the estimates of overall economic impact. A Monte Carlo analysis provides an alternative to analytically derived models: a simulation of the model is repeated thousands of times, based on random values taken from the probability distributions of the individual parameters, to make an estimate of the overall distribution of the dependent variable (in this case, net additional jobs created).

All Monte Carlo simulations have been run using the software package '@Risk' with 10,000 iterations. Confidence intervals have not been estimated for strands of the analysis that are based on the results of national evaluation (National Programmes) or on secondary research (interventions designed to boost tourist demand). It has been assumed throughout that the distributions of individual parameters are independently normally distributed.

9.10 Property Development Projects

Confidence intervals for key model parameters are set out in the table below. 90 percent confidence intervals have been used here to show the variability of the underlying parameters of the model rather than to subject the parameters to statistical significance tests (the standard errors provided can be used to estimate confidence intervals of alternative widths).

Table 1 Property development projects - confidence intervals

Parameter	Value	N	Standard Error	90% CI	Assumption about distribution
Total cost of sampled projects	42,381,106	-	-	-	Based on <i>emda</i> monitoring data, not a random variable
Total floorspace	129,742	-	-	-	Based on project assessment evidence, and not a random variable
Project additionality (weighted by floorspace)	0.68	53	0.06	0.58 - 0.79	Random variable, based on project assessment evidence. Central limit theorem applies, and the confidence interval is estimated using the binomial approximation to the normal distribution.
Crowding in / out (weighted by gross additional floorspace)	0.85	53	0.06	0.75 - 0.96	Random variable, based on project assessment evidence. Central limit theorem applies, and the confidence interval is estimated using the binomial approximation to the normal distribution.
Net floorspace	75,681	-	-	-	Model output
Employment density	44.68	53	1.44	42.3 - 47.05	Random variable, based on project assessment evidence. Central limit theorem

					applies.
Gross jobs created or safeguarded	1,694	-	-	-	Model output
Additionality of employment impacts (weighted by gross jobs, note that this includes non-beneficiary survey evidence as set out in the main technical annex)	0.44	99	0.05	0.36 - 0.52	Random variable, based on beneficiary survey evidence. Central limit theorem applies, and the confidence interval is estimated using the binomial approximation to the normal distribution.
Displacement	0.10	99	0.03	0.05 - 0.15	Random variable, based on beneficiary survey evidence. Central limit theorem applies, and the confidence interval is estimated using the binomial approximation to the normal distribution.
Leakage	0.05	99	0.02	0.02 - 0.08	Random variable, based on beneficiary survey evidence. Central limit theorem applies, and the confidence interval is estimated using the binomial approximation to the normal distribution.
Multiplier effects (lower multiplier effects than 1.39 were assumed for community development projects)	1.38	-	0.01	1.36 – 1.39	Multiplier effects are based on Experian's economic model. A normal distribution with a standard error of 0.01 is assumed to capture potential errors, and truncated between 1.33 and 1.51 reflecting the limits of sector multipliers.
Net additional jobs created or safeguarded (sample)	880	-	-	-	Model output
Cost per job (£)	48,172	-	-	-	Model output
Total emda expenditure (£)	127,050,000	-	-	-	Based on <i>emda</i> monitoring data, not a random variable
Net additional jobs created or safeguarded	2,202	-	-	-	Model output

Source: ECOTEC analysis – note that this table sets out average values for the analysis: the impact assessment and the Monte Carlo analysis are based on the more detailed subcategories of property development projects.

The table below sets out the estimated 90 percent confidence intervals for cost per net additional job created or safeguarded and total net additional jobs created or safeguarded as estimated with the Monte Carlo simulation.

Table 2 90 percent confidence intervals - Property Development Projects

Name	Average cost per net additional job created or safeguarded (£) ¹	Total net additional jobs created or safeguarded
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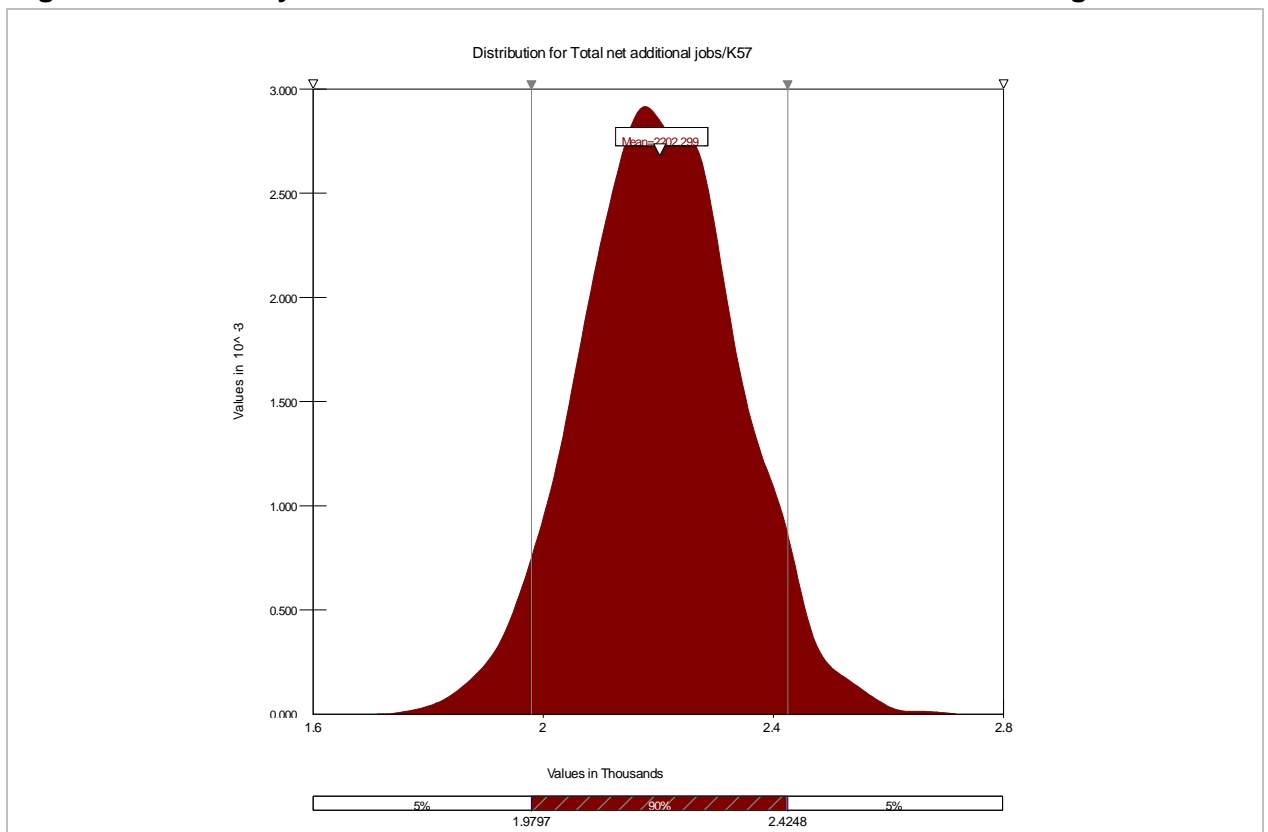
¹ Note that the estimates of confidence intervals for cost per net additional job presented here are for average cost per job across the project assessment sample; the estimates of total net additional jobs created or safeguarded are assembled from more detailed property development categories, and do not relate directly to the average cost per job figures.

Name	Average cost per net additional job created or safeguarded (£) ¹	Total net additional jobs created or safeguarded
Mean	48,323	2,202
Minimum	39,290	1,709
Maximum	59,971	2,784
90 percent lower bound	44,121	1,980
90 percent upper bound	53,085	2,425

Source: ECOTEC Analysis, based on Monte Carlo simulation with 10,000 iterations – where values differ from those derived analytically, these will converge on the analytical results as the number of iterations tends to infinity.

The figure below shows the estimated probability distribution for total net additional jobs created or safeguarded.

Figure 1 Probability distribution - Total Net Additional Jobs Created or Safeguarded



Source: ECOTEC Analysis

9.11 Interventions designed to influence firm performance

The table below sets out 90 percent confidence intervals for key parameters of the model for interventions designed to influence firm performance.

Table 3 Interventions designed to influence firm performance - confidence intervals

Parameter	Value	N	Standard Error	90% CI	Assumption about distribution
Total cost of sampled projects (£)	11,420,274	-	-	-	Based on <i>emda</i> monitoring data, not a random variable
Jobs created attributable to support per beneficiary (weighted by response rate)	0.41	701	0.09	0.25 - 0.57	Random variable, based on beneficiary survey evidence. Central limit theorem applies.
Number of beneficiaries for sampled projects	3,786	-	-	-	Based on project records, not a random variable.
Total gross jobs	1,549	-	-	-	Model output
Project additionality (weighted by gross jobs created)	0.92	21	0.06	0.82 - 1.02	Random variable, based on project assessment evidence. Central limit theorem applies, and the confidence interval is estimated using the binomial approximation to the normal distribution.
Additionality of support	0.55	701	0.02	0.52 - 0.58	Random variable, based on beneficiary survey evidence. Central limit theorem applies, and the confidence interval is estimated using the binomial approximation to the normal distribution.
Displacement	0.20	701	0.02	0.17 - 0.23	Random variable, based on beneficiary survey evidence. Central limit theorem applies, and the confidence interval is estimated using the binomial approximation to the normal distribution.
Leakage	0.05	701	0.01	0.04 - 0.06	Random variable, based on beneficiary survey evidence. Central limit theorem applies, and the confidence interval is estimated using the binomial approximation to the normal distribution.
Multiplier effects	1.39	-	0.01	1.37 – 1.41	Multiplier effects are based on Experian's economic model. A normal distribution with a standard error of 0.01 is assumed to capture potential errors, and truncated between 1.33 and 1.51 reflecting the limits of sector multipliers.
Net additional jobs created or safeguarded (sample)	825	-	-	-	Model output
Cost per job (£)	13,849	-	-	-	Model output
Total <i>emda</i> expenditure (£)	60,508,000	-	-	-	Based on <i>emda</i> monitoring data, not a random variable
Net additional jobs created or safeguarded	4,369	-	-	-	Model output

Source: ECOTEC analysis

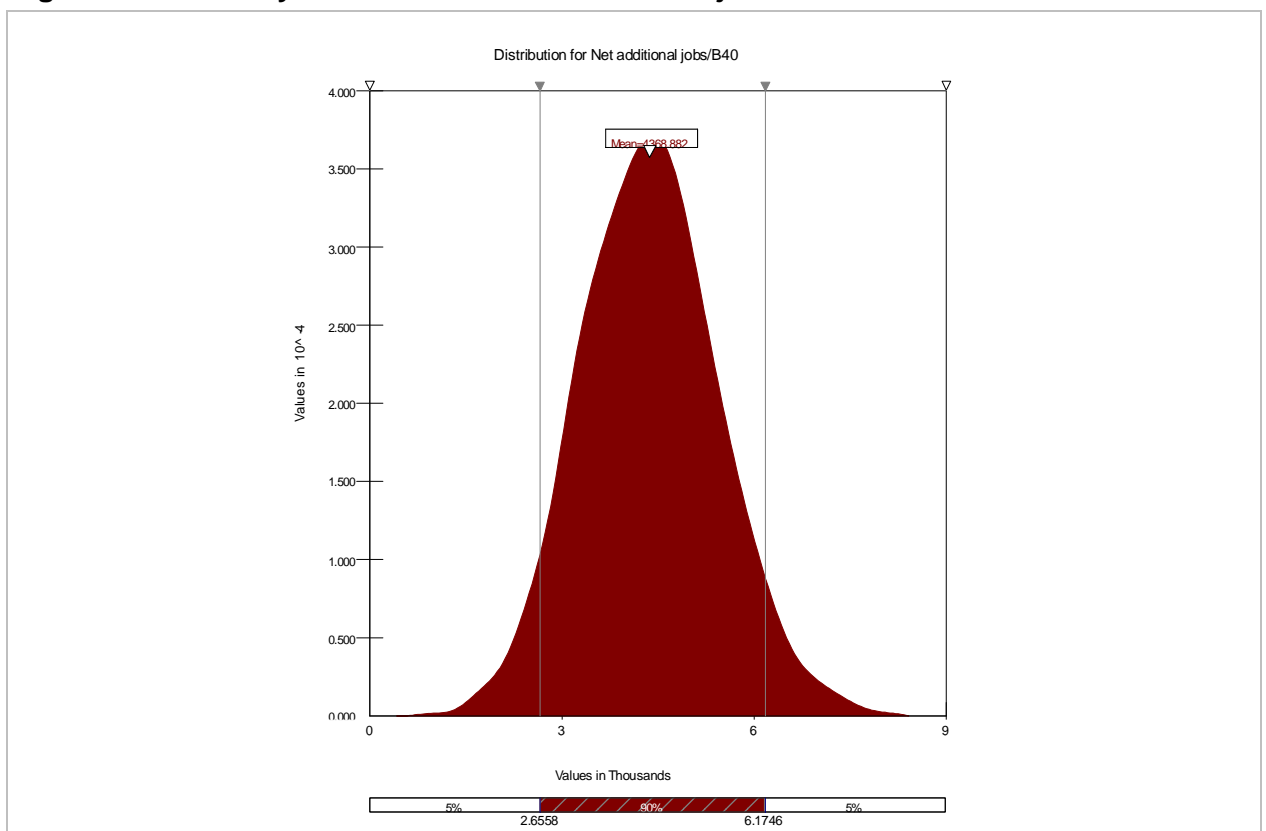
90 percent confidence intervals for cost per net additional job created or safeguarded and total net additional jobs created or safeguarded are set out in the table below.

Table 4 90 percent confidence intervals – Interventions designed to influence firm performance

Name	Cost per net additional job created or safeguarded (£)	Total net additional jobs created or safeguarded
Mean	14,862	4,369
Minimum	6,968	397
Maximum	152,523	8,684
90 percent lower bound	9,798	2,656
90 percent upper bound	22,782	6,175

Source: ECOTEC Analysis, based on Monte Carlo simulation with 10,000 iterations – where values differ from those derived analytically, these will converge on the analytical results as the number of iterations tends to infinity.

Figure 2 Probability distribution for net additional jobs created



Source: ECOTEC Analysis

9.12 Interventions based on improving the employability and skills of individuals

Confidence intervals for the main parameters are set out in the table below.

Table 5 Interventions based on improving the employability and skills of individuals - confidence intervals

Parameter	Value	N	Standard Error	90% CI	Assumption about distribution
Total cost of sampled projects (£)	4,146,807	-	-	-	Based on <i>emda</i> monitoring data, not a random variable
Gross jobs created	948	-	47	870 - 1026	Based on <i>emda</i> monitoring data, but have assumed a random normally distributed error in reporting equivalent to a coefficient of variation of 5%.
Project additionality (weighted by gross jobs created)	0.97	22	0.03	0.92 - 1.03	Random variable, based on project assessment evidence. Central limit theorem applies, and the confidence interval is estimated using the binomial approximation to the normal distribution.
Additionality of support	0.65	125	0.12	0.45 - 0.85	Random variable, based on beneficiary survey evidence. Central limit theorem applies, and the confidence interval is estimated using the binomial approximation to the normal distribution.
Substitution effects	0.30	-	0.05	0.22 – 0.37	Substitution effects were assumed based on prior research. This parameter is allowed to vary normally between 0.2 and 0.4 with a standard error of 0.05.
Displacement	0.20	701	0.02	0.17 - 0.23	Random variable, based on beneficiary survey evidence. Central limit theorem applies, and the confidence interval is estimated using the binomial approximation to the normal distribution.
Leakage	0.05	701	0.01	0.04 - 0.06	Random variable, based on beneficiary survey evidence. Central limit theorem applies, and the confidence interval is estimated using the binomial approximation to the normal distribution.
Multiplier effects	1.39	-	0.01	1.37 – 1.41	Multiplier effects are based on Experian's economic model. A normal distribution with a standard error of 0.01 is assumed to capture potential errors, and truncated between 1.33 and 1.51 reflecting the limits of sector multipliers.
Net additional jobs created or safeguarded (sample, overall gross additional to net additional adjustment of 1.05 made in main analysis)	443	-	-	-	Model output
Cost per job (£)	9,352	-	-	-	Model output
Total <i>emda</i> expenditure (£)	22365	-	-	-	Based on <i>emda</i> monitoring data, not a random variable
Net additional jobs created or	2,392	-	-	-	Model output

safeguarded					
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90 percent confidence intervals for cost per net additional job created or safeguarded and total net additional jobs created or safeguarded are set out in the table below.

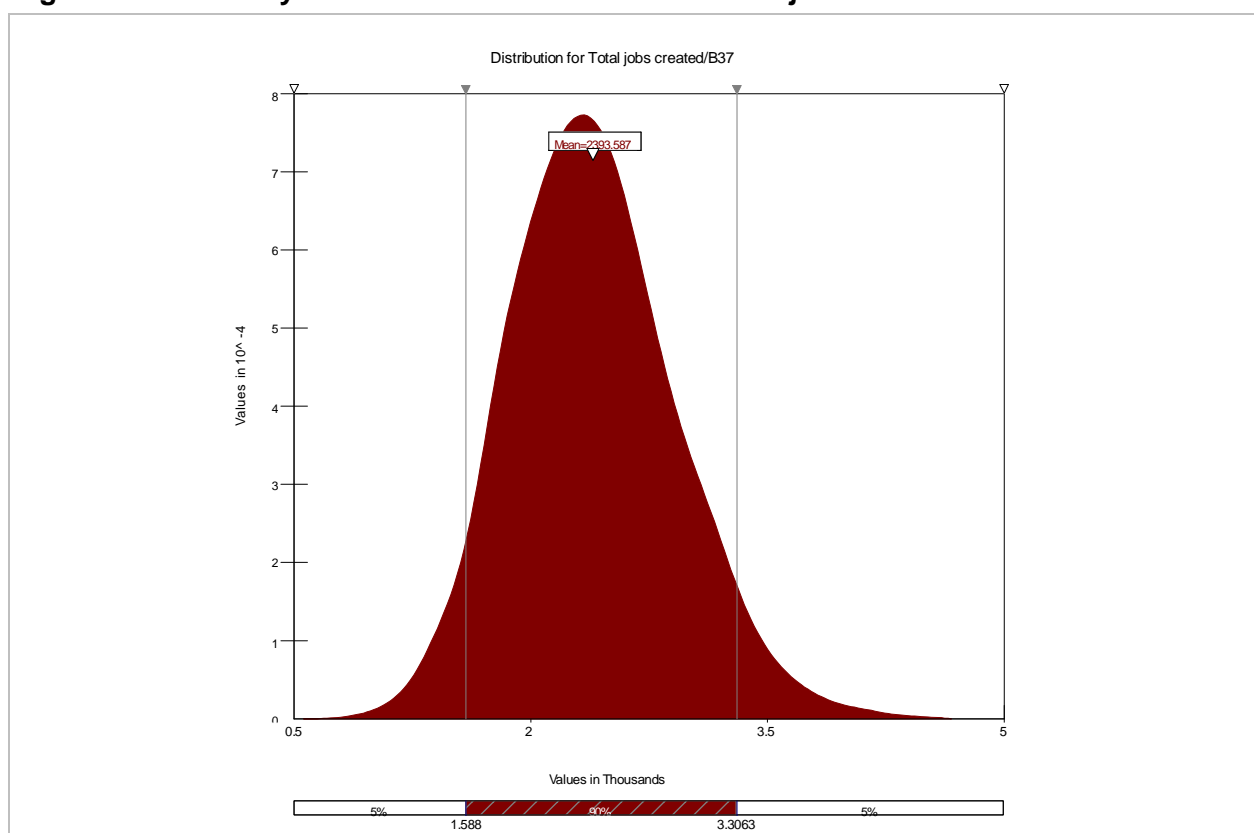
Table 6 90 percent confidence intervals – Employability and skills

Name	Cost per net additional job created or safeguarded (£)	Total net additional jobs created or safeguarded
Mean	9,836	2,394
Minimum	4,677	550
Maximum	40,664	4,782
90 percent lower bound	6,763	1,588
90 percent upper bound	14,083	3,306

Source: ECOTEC Analysis, based on Monte Carlo simulation with 10,000 iterations – where values differ from those derived analytically, these will converge on the analytical results as the number of iterations tends to infinity.

The figure below shows the probability distribution for total net additional jobs created.

Figure 3 Probability distribution for total net additional jobs created



Source: ECOTEC Analysis

9.13 Inward Investment

Confidence intervals for the key parameters of the inward investment model are set out below. Economic impacts were estimated directly from a survey, rather than using the cost-per-job approach used elsewhere.

Table 7 Inward Investment - confidence intervals

	Inward Investment	Expansions	Assumptions on variance
Gross jobs created per beneficiary	9.1	24.8	Based on <i>emda</i> monitoring data - not a random variable
Additionality (weighted by employment)	0.47	0.30	Based on beneficiary survey – central limit theorem applies
Standard error	0.04	0.09	-
Finite population adjustment	0.9	0.80	-
90 % confidence interval	0.42 - 0.53	0.18 - 0.41	-
Gross additional jobs created per beneficiary	4.3	7.4	Model output
Number of beneficiaries in sample	13.0	17	Not a random variable
Gross additional jobs	56	125	Model output
Displacement	0.01	0.01	Based on beneficiary survey – central limit theorem applies
Standard error	0.02	0.02	
90% confidence interval	-0.02 - 0.04	-0.01 - 0.03	
Leakage	0.025	0.025	Based on beneficiary survey – central limit theorem applies
Standard error	0.03	0.03	
90% confidence interval	-0.02 - 0.07	-0.01 - 0.06	
Multiplier effects	1.36	1.36	Multiplier effects are based on Experian's economic model. A normal distribution with a standard error of 0.01 is assumed to capture potential errors, and truncated between 1.33 and 1.51 reflecting the limits of sector multipliers.
Standard error	0.01	0.01	
90% confidence interval	1.34 – 1.37	1.34 – 1.37	
Net additional jobs created in sample	73	164	Model output
Grossing factor	0.1	0.2	Based on <i>emda</i> monitoring data
Net additional jobs	857	1,019	Model output

Source: ECOTEC Analysis

90 percent confidence intervals for total net additional jobs created are set out in the table below.

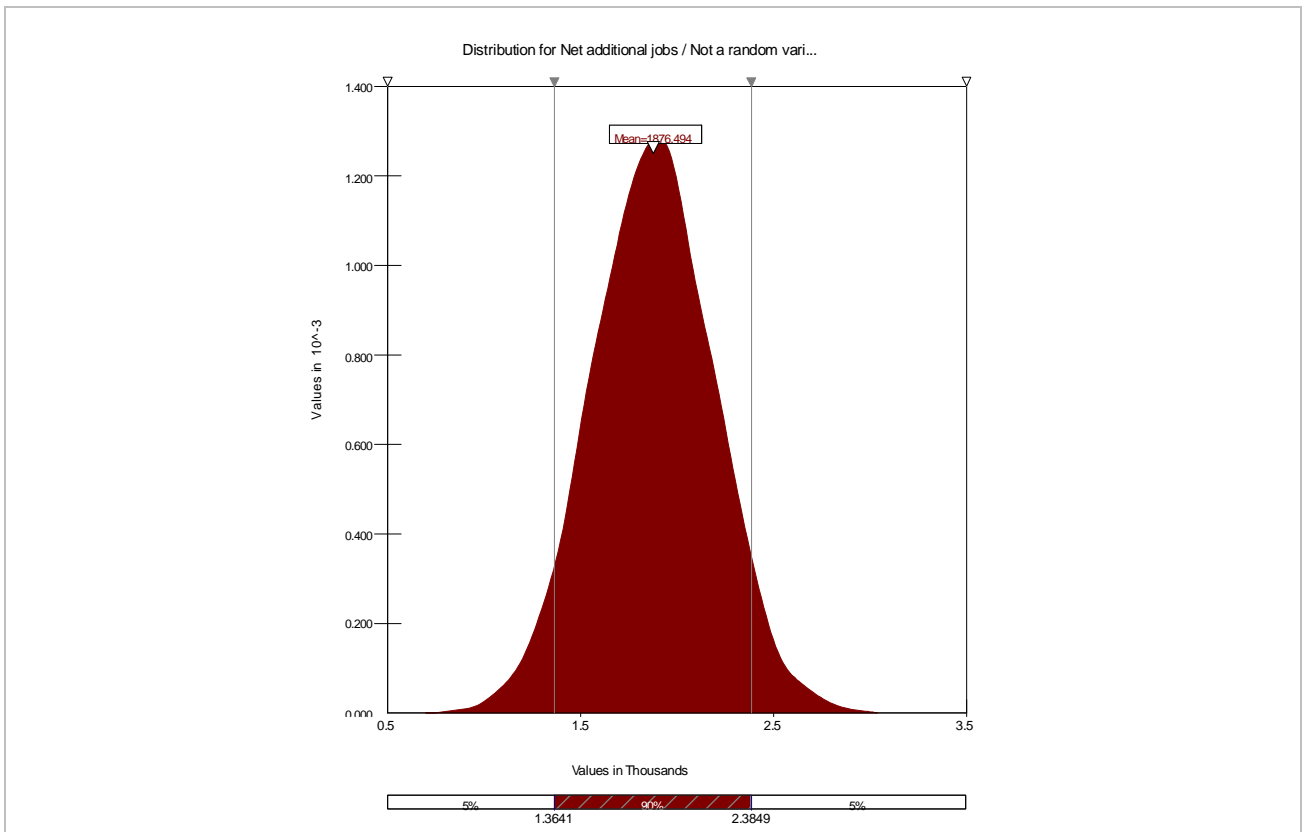
Table 8 90 percent confidence intervals – Inward Investment

Name	Total net additional jobs created
Mean	1,876
Minimum	691
Maximum	3,142
90 percent lower bound	1,364
90 percent upper bound	2,385

Source: ECOTEC Analysis, based on Monte Carlo simulation with 10,000 iterations – where values differ from those derived analytically, these will converge on the analytical results as the number of iterations tends to infinity.

The probability distribution for net additional jobs created is set out in the chart below.

Figure 4 Probability distribution for net additional jobs created



Source: ECOTEC analysis

9.14 Conclusions from the Monte Carlo analysis

The results of the Monte Carlo analysis show that the width of confidence intervals varies across intervention types. This due to a range of factors, including the sample sizes of project assessments, the number of projects for which a beneficiary contact details were

available, the number of successful interviews with beneficiaries, and the underlying variability in the data collected through primary research. Nevertheless, the results tend to confirm the view that the central estimates of the economic impact are generally subject to a 90 percent confidence interval with a width of +/- 25% of the mean.

A reasonable number of uncertain values have been used to estimate the micro-economic model. While individual parameters have generally been reasonably precisely estimated, the combination of these parameters in a multiplicative model inevitably compounds the levels of uncertainty associated with the overall estimates. The main source of variability driving the width of confidence intervals are responses from the beneficiary survey, and the only way in which they could be narrowed would be by conducting a substantially larger beneficiary survey, but as noted elsewhere, a survey on a desirable was not possible owing to the low numbers of beneficiary contact details available from projects.

Nevertheless, the confidence intervals for individual parameters and in combination are generally in line with analogous studies. For example, the econometric approach for the national evaluation of the Business Link Local Service undertaken for BERR identified an average impact of 2.2 percent on employment among beneficiary firms. This estimate was subject to a 90 percent confidence interval of +/- 58 percent (1.3 percentage points) of the mean¹. For comparison, the estimates of the net additional jobs created by interventions designed to influence firm performance were subject to 90 percent confidence interval of +/- 40% of the mean.

9.15 Confidence intervals for other intervention types

Confidence intervals for parameters under other intervention types are set out in the table below.

Table 9 Confidence intervals - Parameters associated with other intervention types

Parameter	Value	Standard Error	90% CI	80% CI	68% CI	50% CI
Trade support						
Average jobs per beneficiary attributable to support	0.090	0.03	0.02 – 0.16	0.04 - 0.14	0.05 - 0.13	0.06 - 0.12
Additionality of support	0.781	0.04	0.68 – 0.88	0.7 - 0.86	0.72 - 0.84	0.74 - 0.82
Displacement	0.013	0.01	-0.01 – 0.04	-0.01 - 0.03	0 - 0.03	0 - 0.02

¹ The study estimated an average impact of 2.2% on employment growth, which is significant at the 5% level with a t-test statistic of 2.831. This implies a standard error for the estimate of 0.008, which translates into a 90% confidence interval of between 0.9% and 3.5%, or a width of 58% either side of the mean (see page 66, Economic Impact Study of Business Link Local Service, University of Warwick, Aston Business School, and Kingston University).

Leakage	0.037	0.02	-0.01 – 0.08	0 - 0.07	0.01 - 0.06	0.02 - 0.06
Multiplier effects	1.359	0.00	1.28 – 1.44	1.35 - 1.37	1.35 - 1.36	1.36 - 1.36
Tourism support						
Average jobs per beneficiary attributable to support	1.30	0.52 - 2.09	0.69 – 1.91	0.83 - 1.78	0.98 - 1.62	0.52 – 2.09
Additionality of support	0.68	0.55 - 0.81	0.58 – 0.78	0.6 - 0.76	0.63 - 0.73	0.55 – 0.81
Displacement	0.82	0.71 - 0.93	0.73 - 0.9	0.75 - 0.88	0.77 - 0.86	0.71 – 0.93
Leakage	0.00	0 - 0	0 - 0	0 - 0	0 - 0	0 – 0

Source: ECOTEC analysis

9.16 Other sources of variation

There are other potential sources of variation in our estimates of the total economic impact of *emda* funded projects that cannot be taken into account in this analysis:

- **Omitted variables:** there is potentially an issue that there are relevant variables omitted in the micro-economic model. To test for this, one would need to know the true population distribution of the dependent variable, net additional jobs created. However, the number of net additional jobs created is estimated through the model and is not observable. As such, it is not possible to construct a suitable statistical test to assess whether there may omitted variables in the analysis.
- **No information on the beneficiary population:** there is no information available on either the total numbers or the characteristics of the beneficiary population. It is therefore not possible to make an assessment of the representativeness of the sample of beneficiaries secured, so the possibility of bias in the results as a result of bias in the beneficiary sample must be acknowledged.
- **Strategic response bias:** beneficiaries may have had an incentive to inflate the effectiveness and impacts of the support they received if beneficiaries hoped to secure further subsidised support in the future. Again, there is no way these biases can be realistically appraised.
- **Extent to which beneficiaries can isolate impact:** there is a question associated with extent to which beneficiaries can identify the impact of the support they received (and the extent to which they could have found alternative support elsewhere). An alternative approach to estimating the extent to which support has resulted in a differential impact among beneficiaries would have been to take a control group of beneficiaries and estimated an econometric model (such as the Heckit model used in the national

evaluation of the Business Link Local Services conducted by Aston, Warwick and Kingston University). This approach would have been fraught with practical and conceptual difficulties, particularly in relation to obtaining a sample of beneficiaries that were free of any *emda* funded support, as no complete record of the businesses and individuals supported by *emda* exists. In addition, to avoid an omitted variable problem, parameters such as the extent to which beneficiaries could have obtained analogous support elsewhere would have been derived in a similar fashion, and such an approach would not have ameliorated these difficulties entirely.

- **Assessor bias:** one parameter of the model, project additionality, was based on the judgement of project assessors following interviews with project case officers and project delivery managers, rather than derived from beneficiary survey data (there is no realistic way of capturing this information from beneficiaries). The Monte Carlo analysis captures statistical variation in the assessment of project additionality. Nevertheless, it should be acknowledged that some assessors may be more positive than others in their assessment of the extent to which projects would have gone ahead in the absence of *emda* funding. These differences are likely to be normally distributed, although we have no way of evaluating this. In addition, omission of the project additionality variable would result in an omitted variable problem (particularly in relation to property development projects), potentially more detrimental to the reliability of the results than the variation associated with assessor judgement.

While estimates have been made of the level of statistical variability associated with the estimates of net economic impact, it should be noted that there are other sources of potential variation that cannot be taken account of in such an analysis, such as strategic response bias. These are discussed in the main report.

Appendix Four: Treatment of Inflation

Appendix 4: Treatment of inflation

The effects of inflation have not been considered in the economic impact assessments of Work Packages 3, 4 and 5.

We propose not to make an allowance for this issue for the following reasons:

- Cost per job estimates are built up from project assessments across a reasonably representative range of start and completion dates.
- Major issues arise in relation to large capital expenditure projects that incur expenditure in different years, where the costs of which may reflect tender prices in different years to the years in which the expenditure was incurred.

The overall effect of the exclusion of inflation would be to bias upwards the estimates of economic impact in the early years of *emda* from which period only a limited number of project assessments have been undertaken. During this period, the majority of *emda* expenditure was on SRB. The economic impact of SRB has been treated separately and is driven by the outputs reported by *emda* rather than expenditure. Any such upwards bias to estimates of job creation will be at the margins.

In addition, the national exercise into which the economic impact assessment will feed in is only examining expenditure post 2002/03 (i.e. post single pot) and as a reasonably representative (by date) selection of projects have been covered between 2002 and 2007, the effects of inflation over this period will be negligible.

It might be possible to incorporate the effects of inflation into the economic impact assessment by:

- Using the national GDP deflator to convert the (nominal) expenditure of projects assessed into expenditure in real prices, based on the year in which the project was complete. This would give us cost-per-job estimates in constant prices.
- Using the national GDP deflator to convert *emda*'s total expenditure over time into expenditure in real prices.

This approach may be problematic: different types of projects use different inputs which are unlikely to be representative of the national basket of consumption goods, and the prices of which will be growing or falling at different rates. The general application of the GDP deflator may be too simplistic and generate spurious results.

In addition, price deflators are only available at the national level and will not reflect regional differences in inflation, and this will add to the complexity of applying the national GDP deflator to *emda's* expenditure. For these reasons all impact estimates are based on spending at current prices (at the time of expenditure).

Appendix Five: Present Value of GVA

This paper sets out an estimate of the present value in 1999/00 of the actual GVA created by *emda* spending. This has been estimated on the following basis:

- On-going and short term GVA benefits have been estimated by applying rates of return (in terms of GVA) per £100,000 of *emda* spending. These rates of return are appended at the end of this paper.
- The on-going GVA benefits are assumed to be realised in the year following expenditure, and to endure for 5 and 10 years¹ - figures are provided under both sets of assumptions. The present value of short-term GVA benefits have also been estimated for the year 1999/00 using a social rate of time preference of 3.5 percent as recommended by the HM Treasury Green Book.
- Short-term GVA benefits (as generated through impacts on construction and tourism through marketing campaigns) are assumed to be realised during the year of expenditure, and to last for 1 year².
- Present values for potential GVA impacts have not been included in the analysis as there is no evidence on the likely distribution of anticipated future expenditure or timing of the completion of inward investment projects. The potential impacts of the Grants for R&D programme were also excluded owing to uncertainty in relation to when impacts may be realised.

Overall it is estimated that *emda* single programme projects generated a present value in 1999/00 of on-going and short-term GVA benefits totalling £4.6bn. National programmes under *emda*'s stewardship are estimated to have generated a present value in 1999/00 of GVA benefits totalling £3.9bn. These results are set out in detail in the table below.

These estimates do not include a number of other potential benefits and costs:

- No consideration is given to other costs of production associated with generating GVA, including investment by the private sector or costs incurred by individuals in the form of reduced leisure time, commuting, and childcare costs.
- Other benefits may be realised that are not included in the analysis, for example the positive externalities associated with innovation (diffusion effects) or reductions in

¹ For example, the net present value in 1999/00 of on-going GVA generated by expenditure in 1999/00 is $GVA * [1 + (1 / (1 + 0.035)) + 1 / ((1 + 0.035) ^ 2)) + \dots + 1 / ((1 + 0.035) ^ 10)]$

² For example, the net present value in 1999/00 of the short term GVA generated by expenditure in 2004/05 is $GVA * 1 / (1 + 0.035) ^ 5$

negative externalities associated with transport infrastructure upgrades (reduced congestion) or improved resource efficiency (in the form of reduced pollution).

- As noted above, potential future impacts are not included in the analysis.

Table 9.10 Present value in 1999/00 of actual GVA impacts of *emda* projects

Intervention Type	Present Value of Actual GVA Impacts (£m, 10 year duration)	Undiscounted value of GVA (£m, 10 year duration)	Present Value of Actual GVA Impacts (£m, 5 year duration)	Undiscounted value of GVA (£m, 5 year duration)
Single Programme				
Property Development Projects				
On-going GVA associated with property developments	767	923	417	461
Short-term GVA associated with construction of developments	140	140	140	140
Property Development Projects (total)	907	1,062	556	601
Interventions designed to influence firm performance				
Business support	1,674	2013	909	1006
Tourism support	44	53	24	27
Trade support	22	27	12	13
Interventions designed to influence firm performance (total)	1,741	2,093	945	1,046
Interventions based on improving the employability and skills of individuals				
Interventions designed to boost inward investment	531	638	288	319
Interventions designed to boost visitor demand				
Tourism marketing	80	98	80	98
Visitor attraction	20	24	11	12
Interventions designed to boost visitor demand (total)	100	122	91	110
Other projects (including residual expenditure)	644	774	350	387
Total single programme	4,646	5,559	2,623	2,898
National programmes				
Business Link	740	890	402	445
Coal	965	1,151	585	651
MAS	208	250	113	125
RSA/SFIE	175	210	95	105
SRB	1,763	2,120	957	1,060
Total National Programmes	3,851	4,621	2,151	2,386
TOTAL	8,497	10,180	4,774	5,284

9.17 Net additional GVA Benefits per £100,000 *emda* spending

The returns on *emda* investment (net additional on-going GVA created per £100,000 *emda* expenditure) used to estimate the net present value of the GVA created by *emda* interventions are set out in the table below.

Table 9.11 Net Additional On-Going GVA Impacts per £100,000 *emda* spending

Table text	Net Additional On-Going GVA per annum (£m)	Expenditure (£000s)	Net Additional On-Going GVA per annum Created per £100,000 EMDA Expenditure (£s)
Property Development Projects			
Acquisition plus	11	7,380	147,053
Reclamation	1	8,149	10,269
Reclamation plus	2	7,484	30,520
Site Development - Commercial	43	42,523	102,027
Site Development - Community, Sports and Training Facilities	15	30,895	48,169
Site Development - Housing	0.0	11,266	0
Site Development - Industrial	17	15,700	110,882
Site Development - Mixed	1	1,593	71,157
Site Servicing	2	2,060	87,266
Interventions designed to influence firm performance			
Business Support	191	60,508	316,182
Business Link	8	1,925	399,544
Tourism Support	5	3,525	151,681
Trade Support	3	566	468,407
Interventions based on improving the employability and skills of individuals	93	22,365	415,667
Interventions designed to boost inward investment	65	16,940	383,707
Interventions designed to boost visitor demand			
Visitor Attraction	2	21894	11,160
Tourism Marketing	0	10,735	0
Other projects	67	212,441	31,365
Residual expenditure	38	34,000	111,765
Single Programme	565	511,949	110,289

Table text	Net Additional On-Going GVA per annum (£m)	Expenditure (£000s)	Net Additional On-Going GVA per annum Created per £100,000 EMDA Expenditure (£s)
Coal	100	104,023	96,133
Business Link	89	22,362	397,997
MAS	25	5,045	495,540
RSA/SFIE	21	18,175	115,543
SRB	212	201,057	105,443
National Programmes	447	350,662	127,473
Total (based on project expenditure in PD)	1,012	862,611	117,275
Total (based on project expenditure in PD, but excluding £172m spent on projects not generating employment outputs)	1012	690,611	146,537
Total (based on total expenditure – as reported in the annual accounts, including <i>emda</i> overheads and non-cash costs, but excluding European spending)¹	1,012	1,096,600	92,251

9.18 Summary

The analysis shows us:

- Depending on whether on-going GVA benefits are assumed to endure for 5 or 10 years, the total undiscounted impact of *emda* on GVA in the region so far is estimated to be between £5.2bn and £10.2bn; £2.8bn to £5.6bn of these impacts have been generated by Single Programme projects, and £2.4bn to £4.6bn generated by National Programmes.
- Taking account of time preference (i.e. that a benefit today is preferable to an income tomorrow), the present value of *emda* impacts in 1999/00 is estimated to be between £8.5bn and £4.8bn depending on the assumed duration of GVA benefits. The present value of Single Programme GVA impacts in 1999/00 is estimated to be between £2.6bn

¹ It is not possible to break down administrative and non-cash expenditure either by intervention type or by single and national programmes using the information available, to reflect the total financial cost of *emda*.

and £4.6bn, while the present value of the GVA impacts in 1999/00 of National Programmes is estimated to be £2.2bn and £3.9bn.

- In terms of 'return' on investment; every £100,000 of *emda* spend (including administrative and non-cash costs) is estimated to have generated a per annum GVA benefit of £92,251. Depending on whether per annum GVA benefits are assumed to persist for 5 or 10 years, this equates to an overall 'return' (subject to the caveats above) on investment of between £4.8 and £9.3 of (undiscounted) GVA for every £1 of *emda* expenditure.
- The present value of *emda* expenditure (excluding European spending) in 1999/00 is £950m. Using present value estimates of GVA and expenditure, this equates to a 'return' on investment of between £5.0 and £8.9 per £1 of *emda* expenditure.
- If total project expenditure only is considered, GVA 'return' rises to £6.1 and £11.8 per £1 on *emda* expenditure respectively. Single Programme expenditure is estimated to have a 'return' on investment (based on project expenditure only) of between £5.7 and £10.8 per £1 *emda* spending, and National Programmes between £6.8 and £13.2.
- Total project expenditure includes £172m of expenditure on projects that were not designed to generate employment or GVA impacts (which includes administration projects). If this expenditure is excluded from the calculation, overall GVA 'return' per £1 of *emda* investment is estimated at between £7.7 and £14.7 depending on whether GVA endures for 5 or 10 years.

Table 9.12 £ GVA (undiscounted) for every £1 of *emda* expenditure

	GVA endures for 5 years	GVA endures for 10 years
Total (based on all <i>emda</i> expenditure)	4.8	9.3
Total (based on <i>emda</i> project expenditure only)	6.1	11.8
Single Programme (total project expenditure)	5.7	10.8
National Programme (total project expenditure)	6.8	13.2
Total (based on <i>emda</i> expenditure on projects generating economic outputs only)	7.7	14.7
Total (based on the present value of GVA and costs)	5.0	8.9

