

***Guidelines  
for the  
economic  
assessment  
of mining  
and coal seam  
gas proposals***

*CIE were commissioned by the NSW Department of Planning and Environment to support the preparation of the CBA section, and Appraisal Guidelines for environmental, heritage, social and transport impacts and associated workbooks. Deloitte Access Economics were commissioned to support the preparation of the LEA section, and ACIL Allen Consulting the CBA workbook.*

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## 1 Introduction

The purpose of these Guidelines is to assist proponents with providing the necessary information to meet some of the requirements of section 79C of the *Environmental Planning and Assessment Act 1979* (EP&A Act). In particular these Guidelines focus on the following two matters the consent authority must take into consideration in determining a development application:

- The public interest<sup>1</sup>; and
- The likely impacts of that development, including environmental impacts on both the natural and built environments, and social and economic impacts in the locality.

Consistent with the approach to evaluations in other areas of State Government decision making, the public interest in these guidelines is focused on the collective public interest of households in NSW<sup>2</sup>.

Two components are used to provide the supporting information for the two considerations above. Firstly, cost benefit analysis (CBA) is used to assess the public interest by estimating the net present value of the project to the NSW community. Secondly, local effects analysis (LEA) is used to assess the likely impacts of the development in the locality.

The CBA and LEA provide a methodology to inform a consent authority about the likely impacts of a proposal. The consent authority is to have regard to these impacts as part of its consideration of a proposal as part of its statutory obligations under section 79C.

### Economic assessment as an input to the development assessment process

Under section 78A of the EP&A Act, a development application for State Significant development must be accompanied by an Environmental Impact Statement (EIS). The *Environmental Planning and Assessment Regulation 2000* requires a proponent to request any requirements for the EIS from the Secretary of the Department of Planning and Environment. These requirements are referred to as Secretary's Environmental Assessment Requirements (SEARs). To support a triple bottom line assessment, the standard SEARs require an economic assessment of the project in accordance with these guidelines.

The economic assessment, comprising the CBA and LEA, forms part of the EIS. The economic assessment should consider all the issues covered in the SEARs and be integrated with the conclusions of the EIS. The economic assessment should contain sufficient detail that it can be read as a stand-alone assessment. However, to avoid unnecessary duplication of highly technical or detailed information an economic assessment can summarise or cross reference information presented in other parts of the EIS.

Section 79C of the EP&A Act states that in determining an application, the consent authority must evaluate a number of factors. Both the quantitative and qualitative findings of the CBA

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<sup>1</sup> Clause 1 sub clause b and e of the *Environmental Planning and Assessment Act 1979*.

<sup>2</sup> The focus on households avoids double counting and other issues that would arise if businesses and other organisations were included. This is because gains or losses to NSW businesses ultimately either accrue to the NSW households that own them (either directly or indirectly) or flow out of the State.

and the LEA are evaluated. They are considered alongside other information in relation to the individual proposal and supporting arguments.

The economic assessment report will be reviewed as part of the full EIS and placed on public exhibition for community comment.

### The role of cost benefit analysis (CBA)

CBA estimates and compares, on a common basis, the total benefits and costs of a project or policy to the members of a specified community.

CBA provides a technique that allows a systematic treatment of trade-offs and provides a basis on which the Government can assess the net public benefits of decisions. It allows for quantification and valuation of the full range of potential impacts, economic, social or environmental (including human health) that might arise from a project. All costs and benefits should be quantified and monetised if feasible and material.

Impacts across the various types of costs and benefits are converted into a common unit. The preferred unit is the Australian dollar in current day prices.<sup>3</sup> These values are then aggregated into a single metric – *the expected present value of net benefits* from a proposed project. This result is frequently referred to as the NPV ('net present value') of a project. Some impacts are difficult to quantify objectively, such as heritage impacts. As unquantified impacts are not included in the NPV, they should be reported alongside the NPV if they are material.

A CBA framework is focused on the benefits for a specified community, in this case the NSW community. The policy option that delivers the highest *net social welfare* is considered an important indicator of the best outcome for society, subject to considerations of any major unquantified impacts and any major adverse impacts on particular groups in the community.

A CBA framework also considers the timing of each of the impacts, where future impacts are 'converted' into today's terms so that all impacts can be meaningfully compared regardless of timing. A CBA, for example, will enable an evaluation of policies that deliver different streams of benefits and costs over time.

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<sup>3</sup> This excludes future inflation in general prices. Changes in prices relative to inflation are included, such as real changes in coal prices.

The key steps to undertake a CBA are presented in box 1.1.

<b>Box 1.1: Key steps in a CBA</b>
<b>Step 1: Establish the base case</b> against which to assess the potential economic, social and environmental impacts of changes due to the project.
<b>Step 2: Define the project</b> including all significant inputs required to achieve the project's objectives.
<b>Step 3: Quantify the changes</b> from the base case resulting from the project. This will focus on the incremental changes to a range of factors (for example, environmental, economic, social) resulting from the project.
<b>Step 4: Estimate the monetary value of these changes</b> and aggregate these values in a consistent manner to assess the outcomes. Where market prices exist, they are a starting point for valuations of both outputs and of inputs used for production. For non-market goods, as for many environmental impacts and some social impacts, the aim is to value them as they would be valued in money terms by the individuals who experience them.
<b>Step 5: Estimate the Net Present Value (NPV)</b> of the project's future net benefits, using an appropriate discount rate.
<b>Step 6: Undertake sensitivity analysis</b> on the key range of variables, particularly given the uncertainties related to specific benefits and costs.
<b>Step 7: Assess the distribution of costs and benefits</b> across different groups.
<b>Step 8: Report CBA results, including all major unquantified impacts</b> so the appraisal addresses and incorporates all material relevant to the decision maker.

The economic assessment is just one part of the broader EIS. However, it is a widely used tool for deciding between alternative development options. It is intended to allow decision-makers to consider trade-offs and decide whether the community as a whole is better or worse off as a result of the proposal. It should be based on rigorous, transparent and accountable evidence that is open to scrutiny.

Cost benefit analysis seeks to be comprehensive and include all economic, social and environmental impacts using well-developed, objective and repeatable valuations. However, in practice, valuation of some factors is, at least partly subjective or not possible. Therefore, of itself, a positive NPV does not mean that a project is in the public interest. This is because a decision maker may assess that unquantified impacts or information contained elsewhere in the EIS should be determinative. Conversely, a project with a negative quantified NPV could be in the public interest if unquantified factors are positive.

### Key features of a CBA

A CBA should have the following key features:

- **Scope** – A CBA should include all first round (primary) impacts both direct and indirect but not secondary impacts. Direct impacts reflect the revenues of the project less the opportunity cost of resources (such as land, labour and capital) used for the project. Indirect impacts are impacts on third parties and include all the environmental, social and health cost and benefits and associated public expenditure. The distribution of costs and benefits to the NSW community will reflect arrangements such as taxes and royalties applying to the project and impacts in related markets.
- **Discount rate** – A discount rate of 7 per cent per annum with sensitivity testing at 4 per cent and 10 per cent per annum should be used.<sup>4</sup>
- **Timeframe** – the evaluation period should be long enough to capture all costs and benefits attributable to the project. In general the evaluation period should reflect the expected economic life of the principal asset, which may be as short as 10 or 20 years. If a project has environmental impacts (positive or negative), these impacts may continue well after the productive life of the project under consideration. For long-lived projects, it is recommended a 30 year time-frame post construction<sup>5</sup> is used, consistent with NSW Treasury Guidelines for Economic Appraisal, and where applicable a residual value for impacts beyond that time-period. However, where predictable and material, a longer time-frame can be adopted. In all cases, remediation and decommissioning costs should be accounted for, either within the time frame considered or as part of the residual value for impacts beyond that timeframe.
- **Risk and uncertainty** – A ‘risk neutral’ approach to expected costs and benefits, such that core estimates of costs and benefits reflect average (mean) estimates of the likely outcomes. Sensitivity testing should be conducted around key parameters.
- **Unquantified factors** – to provide information to the decision maker on any impacts that could not be quantified to be assessed in conjunction with the quantified expected net benefits.

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<sup>4</sup> NSW Treasury, 2007, *NSW Government Guidelines for Economic Appraisal*. Office of Financial Management: Policy and Guidelines Paper.

<sup>5</sup> In the case of a mine, the CBA would need to cover 30 years from when the mine begins operating.

## Local effects analysis (LEA)

LEA focuses on how local people will experience the changes incurred due to the project, with priority given to effects that are perceived to be material at the local level. An assessment of the consequences of the proposal in its “locality” is required by section 79C of the EP&A Act, which specifically requires an assessment of social and economic impacts.

The CBA conducted at the project and State level will already contain much of the information that is needed for the LEA. For example, the economic benefits to workers and suppliers that are considered in the CBA form a critical input for an LEA. In this sense, LEA is not a new approach and does not require significant additional analysis over and above the CBA.

The LEA is intended to be complementary to the CBA. What LEA does is translate the effects estimated at the State level to the impacts on the communities located near the project site. LEA can be seen as an identification and enumeration of local effects that have been incorporated into the CBA with the purpose of an LEA being to:

- Inform communities;
- Identify local impacts or change; and
- Aid a balanced assessment by providing some information that will assist in developing any mitigation plans and strategies that may be required.

The LEA also provides additional information to describe changes that are anticipated to occur within a locality, such as employment changes. These are intended to inform the scale of change rather than being a cost or benefit to the local community.

For the purposes of these draft Guidelines, the LEA defines the locality and the population group as the following:

- Locality - defined as the Statistical Area Level 3 (SA3) that contains the proposed project.<sup>6</sup>
- Population group - for practical reasons of measurement and identification, the analysis should include local effects that accrue to those people ordinarily resident in the locality at the time of the proposal.

In theory, a “full” LEA would capture the full range of effects experienced by local people as a result of the proposal. In practice, it is unlikely to be practical or cost effective to undertake a quantitative assessment of all local effects. Therefore, it is necessary to propose some priorities, reflecting the legislation, local issues, the cost and complexity of assessment and the costs of obtaining the information required for quantitative assessment. The following local effects are therefore analysed in the LEA:

- Local employment and income effects;
- Other local industry effects, for example on suppliers; and
- Environmental and social changes in the local community.

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<sup>6</sup> Statistical Areas are defined by the Australian Bureau of Statistics as part of the Australian Statistical Geography Standard. SA3s have been constructed to represent functional areas of regions and so are a good basis for analysing local effects from mining and coal seam gas projects.

## Using these Guidelines

The anticipated users of these Guidelines are proponents and relevant professionals employed by the proponent to assist in the preparation of a development application for a project. The Guidelines will also be used to assess the adequacy of a proponent's economic assessment report.

The Guidelines will be supported by Technical Notes, which set out default methodologies, parameters and assumptions to be used as part of the economic assessment. These Technical Notes will be updated from time to time to reflect new research and changes in best practice.

In general, these Guidelines and the Technical Notes must be treated as setting out minimum standards for the economic assessment. Proponents may, at their discretion, present calculations based on alternative methodologies or assumptions. However, if this is done, these alternative results should be clearly presented as supplementary to the main results. Proponents should also present a detailed justification for why the alternative parameters should be considered, along with supporting research and analysis.

A number of Excel workbooks have been prepared to assist proponents and improve consistency in how information is presented. These workbooks are also intended to assist decision makers and the community by making it easier for them to verify the results of the economic assessment. It is recognised that one-size fits all workbooks may not achieve these aims as each project will have different characteristics. Therefore, proponents may use their own workbooks provided that all assumptions are clearly stated, that standard or default parameters are used where required and the workbook can be easily audited.

The Department of Planning and Environment will consult with interested stakeholders about a possible Technical Note setting out minimum standards for workbooks.

## 2 Establishing the base case and defining the project

### Establish the base case

In a CBA, the costs and benefits of a project are compared to the costs and benefits ‘without’ the project. The without project case is termed the ‘base case’.

The base case should reflect the existing use of the land (based on current and committed policy settings) where the project is proposed. A clearly defined base case outlines the economic, environmental and social impacts associated with the existing use of land.

The purpose of establishing a clear base case is to focus on the incremental change in economic, environmental and social impacts caused by the project relative to the existing land use.

The base case should include existing and already approved (but not yet operational) projects that will interact with the mining or coal seam gas project.<sup>7</sup> This will ensure the cost benefit analysis at the project level accounts for cumulative impacts and threshold effects to the extent possible.<sup>8</sup>

### Existing land use on the project site

The proponent should outline the existing land use on the project site and assess its material economic, environmental and social impacts that would occur during the evaluation period. For example, if the land is currently used for agriculture, the base case should include recognition of displaced agricultural activity. It may also be appropriate to assess environmental impacts (e.g. greenhouse gas emissions) from continued agricultural production on the project site. If an Agricultural Impact Statement has been prepared, it would be appropriate to cross reference that Statement and draw on information from that analysis when defining the base case.

The CBA should estimate the forgone value of the existing land use. The value of output and residential amenity given up or forgone on the project site over time can be estimated as the market value of the land and properties.

Current land prices are generally an appropriate indicator of the ‘present value’ of future output, housing and lifestyle uses associated with land and properties in their current use. The proponent should estimate the current land and property price of the project site. This value should exclude any part of the price that may reflect the impact of mining, regardless of whether that impact is positive or negative:

- Positive – it should exclude any element of mining profit that is capitalised into the land price, and which is therefore part of the net benefit of the project; and

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<sup>7</sup> The base case should not include projects that may potentially be approved in the future. These projects will be subject to their own cost benefit analysis during the assessment process.

<sup>8</sup> Cumulative impacts or threshold effects can occur where there are multiple projects in a given region. Cumulative impacts occur where the impact of two projects taken together is greater than the sum of the impacts of each undertaken individually. One example of cumulative impacts is if there are thresholds where impacts cannot be meaningfully ‘reversed’ or impacts significantly intensify (e.g. the extinction of a threatened species population).

- Negative – it should exclude any discount on the land price that could be related to the threat of mining having a negative impact on amenity.

The existing use of the site may have third party impacts, such as environmental costs or impacts on neighbouring agricultural land. In practice, not all third party impacts of the existing land use will be easily identifiable and quantifiable. Focus should be placed on impacts that are likely to be of material significance for the CBA. If third party impacts of the existing land use are not quantified, a CBA of a mining or coal seam gas project implicitly assumes no third party impacts under the existing land use. Proponents should consider whether this implicit assumption is reasonable and set out reasons for this conclusion.

#### *Assess interactions with other projects in the surrounding area*

Assess whether the proposed project interacts (complements or competes) with existing or approved projects in the surrounding area. This is required to evaluate possible cumulative impacts or threshold effects, as these projects will change base case environmental conditions.

Where interactions occur with other projects, identify the economic, environmental and/or social impacts that are likely to be of material relevance. For example, where the additional water take required by a new project may exceed the current availability of the resource, or where air or noise pollution contributes to higher base levels than could normally be expected.

These interactions would be part of the cost benefit analysis because other projects would be reflected in the base case set of environmental conditions that occur over the evaluation period.

#### **Define project**

Projects may be new mining or coal seam gas projects or extensions or modifications of existing projects. In any case, the proponent should describe the project in terms of land use, physical layout, proposed output, likely market(s), timing of the project and related infrastructure requirements. Where appropriate, the proponent should outline the mitigation or management strategies that will be undertaken as part of the project's activities.

The definition of the project should include all significant inputs required to achieve the project's objectives. The appraisal must focus on the whole proposed project for which approval is sought. The definition of the project should include options or scenarios for mitigation programs, as well as activities required by governments because of the project.

### 3 Cost benefit analysis – quantification of impacts

This section sets out the requirements to complete the steps of a CBA of a mining or coal seam gas project, after the base case and project have been defined. Project proponents are required to prepare a full CBA for NSW, which quantifies and attributes to NSW all the incremental costs and benefits of the project. Key elements of a CBA are summarised in table 3.1.

**Table 3.1: Components of net benefits attributed to NSW**

	<b>Cost Benefit Analysis</b>
Royalties	Yes
Company income tax	Yes (NSW share)
Net producer surplus	Yes
Economic benefit to existing landholders	Yes
Economic benefit to workers	Yes
Economic benefit to suppliers	Yes
Net environmental, social and transport-related costs	Yes
Net public infrastructure costs	Yes

#### Cost benefit analysis for NSW

A CBA estimates and compares the total benefits and costs of a project to members of a specified community. These Guidelines consider the community of interest as NSW, requiring benefits and costs to be estimated where possible as those that accrue to the NSW community.

This section outlines how to report and quantify the incremental costs and benefits of a mining/coal seam gas proposal and estimate their monetary value for both approaches available to the proponent.

#### *Task 1 Estimate royalties payable*

The mineral royalty is the price charged by the State for the transfer of the right to extract a mineral resource. All royalties payable as a result of a project will be attributed to the NSW population.

The quantification of royalties payable (including allowable deductions) should be based on the NSW Government guidance documents<sup>9</sup> and the royalty rates prescribed in legislation.<sup>10</sup>

<sup>9</sup> For example, see NSW Trade and Investment, *NSW Coal Mining Guidelines for Royalty Compliance*, [http://www.resourcesandenergy.nsw.gov.au/\\_data/assets/pdf\\_file/0007/399562/royalty-and-statistics-guidelines-coal.pdf](http://www.resourcesandenergy.nsw.gov.au/_data/assets/pdf_file/0007/399562/royalty-and-statistics-guidelines-coal.pdf)

<sup>10</sup> *Mining Regulation 2010*, Minerals –Part 7, Section 62, Schedule 6. *Mining Regulation 2010*, Coal – Part 7, Section 63. *Petroleum (Onshore) Regulation 2007*, Petroleum (Onshore) – Part7. *Petroleum (Offshore) Act 1982*, Petroleum (Offshore) – Section 143.

The two different types of royalties are:

- Ad Valorem royalty applied to high value to volume minerals and levied as a percentage of the total value of the mineral recovered (or the ex-mine value).
- Quantum royalty levied as a flat rate per unit of quantity.

The Ad Valorem royalty rates for coal are provided in table 3.2 and examples of royalty rates applied to different types of minerals are provided in table 3.3.

**Table 3.2: Ad Valorem royalty rates for coal**

Coal	Royalty rate
Open cut coal	8.2 per cent
Underground coal	7.2 per cent
Deep underground coal	6.2 per cent

Source: NSW Trade and Investment: Resources and Energy, <http://www.resourcesandenergy.nsw.gov.au/miners-and-explorers/enforcement/royalties/royalty-rates>, Accessed March 2015.

**Table 3.3: Royalty rates applied to selected minerals (excluding coal)**

Mineral	Royalty rate
Asbestos, Copper, Iron minerals, Nickel, Oil shale, Tungsten, Zinc	4 per cent ex-mine value (value less allowable deductions)
Agricultural lime, Bauxite, Gypsum	35 cents per tonne
Limestone, Magnesium salts, Potassium salts, Sodium salts	40 cents per tonne
Chlorite, Marble, Phosphates	70 cents per tonne
Petroleum	10 per cent of wellhead value (value less allowable deductions)

Source: NSW Trade and Investment: Resources and Energy, *Royalty Rates*, <http://www.resourcesandenergy.nsw.gov.au/miners-and-explorers/enforcement/royalties/royalty-rates>, Accessed March 2015.

### **Task 2 Estimate company income tax**

The proponent should estimate the total annual company income tax payable for each year of the evaluation period of the project. The proportion of company income tax attributable to NSW should be estimated by applying the proportion of Australia's population based in NSW, equivalent to 32 per cent as of June 2014 (table 3.4).<sup>11</sup>

Note that a new mine will also pay other taxes, such as payroll tax and personal income tax. The majority of these taxes will have been generated without the project, as people would have been employed elsewhere. Hence these should be included in costs. To the extent that a proponent can demonstrate that other taxes are genuinely additional and will not be offset by lower tax payments elsewhere in the economy, they may be recognised, provided that the impact of these taxes on the overall NPV of the project is reported.

<sup>11</sup> This is based on population data from ABS, 2014, *Australian Demographic Statistics*, Cat. 3101.0 June 2014. This proportion should be updated to reflect updates to ABS population data.

**Table 3.4: Estimating ratio of NSW to Australian population**

Indicator	Data
NSW population ('000)	7 519
Australian population ('000)	23 491
Ratio of NSW to Australian population	32 per cent

Source: ABS, 2014, *Australian Demographic Statistics, June 2014 3101.0*. Released 18/12/2014.

### **Task 3 Net Producer Surplus - Identify the direct costs and benefits to the producer**

This approach estimates the net producer surplus attributable to the NSW community. Estimating net producer surplus requires information on the direct costs and benefits of the project. Table 3.5 outlines the direct benefits and costs of a mining or coal seam gas project that are typically considered.

The value of the direct benefits and costs will be estimated as part of the proponent's financial assessment of the project. The annual values of all direct benefits and costs estimated by the proponent should be entered into the Cost Benefit Analysis Workbook.

The costs entered by the proponent will reflect their expected expenditures.

**Table 3.5: Direct benefits and costs of a project included in net producer surplus**

Benefits	Costs
Gross mining revenue	Operating costs
Residual value of land at end of evaluation period	Capital costs
Residual value of capital at end of evaluation period	Decommissioning costs
	Environmental mitigation costs
	Transport management costs
	Rehabilitation expenses
	Purchase costs for land
	Local contributions
	All taxes (Australian, state and local)

Note: The cost estimates should reflect expected expenditure by the proponent.

### **Task 4 Quantify direct benefits and direct costs to the producer and estimate the total direct net benefit to the producer**

The total direct net benefit to the producer is the difference between the direct benefits (value of output, and residual value of land and capital) and the expected expenditure on inputs. It does not include indirect benefits and costs such as premiums for resources above their opportunity costs, the net environmental, social and transport costs or the net public infrastructure costs of the project.

The value of output will rely on projections of prices for outputs of the project. These prices would often be the same as the base case, as long as the project was small in the context of the relevant market. The relevant market would often be global.

### Task 5 Estimate net producer surplus attributable to NSW

The net producer surplus attributable to NSW is the economic rent attributable to NSW owners of capital. This is equivalent to the NSW owner share of the producer gain to the proponent, excluding all opportunity costs of inputs and the economic benefits to all other parties.

The proponent should estimate the annual net producer surplus (for each year of the evaluation period) as follows:

$$\text{Net producer surplus} = \text{Revenue} - \text{costs} - \text{tax} - \text{royalties}$$

Costs should include all costs incurred by the proponent including contributions to public infrastructure and costs for mitigating environmental impacts.

The proponent should attribute a proportion of net producer surplus to NSW as follows:

- Estimate the Australian share of the project's ownership
- Apply the default proportion of 32 per cent<sup>12</sup> to estimate the NSW share of ownership (see example in table 3.6).

**Table 3.6: Example of calculating net producer surplus attributable to NSW**

Net producer surplus (\$m)	100
Australian share of project's ownership	20 per cent
NSW share of Australia <sup>a</sup>	32 per cent
Value of net producer surplus attributable to NSW (\$m)	6.4

<sup>a</sup> Based on NSW population relative to Australian population.

### Task 6 Estimate indirect benefits to NSW

Indirect benefits include economic benefit to existing landholders, workers, and suppliers and should be estimated in a cost benefit analysis for NSW as set out below. Indirect benefits should be attributed to NSW as set out in table 3.7.

**Table 3.7: Attribution of indirect benefits to NSW residents**

Benefit category	Attribution to NSW
Economic benefit to existing landholders	Full attribution to NSW (unless foreign ownership is identifiable)
Economic benefit to workers	Partial attribution to NSW (based on origin of labour)
Economic benefit to suppliers	Partial attribution to NSW (based on share of ownership of suppliers)

#### Task 6.1 Economic benefit to existing landholders

A mining or coal seam gas proponent may need to purchase land or pay an access fee to an existing landholder(s) to undertake the project's activities. Often these payments to existing

<sup>12</sup> Based on NSW population relative to Australian population.

landholders exceed the opportunity cost of land. The surplus is an economic benefit to existing landholders.<sup>13</sup>

In the case where a proponent purchases land, the opportunity cost is equivalent to the forgone revenue less costs of the existing land use as estimated when defining the base case. In general, current land prices are an appropriate indicator of the present value of the existing land use, taking into account future production, housing and lifestyle uses, noting that any impacts of the mining project are excluded.

In the case where a proponent leases land, the economic benefit to landholders is the surplus between the value paid by the proponent less the present value of output, housing and lifestyle forgone on the leased area of land, assuming the mining or coal seam gas operation is compatible with a continuing mix of agricultural and residential land uses.

The total economic benefit to existing landholders should be attributed to NSW, unless there is sufficient evidence to allocate part of this to non-NSW land owners.

### *Task 6.2 Economic benefit to workers*

The economic benefit to workers is the difference between the wage paid in the mining project and the minimum (reservation)<sup>14</sup> wage that the workers would accept for working elsewhere in the mining sector (Chart 3.8). The minimum wage reflects the employment opportunity costs, skill level required and the relative disutility of an employment position.

In practice, minimum (reservation) wages are not readily observable. An appropriate starting assumption should be that workers do not receive a wage premium, even if they will earn more working in the mining sector.

- If workers are already working in the mining sector, it is not generally the case that one mine will pay significantly more than other mines for workers doing a similar job in similar conditions.
- If a mine will employ workers that are currently working locally, but not in the mining sector, a mine may need to offer higher wages to compensate for more physically demanding work, tougher conditions etc. In this case, the benefit to the worker from higher pay will be offset by the costs associated with greater hardship etc.
- If a mine needs to attract workers from other parts of NSW, it may need to pay them more than they are earning in their existing or previous jobs so that they will relocate. For example, a mine that employs truck drivers in a remote area may need to offer a higher wage than is paid to drivers of similar trucks in the city or large towns. If so, the difference between the minimum wage necessary to get a truck driver to relocate and the standard wage in the city or town is not a valid wage premium.

Although a zero wage premium is a useful starting assumption, the appropriateness of this assumption must be assessed on a case by case basis. This is because benefits to workers can be one of the major economic benefits from a project. If a proponent considers that a project will generate positive benefits for workers, the economic assessment should clearly explain the reasons for this conclusion and present evidence in support of the valuation that has been adopted.

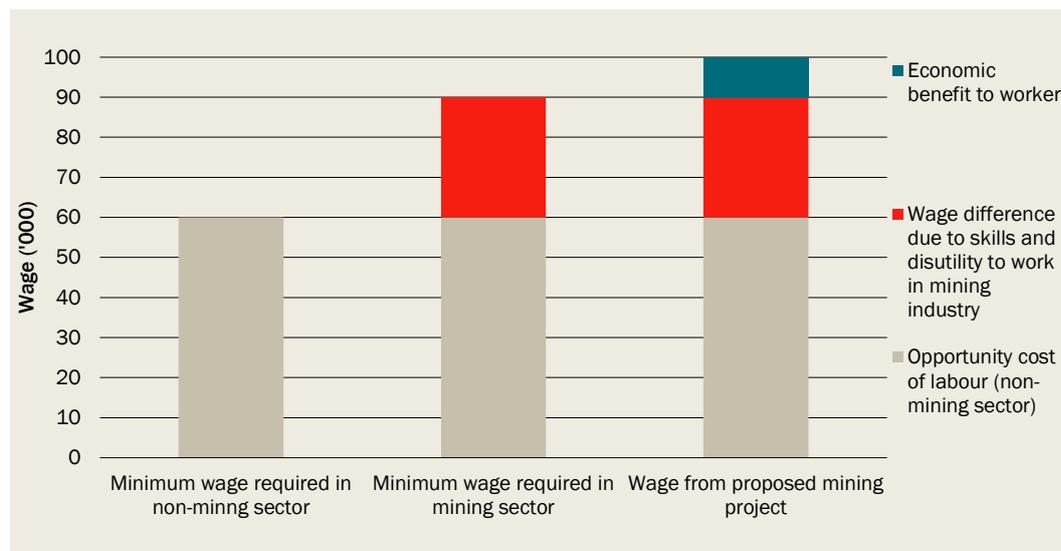
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<sup>13</sup> The opportunity cost of land encompasses its value of future output, housing and lifestyle uses.

<sup>14</sup> The reservation wage is the minimum wage a worker has to be paid to work in a particular industry. In view of the hours of work and working conditions, there is a reasonable possibility that workers' reservation wages in mining are higher than in other industries, and take into account hours of work and working conditions.

A broad range of factors may be relevant to the question of whether a project will generate net benefits for workers. In general, the net benefit to workers is more likely to exist if workers will be drawn from a population with persistently high unemployment or experiencing other forms of social and economic disadvantage. Workers are also more likely to realise net economic benefits if they will develop new skills by working on a project, such that they become more employable in the long term, especially if the skills are relevant to jobs in other industries or locations. Workers may also receive a net economic benefit if a proponent intends to pay its workers more than necessary to attract the necessary skills or number of workers. If this is the case, they should clearly explain why this intention is credible<sup>15</sup> and how compliance with this intention might be verified and enforced.

**Chart 3.8: Identifying the economic benefit to workers**



To ensure transparency about the impact of assumptions about economic benefits to workers on the overall result, the sensitivity of the overall result to these assumptions must be reported as part of the overall sensitivity analysis of the economic assessment.

A CBA for NSW should include the economic benefit to workers already residing in NSW prior to the project (the base case). The economic benefit to workers migrating to NSW should not be included in the CBA for NSW. Therefore, the proponent should estimate the proportion of NSW resident and non-NSW resident workers expected to be employed by the project for the purposes of attribution.

### *Task 6.3 Economic benefit to suppliers*

Similar to the economic benefit gained by existing landholders and workers, local suppliers may also receive an economic benefit by achieving higher surpluses through supplying the mining/coal seam gas project. This economic benefit reflects producer surplus created for suppliers. This should be net of any producer surplus loss because of a reduction in an existing industry.

<sup>15</sup> A time-inconsistency problem can arise in such circumstances, such that even if a proponent intends, in good faith, to pay above market wages to its workers, the incentives will be for it to stop doing so once construction starts or once the project is operational.

The value of economic benefit to suppliers attributed to NSW should reflect expected input-shares for NSW and non-NSW suppliers for the project.

Table 3.9 outlines a worked example of how to attribute components of total net benefit to NSW.

**Table 3.9: Worked example of attributing benefits to NSW**

Benefit	Example of total value (\$m)	Proportion attributable to NSW (per cent)	Value for NSW CBA (\$m)
Royalties payable	50	100	50
Company income tax	10	32	3.2
Economic benefit to existing landholders	10	100	10
Economic benefit to NSW workers	10	Determined by ratio of NSW workers to non-NSW workers	
Economic benefit to NSW suppliers	10	100	10
Net producer surplus to NSW	100	Determined by Australian share of ownership. Apply default of 32 per cent NSW to Australia ratio	

#### *Task 7 Estimate indirect costs to NSW*

The indirect impacts include the net environmental, social and transport costs, net public infrastructure costs and indirect costs to other industries.

##### *Task 7.1 Net environmental, social and transport-related costs*

Mining and coal seam gas projects can cause environmental impacts to air quality, ambient noise, biodiversity, greenhouse gas emissions, groundwater, non-Aboriginal heritage, Aboriginal heritage, surface water and visual amenity. Transport related impacts also occur such as increased traffic congestion. In general the total net environmental, social and transport costs will be attributable to NSW. The proponent should include the total net environmental, social and transport costs in the NSW CBA, unless there are cases where these costs are not entirely attributable to the NSW community.

Guidance on how to identify and value these impacts of the project is expected to be provided in Technical Notes. Regardless of whether a Technical Note has been released, proponents are expected to address each of the following issues (including quantification where feasible):

- Aboriginal heritage
- air quality
- ambient noise
- biodiversity
- greenhouse gas emissions
- water – both ground and surface
- non-Aboriginal heritage
- traffic and transport
- visual amenity.

If Technical Notes are available, the proponent should identify and quantify impacts consistent with those Technical Notes. If there is not a Technical Note dealing with a particular environmental, social or transport-related cost (or benefit), proponents should still quantify impacts wherever possible. In doing so, they should have regard to good practice, including relevant research and approaches used in other Australian and international jurisdictions for quantifying similar impacts.

It is noted that multiple projects in a given region may cause cumulative environmental impacts whereby the total impact of two projects together is greater than the sum of the parts. Economic valuation of environmental impacts should take into account the cumulative effects of multiple projects on both marginal benefits and marginal costs. For example, a particular type of rare or endangered habitat might have been valued in past studies at a particular rate. If other projects have, or are expected to, damage part of that habitat, then the value of the remaining habitat may be higher than estimated in the past studies. Conversely, positive impacts of other projects may also be relevant if they have increased the security of the habitat under consideration.

#### *Task 7.2 Net public infrastructure costs*

Net public infrastructure costs are those costs borne by government (local, state and Commonwealth) for providing public infrastructure. These should:

- Reflect incremental costs compared to costs incurred by governments for existing land use;
- Not include any portion of these costs paid for by the proponent and hence already included in direct costs section.

The incremental cost of public infrastructure (e.g. water, sewerage, drainage, power and communication expenditures) and transport infrastructure required due to a mining or coal seam gas project should be included in the CBA. Infrastructure damage costs, such as increased road damage or the impact of subsidence on infrastructure should be assessed. Changes in the timing of when infrastructure will need to be developed or replaced should also be taken into account. (For example, a road may have been expected to be upgraded in five years under the base case due to increased traffic unrelated to the project. If, as a result

of the project the road needs to be upgraded in 1 year, this timing effect should be recognised in the economic assessment.)

Mining and coal seam gas proponents contribute to the cost of incremental public infrastructure through payment of infrastructure charges, local contributions as part of development agreements or contributions made under planning agreements (PA) to provide or fund for additional public infrastructure.<sup>16</sup>

The net public infrastructure cost is the difference between the incremental cost of public infrastructure and the local contributions paid by the proponent (Table 3.10). The proponent should estimate the net public infrastructure cost for inclusion in the CBA. In the case where local contributions paid by the proponent exceed the incremental public infrastructure cost, the residual is a net public infrastructure benefit to NSW.

The full net public infrastructure cost should be attributed to NSW.

**Table 3.10: Example of net public infrastructure cost**

Item	Value (\$m)
Incremental public infrastructure cost	50
Local contributions	40
Net public infrastructure cost	10

#### *Task 7.3 Estimate loss of surplus to other industries*

A new mining project may impact on the surplus obtained from other industries, such as tourism or equine industries. It is preferable if these effects are measured through environmental impacts, where applicable. For example, tourism might be impacted by air pollution and then the most direct way to estimate this impact is to value it through the approach for air pollution.

There may be some unquantified residual impacts from this approach. These will in most cases not be material. Where they are likely to be significant, consideration should be given to the loss of surplus in these other industries. For example, a tourist facility might face a loss of revenue of \$100,000 but would not incur costs of \$60,000 then the loss of surplus is \$40,000.

If a project will have an impact on agricultural enterprises, the assessment of impacts should be consistent with any Agricultural Impact Statement that may be required.

### **Estimate the net present value of the project attributable to NSW**

The project's net present value to the NSW community accounts for all direct and indirect costs and benefits. It is the total direct net benefits (royalties, company tax and net producer surplus), plus the indirect benefits minus the net environmental, social and transport related costs and the net public infrastructure costs.

All estimated costs and benefits occurring throughout the evaluation period should be converted into present values via the standard discounting process outlined in the CBA Workbook. The proponent should estimate the net present value by taking the difference between the present values of costs and benefits.

<sup>16</sup> Where these services provide a community benefit to other users, the costs of provision should be pro-rated approximately with benefits provided.

## Risk identification and sensitivity analysis

Sensitivity analysis is standard practice in CBA to account for the uncertainty that commonly surrounds the value estimates of costs and benefits, particularly values inferred from market behaviour to approximate the 'true' value of non-market goods and services.

Sensitivity analysis provides decision makers with the potential range in the level of net benefits that could arise from the project. Where there is substantial uncertainty around key impacts, "threshold" testing should also form part of the sensitivity analysis to understand, for example, the magnitude of the costs that would be required to occur to offset the benefits of additional mining activities.

As part of the CBA, the proponent should undertake sensitivity analysis of a key range of variables and include these as part of the economic assessment report. NSW requires that proponents assess their proposal by adopting some 'default' parameters. Default parameters common to each project provide a standardised baseline allowing for quick comparative evaluations of different projects. Within the analysis, this requires the presentation of a scenario based on only these standard assumptions.

However, the specific features of a project may mean the standard assumptions do not appropriately reflect the costs and benefits associated with a given proposal. Accordingly, all proponents may include another 'own source' parameter scenario within their appraisal. However, in choosing to introduce a scenario with different parameter assumptions, the onus is on the proponent to clearly explain:

- the difference in assumptions
- why their own assumptions are more representative of the project's true benefits and costs than the default values.

The core requirement is that assumptions and results across scenarios are transparent to decision makers and other interested parties. This requires that the 'default parameter' and 'own parameter' scenarios are reported side by side in the appraisal, so the implications of different assumptions are clear.

In addition, sensitivity analysis should include:

- output prices, using a wide range of estimates – where possible, regard should be had to historical pricing information over as long a period as possible in specifying the range of values tested and presented.
  - Where practicable, sensitivity analysis should identify how much output prices would need to fall for a project to have a zero NPV and report on whether such a scenario is either likely or unlikely.
- discount rate (4 per cent and 10 per cent)
- royalties derived from project as a result of lower gross mining revenue (25 per cent lower or higher than primary case)
- company income tax from project (50 per cent lower or higher than the primary case)
- environmental cost (based on low and high estimates in Excel Workbooks)
- net public infrastructure cost (25 per cent lower or higher than primary case)
- Proponents are encouraged to test scenarios using multiple sensitivities.

If a proponent considers that a project will generate net economic benefits for workers, they should also present the net present value of the project without taking these benefits into account.

If a project involves mitigation measures to reduce environmental, social or other costs (for example, biodiversity offsets or subsidence prevention measures), the risk that those measures may or may not be fully effective should be discussed. In this regard, the extent of analysis to be included should be consistent with the probability and potential magnitude of the risk.

### **Distributional impacts**

The Local Effects Analysis considers one aspect of the geographic impacts of a project. Projects can also have distributional impacts in other dimensions. For example, a project could affect different parts of a local community differently (with a potential loss of social cohesion), or have differential impacts on different socio-economic groups or generations (for example, the current generation might receive significant direct economic benefits but future generations experience environmental costs due to a project).

In most cases, distributional and equity considerations are most efficiently addressed by governments directly, rather than via decisions about individual mining or coal seam gas proposals. However, it is important for transparency that major distributional impacts of a project are understood, both to inform broader policy decisions and to provide transparency for the public. Therefore, it is appropriate that economic assessments explicitly consider whether a project will have any significant distributional impacts.

One option for addressing distributional impacts would be to identify the most likely 'winners' and 'losers' from a project and report qualitatively on the extent of any expected material impacts. In doing so, best practice would involve focusing on the most significant or widespread distributional impacts rather than minor impacts (whether positive or negative).

### **Report CBA results**

The economic assessment report prepared by proponents should be transparent and comprehensive and note all important assumptions. The results section of the report should balance readability with presenting sufficient detail to allow the results of the CBA to be easily understood and replicated. The report should describe:

- The quantified costs and benefits of 'default parameter' and 'own source parameter' scenarios;
- Estimated net present value of the quantified impact and sensitivity analysis conducted; and
- Major risks, unquantified impacts and distributional impacts.

## 4 Local effects analysis (LEA)

### Introduction

This section sets out draft guidance for undertaking an LEA of mining and coal seam gas proposals. An assessment of the consequences of the proposal in its “locality” is required by section 79C of the EP&A Act, which specifically requires an assessment of employment effects.

The section is intended to support the development of a consistent, transparent and robust way of approaching the assessment of local effects related to coal mine and coal seam gas proposals. It aims to provide practical guidance that will allow analysts to capture the idea that local effects should be based around how local people will experience the proposal, with priority to be given to effects that are perceived to be material at the local level.

The CBA conducted at the project and State level will already contain much of the information that is needed for the LEA. For example, the economic benefits to workers and suppliers that are considered in the CBA form a critical input for an LEA. It is important to note that the information used in the LEA must be consistent with the values quantified at the State level CBA. In this sense, LEA is not a new approach and does not require significant additional analysis over and above the CBA.

The LEA is intended to be complementary to the CBA. What LEA does is translate the effects estimated at the State level to the impacts on the communities located near the mine site. LEA can be seen as an identification and enumeration of local effects that have been incorporated into the CBA with the purpose of an LEA being to:

- Inform communities;
- Identify local impacts and changes; and
- Provide information that will assist in developing mitigation plans and strategies.

It is not intended that the components of an LEA can be added together to provide a single summary measure or that an LEA measures economic welfare outcomes.

### *Geographic and population covered by the LEA*

This section discusses some basic definitions that must be considered for an LEA to be undertaken, including:

- How to define the spatial area analysed in an LEA; and
- How to define the population groups to be included in an LEA.

#### *Defining the spatial area*

While the concept of a locality is enshrined in the EP&A Act, locality is not defined. It is acknowledged that a standardised approach may not be ideal for all potential proposals; however, for the purposes of conducting meaningful and comparable LEAs, a standard approach is required.

These draft guidelines propose that the locality should be defined as the Statistical Area Level 3 (SA3) that contains the proposed project. Statistical Areas are defined by the Australian Bureau of Statistics as part of the Australian Statistical Geography Standard.

SA3s have been constructed to represent functional areas of regions and are therefore a good basis for analysing local effects from mining and coal seam gas projects.

### *Defining the population groups*

For practical reasons of measurement and identification, the analysis should include local effects that accrue to those people who ordinarily reside in the locality at the time of the proposal. This definition of the population will also assist in achieving one of the purposes of an LEA, which is to inform local communities.

### **Local economic effects to be included in an LEA**

The following local effects should be analysed in an LEA:

- Effects relating to local employment;
- Effects related to non-labour project expenditure; and
- Environmental and social impacts on the local community.

From an economic point of view, the mine or coal seam gas project creates two major effects in the locality: it employs people and it purchases goods and services. The project may also affect other industries through channels such as direct use of land. This section sets out the suggested approach to quantitatively and qualitatively analyse these effects.

In quantitatively and qualitatively analysing these effects, an LEA starts with information from the CBA and identifies the relevant local components. LEA also extends information within the CBA to account for effects which are important for people in the locality. In particular an LEA includes a consideration of employment effects as measured by full time equivalent employees (FTE).

These effects analyse the way in which the development impacts the local economy, both through the additional income it provides to local workers and through the impacts of increased demand on businesses in the locality. These impacts are not separate benefits and should not be added together. Instead, they should be regarded as different ways of identifying how the local community is economically impacted by the proposal.

### *Estimating effects related to local employment*

Employment effects are important as they feature in the State Environmental Planning Policies, are of importance to local residents, and are a major way in which mining projects contribute to the local economy.

The estimation of employment effects should take into account the net benefits of the direct employment created by the project as well as the flow on employment that is created as these employees spend their increased income. In more detail, the flow of employment benefits through the economy can be summarised as:

- The project directly employs workers.
- A portion of these workers are ordinarily resident in the locality. These workers are likely to experience an increase in labour earnings due to the project. Some will experience larger increases than others. This is a local economic benefit of the project.
- The remainder of the workers will likely be temporary residents or commuting workers and the increase in their income does not create local economic benefits for the purpose of a LEA.

- For both groups of workers, some of the increased labour earnings will be spent in the local economy which could give rise to some flow on employment in the local economy. This is a local economic benefit of the project.

The approach to estimating employment effects therefore requires consideration of total direct employment, the proportion of workers that are local residents, the net increase in local workers' income and the flow on employment that local expenditure of increased income will create.

Considering total direct employment and the proportion of workers that are local residents, the proponent needs to quantify its labour requirements for all of the construction and operations that form part of the proposal and attribute this to either local residents or non-local residents. Table 4.1 provides an example of how this data could be presented. The table shows a hypothetical project that will employ a total of 635 people a year, of which 185 are ordinarily resident in the locality.

**Table 4.1: Analysis of direct labour inputs**

	Ordinarily resident in locality	Not ordinarily resident in locality	Total
Direct employment	185	450	635

Note: this table shows hypothetical data

Turning to the increase in workers' income, it is necessary to estimate the net benefits that can be attributed to the project. This issue is discussed in detail in the "Economic benefit to workers" in section 3. In essence, some of the employed workers may come from outside the labour force while others may already be working in the mining industry.

The recommended indicator of the net increase in income is the difference between incomes in the mining industry in the local area compared to the average level of income in the area – an example of this is shown in table 4.2. The best source for this data will be the most recent census adjusted for any known changes in income over the period since the census. Available income data is likely to be based on gross wages, but ultimately the increase needs to be estimated after tax and superannuation, to reflect the change in disposable incomes within the locality.

Once the increase in income (after tax and superannuation) has been calculated, it can be multiplied by the employment levels to give a total increase in income for local residents, as shown in Table 4.2. The increase in income for those who ordinarily reside in the locality is a local economic benefit of the project.

**Table 4.2: Analysis of net income increase**

	Ordinarily reside in locality
a) Direct employment during operations phase	185
b) Average net income in mining industry (\$/year)	\$100,000
c) Average net income in other industries (\$/year)	\$65,000
d) Average increase in net income per employee (b-c)	\$35,000
e) Increase in net income per year due to direct employment (\$m) (a*d)	\$6,475,000
f) FTE equivalent (e/b)	64.75

Note: this table shows hypothetical data

### *Second round / flow-on effects*

Second round effects can be extremely important for local communities and therefore considered as part of the LEA. A range of techniques are available for estimating second round or flow-on effects. These include CGE (computable general equilibrium)-modelling, Input-Output (I-O) or multiplier analysis. Most such techniques have limitations. For example, CGE modelling can be complex and expensive and lack transparency, while I-O analysis has been criticised for overstating impacts.

The LEA should include analysis of second round effects. However, the type and form of this analysis should be identified based on a case by case assessment of the most appropriate approach for each project. This may mean that, in some cases, a purely qualitative discussion is the best option. In other cases, CGE analysis may be most appropriate, particularly for larger projects. Regardless of the approach taken, any limitations should be noted. Careful consideration should be given to how quantitative results are presented to minimise the risk of them being misinterpreted.

The overall results of this calculation are not intended to provide a precise measure of employment effects but, rather, an indication of the likely range of local effects.

### *Estimating effects related to non-labour project expenditure*

In addition to employment, the other major economic effect of the proposal will be expenditure on other, non-labour inputs. Expenditure on other, non-labour inputs are a major way in which coal mining and coal seam gas projects contribute to the local economy.

The estimation of effects related to other, non-labour expenditure in an LEA is restricted to the direct expenditure made by the project in the local area.

The approach to estimating effects related to other, non-labour expenditure therefore requires consideration of total direct, non-labour purchases by the project and the proportion of these purchases which are made in the locality.

The proponent will have to quantify its expenditure for all of the construction and operations activity that form part of the proposal and attribute this to geographical areas. Labour expenditure should be excluded. The table below provides an example of how this data could be presented. The table shows a hypothetical project that will spend a total \$450 million a year during operations, of which \$200 million is spent in the locality.

**Table 4.3: Analysis of direct expenditure (excluding labour)**

	<b>In locality</b>	<b>Outside locality</b>	<b>Total</b>
Total direct expenditure (\$m)	200	250	450

*Note:* this table shows hypothetical data

### *Effects on other local industries*

Even where there are no direct links, such as purchases of goods and services or through the spending of additional labour earnings, the development or extension of a mining project can have effects on other local industries. Some of the most important ways in which this can happen are:

- Displacement of a specific land use, where the mining project uses land that would otherwise be used for other purposes;
- Where the mining project affects choices by external parties, particularly tourism and business travel; or

- Where the mining project creates temporary effects on other industries that cause short run market adjustments in the cost of living for local residents, particularly in food and housing markets.

In some cases how a mining project could affect industries is quite clear, for example: where a land use is displaced. In other cases the mechanisms are less clear and are probably context specific. Nonetheless, these sorts of effects are often material to residents of the locality

A qualitative discussion of these effects on other industries is required as part of an LEA. Where no or minimal impacts are claimed, evidence should be provided to support this assessment. Where possible, this discussion should specifically note who is being affected and what strategies might be possible to mitigate these impacts.

#### *Environmental and social impacts on the local community (externalities)*

Every LEA should assess positive and negative externalities created by the proposed project on the locality. Indeed, most externalities will be concentrated within the locality of the proposal and may impose significant costs or create benefits for local residents. For example, on the positive side, the local community may receive access to better quality infrastructure while on the negative side they may be exposed to noise from machinery.

Estimation of the externalities caused by a project is a required component of the CBA.

An LEA should start with the externalities investigated in the CBA and identify those that create material, un-mitigated effects within the locality. The portion of the cost measured in the CBA that are incurred within the locality should be reported in an LEA. For externalities that are treated qualitatively in the CBA, the local effects should be discussed qualitatively in an LEA. It is recognised that there are some specific externalities that may not be able to be partitioned to those within and outside of the locality.

**Table 4.4: Analysis of externalities**

<b>Externality benefit (cost)</b>	<b>In locality</b>	<b>Outside locality</b>	<b>Total</b>
Noise (\$m)	(4.9)	(0.1)	(5.0)
Transport	(11.0)	(1.0)	(12.0)

*Note: this table shows hypothetical data*

#### **Presenting the LEA outputs**

An example table for summarising the output from an LEA is shown below. In practice, summary tables should show each of these measures throughout the project's life. Summaries of results of an LEA should include:

- Employment effects;
- Other, non-labour expenditure effects; and
- Externality effects.

In the economic assessment report, the summary table should be accompanied by a detailed description of the results, an indicative timeline of when the costs and benefits are likely to occur, and the assumptions and methods used to arrive at them. As with the cost benefit analysis, it is important that sufficient supporting information is provided to allow the results to be replicated. This description should also include discussion of qualitative issues such as the effects on other local industries and residents.

**Table 4.5: Summary table**

	(A)	(B)	(C)	(D)	(E)	(F)
		Project direct: Total	Project direct: Local	Net Effect: Local	Total Local Effects : Low	Total Local Effects : High
(1)	Employment related					
(2)	FTE	635	185	65	130	194
(3)	Income (\$m)			6.5		
(4)	Other, non-labour expenditure (\$m)	450	200			
(5)	Externality benefit/(cost)					
(6)	Noise (\$m)	(5.0)	(4.9)			
(7)	Transport (\$m)	(12)	(11)			
(8)	etc.	X	X			

*Note:* this table shows hypothetical data based on earlier examples.

Items shaded in grey are likely to be directly sourced and reconcilable with the CBA. Items in the summary table should not be added to arrive at a total effect.