

Sustainable Development Evaluation of Road Infrastructure Programmes and Projects

Synthesis Report

Farrell, K., Healy, D., Leyden, K., Douthwaite, R., Ewing, M., Gibbons, M., Guckian, B., Johnson, P., Lowes, T., Lumley, I., Murray, A., Sweeney, O., Searson, K., Sirr, L.

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Cad a dhéanfaimid feasta gan adhmaid? Tá deireadh na gcoillte ar lár
'What will we do in the future without wood? The end of the forests has come'

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SOCIO ECONOMICS

The Socio Economics Section of the Environmental RTDI Programme addresses the need for research in Ireland to inform policymakers and other stakeholders on a range of questions in this area. The reports in this series are intended as contributions to the necessary debate on Socio Economics and the environment.

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1 Introduction

1.1 Strategic Environmental Assessment and road construction in Ireland

There has been no formal Strategic Environmental Assessment (SEA) of road-building programmes in Ireland. This research project examines the environmental assessment process used to develop policy and road construction programmes and ways the existing process might be improved. In conducting our analysis, we also examine to what degree the existing process embodies principles of sustainability. In doing so, we propose a new sustainability assessment process that would incorporate, and improve the existing environmental assessment of road and wider transport programmes.

1.2 EIA and road construction in Ireland

In writing this report the authors would like to begin by recognising the good work already done, in particular by the EPA and the NRA, but also by the wider EIA community, in developing a methodology that can be applied widely with the aim of protecting the environment, as defined in Directive 85/337/EEC, as amended. In particular the authors would like to underline the positive role played by the Guidelines and Advice Notes produced by the EPA, and the consultation process associated with same.

The principal purposes of this aspect of the research project were to examine how the fruits of this labour have been translated into action within the context of road infrastructure and programmes and to assist in ensuring that the regulatory framework that governs the assessment process in Ireland is robust enough to provide assessments that perform the two key functions:

- To assess satisfactorily all the effects a proposed road development is likely to have on the environment, before a decision is made whether to grant consent for the proposal
- To ensure that appropriate measures to mitigate the impacts are planned where necessary and are implemented when required.

We begin by taking a brief look at the EIA process as laid down in Directive 85/337/EEC as amended.

1.2.1 The Amended Environmental Impact Assessment Process

The EIA process in Ireland is governed by Directive 85/337/EEC as amended. Before looking at the implications of this an understanding of what the EIA process is intended to achieve is essential.

EIA (Environmental Impact Assessment) was defined by Saddler¹ as:

The process of identifying, protecting evaluating and mitigating the biophysical, social and other relevant effects of development proposals, prior to major decisions being taken and commitments made

The World Bank² expands this definition and describes EIA as a procedure that:

Evaluates a projects potential environmental risks and impacts in its area of influence; examines project alternatives; identifies ways of improving project selection, siting, planning, design, and implementation, by preventing, minimizing, mitigating or compensating for adverse environmental impacts and enhancing positive impacts

The main aim of the process is to stimulate thinking, and encourage action, and not just the ticking off of boxes just to get another report³.

The Institute of Environmental Assessment⁴ identifies two sets of principles, 'basic' and 'operative'. The basic set applies to all stages of project EIA as well as to those of Strategic Environment Assessment (SEA) of policies, plans and programmes. One of these states that the EIA process should be participative:

Providing appropriate opportunities to inform and involve the interested and affected public, and, that their inputs and concerns should be explicitly addressed in the documentation and decision-making.

In a review of 25 years of National Environmental Policy Act (NEPA) in the USA, the Council on Environmental Quality (CEQ)⁵ stated:

the success of a NEPA process heavily depends on whether an agency has systematically reached out to those who will be most affected by a proposal, gathered information and ideas from them, and responded to the input by modifying the proposal or adding alternatives, through the entire course of the planning process.

The statutory regulatory process required by the Environmental Impact Assessment [EIA] Directive (as amended) is implemented by national legislation, in this instance the Roads Act 1993 (as amended). The Directive has a number of objectives as specified in its preamble. The following are the most relevant of the objectives for the purpose of this study:

1 Saddler, B. et al. (1999) *Principles of Environmental Impact Assessment Best Practice*. Institute of Environmental Assessment U.K. <http://www.greenchannel.com/iea/>

2 Klees, R. (2002) *Environmental Impact Assessment Systems in Europe and Central Asia Countries*. World Bank. www.worldbank.org/eca/environment

3 Verheem, R. (2002) *Recommendations for sustainability assessment in The Netherlands*. Netherlands Commission for EIA.

4 Saddler, B. et al. (1999) *Principles of Environmental Impact Assessment Best Practice*. Institute of Environmental Assessment U.K. www.greenchannel.com/iea/

5 C.E.Q. (1997) *The National Environmental Policy Act. – A Study of its Effectiveness After Twenty-Five Years*. Council on Environmental Quality, <http://ceq.eh.doe.gov>.

Whereas the 1973 (4) and 1977 (5) action programmes of the European Communities on the environment, as well as the 1983 (6) action programme, the main outlines of which have been approved by the Council of the European Communities and the representatives of the Governments of the Member States, stress that the best environmental policy consists in preventing the creation of pollution or nuisances at source, rather than subsequently trying to counteract their effects; whereas they affirm the need to take effects on the environment into account at the earliest possible stage in all the technical planning and decision-making processes; whereas to that end, they provide for the implementation of procedures to evaluate such effects;

...

Whereas development consent for public and private projects which are likely to have significant effects on the environment should be granted only after prior assessment of the likely significant environmental effects of these projects has been carried out; whereas this assessment must be conducted on the basis of the appropriate information supplied by the developer, which may be supplemented by the authorities and by the people who may be concerned by the project in question;

...

Whereas the effects of a project on the environment must be assessed in order to take account of concerns to protect human health, to contribute by means of a better environment to the quality of life, to ensure maintenance of the diversity of species and to maintain the reproductive capacity of the ecosystem as a basic resource for life;

An EIA should assess through a transparent, inclusive and evidence-based process all the effects which a proposed development is likely to have on the environment in its widest sense, and include measures to mitigate those effects.

In outline, the EIA process operates as follows.

The project proposers produce an Environmental Impact Statement (EIS) which must contain the information specified in the Directive, including information on the design of the project, the alternatives considered, the existing environment (under various headings), the predicted impacts of the project on the environment, the methodology used for predictions, and the mitigation measures to be incorporated. The Directive specifies that:

This description should cover the direct effects and any indirect, secondary, cumulative, short, medium and long-term, permanent and temporary, positive and negative effects of the project.

The EIA process should begin as early as possible in decision making for a project, providing for the involvement and input of communities and industries affected, as well as the interested public.⁶ This involvement should begin with the screening stage

⁶ Saddler, B. et al. (1999) *Principles of Environmental Impact Assessment Best Practice*. Institute of Environmental Assessment U.K. www.greenchannel.com/iea/

and continue with involvement in: the scoping of the likely impacts and assessment of their significance; the discussion of the alternative approaches to addressing the need that the project is designed to provide for; the baseline study; and the drawing up of measures to avoid, reduce or offset the potential impacts. See Appendix I of our Section 1 Integrated Report for a more detailed description of public involvement in the process.

The completed EIS must then be made available to the public which must be given an opportunity to comment on the proposal and on the EIS, and supply relevant information. In the case of a road scheme this is done both by written submissions and by participation at an oral hearing.

All this information must be assessed by the competent authority before a decision is made in relation to the application for development consent.

Although it is not specified in the Directive, it is implicit in the scheme that conditions associated with the consent must be complied with and we also have tried to consider that aspect in this research.

A particular problem which arises in relation to road scheme EIA as carried out in Ireland is the fragmentation for operational and construction reasons of projects which are, both in conception and effect, unitary projects. Road schemes such as the motorway/dual carriageway between Dublin and Galway are typically divided into a number of sections for design and approval. Unfortunately, the gathering of data for the EIS and the carrying out of the EIA are also carried out on these fragmented sections, and despite the specifications of the Directive as to the assessment of cumulative impacts, there is no assessment of the cumulative impacts of the project as a whole.

2 Methodology

A multi-disciplinary team of ten researchers conducted research for this project. The work was divided into *four* stages or “Sections”:

Section 1: Evaluation of Environmental Impact Assessment

Section 2: Evaluation of Road Programmes and Policy

Section 3: Scoping for a Sustainability Impact Assessment

Section 4: Future Scenarios – Road Transport Volumes in the Future

2.1 Section 1: “Evaluation of EIA”

For “*Section 1*”, each researcher assessed the Environmental Impact Assessment process in their own disciplines. Arising from this, they each produced an individual report, examining individual EISs and the EIA process for selected road schemes.

The ten disciplines involved are:

1. Air pollution and climate
2. Built heritage
3. Biodiversity and ecosystems
4. Economic impacts

5. Hydrology
6. Property impacts
7. Social impacts
8. Spatial planning
9. Traffic modelling
10. Transport policy

The road schemes considered here were chosen to illustrate the gaps in the EIA process as perceived and experienced by the expert group, rather than to be a statistically representative sample. The intention in the process was to undertake a critical analysis of the operation of the process with an eye to making effective recommendations for improving it.

The road schemes were selected through an informal process. The reasons for the choices made included prior familiarity of researchers, availability of information, maximising overlap between researchers, varying consideration of road schemes in different locations, relevance of schemes to the discipline in question.

We note that there is better practice in some disciplines than in others and that the quality of information and assessment does vary between schemes. However, one of the aspects of the EIA process is that a failure at any level of the process has significant consequences for the integrity of the entire process. Therefore, both in the integrated Section 1 report, and in general, in the individual Section 1 reports we focus on the failings rather than the elements which have been done correctly.

The schemes examined for each discipline are given in **Error! Reference source not found.** below.

A total of 10 steps were followed for the assessments. For the first six, each of these assessments included the examination of:

1. The Environmental Impact Statement produced
2. Any technical reports leading to the statement
3. Relevant evidence given to the oral hearing held
4. The report by the Inspector(s) conducting the oral hearing
5. The decision of An Bord Pleanála.
6. Consultation with involved parties and the interested public

The above *six* elements constitute the EIA process and were assessed for internal coherency, compliance with EU and Irish law, and compliance with the EPA Guidelines and Advice Notes on EIA.

A further *two* steps were included, namely the investigation of compliance with relevant:

1. Commitments contained in the EIS or given at the oral hearing
2. Conditions imposed by An Bord Pleanála

These two elements are the enforcement aspects of the road construction process. Unfortunately there is no enforcement authority responsible for overseeing

compliance with consents granted under the Roads Act. There is no ongoing process of oversight to ensure compliance, and no reporting process to identify non-compliances. We carried out such compliance investigations, using documentation / desk study techniques, site visits and contact with relevant officials where necessary.

Following these, the researchers performed an examination of any studies carried out after scheme implementation to assess the impacts of the scheme. We sought data which was required to have been gathered under monitoring conditions imposed in the consent or which was committed to within the EIS for this examination.

Finally, we performed an investigation of the situation after scheme implementation to determine whether impacts were correctly predicted in the EIA process. This was to be carried out in relation to road schemes in which monitoring plans were contained in the EIS or imposed as conditions by An Bord Pleanála which would reveal the relevant post-implementation parameters. In some instances, such data had been generated; in others it had not.

In addition to the basic methodology, 16 questions were devised for researchers to address. The purpose of these was to bring cross-disciplinary cohesion to the analysis. They were as follows:

1. Does the EIS cover the appropriate geographical scope (i.e. all areas affected)?
2. Are all important issues identified in the EIS?
3. Does the EIS include sufficient baseline data?
4. Are all important baseline data quantified?
5. Are interpretations of data correct?
6. Does the EIS predict all relevant likely impacts?
7. Are important impacts properly quantified?
8. Do predictions in one area of the EIS contradict predictions in other areas of the EIS? (E.g. in one section the road will lead to increased economic development or demand for building, but elsewhere the road will not lead to any increased traffic.)
9. Does the EIS accurately reflect the technical reports leading to the statement?
10. Does the evidence to the hearing accurately reflect the EIS and/or technical reports?
11. Does the Inspector's Report accurately reflect all the evidence given at the hearing?
12. Did the Inspector carry out a meaningful assessment for the purposes of the EIA Directive (and Habitats/Birds/ other Directives where applicable)?
13. Are the conclusions of the Inspector substantiated by evidence / explained by reasoning?
14. Does the Inspector's report show that he had the necessary understanding of the subject to carry out an assessment?
15. Do the undertakings given at the hearing and/or conditions imposed by the Board adequately address the mitigation measures identified as necessary?
16. Do the conditions imposed by the Board demonstrate that the EIA was inadequate (by requiring gathering of information which should have been in the EIS)?

2.2 Section 2: “Evaluation of Road Programmes and Policy”

The methodology for Section 2 consisted of an examination of the National Development Plan (NDP), Economic and Social Infrastructure Operational Programme (ESIOP), Roads Evaluation, Mid-Term Evaluation and Mid-Term Review documents, as well as documents from ESIOP Monitoring Committee.

Using these sources, the participants undertook to:

1. Summarise the evaluation process carried out
2. Follow the sequence of how issues identified in one section of the process are followed up (or not) in subsequent sections of the evaluation process
3. Identify reasons for the lack of quantitative estimates where such could have been made.
4. Establish the level of specialist expertise relied on in the evaluation process.
5. Compare with recommended procedures for Strategic Environmental Assessment and developing procedures for Sustainability Impact Assessment
6. Make recommendations as to the appropriate methods for assessing sustainability of road investment proposals at the programme level

2.3 Section 3: “Scoping for a Sustainability Impact Assessment”

Drawing on the results of the research in Section 1 and, especially, Section 2, the researchers have proposed a **sustainability assessment** process. This process would incorporate, complement and enhance the existing Strategic Environmental Assessment (SEA) and Environmental Impact Assessment (EIA) with an eye towards promoting sustainable development especially in the areas of transportation and land-use planning.

2.4 Section 4 “Future Scenarios – Road Transport Volumes in the Future”

An essential element of any Sustainability Assessment of road infrastructure investment is the consideration of likely future scenarios as they affect transport. The methodology for this section involved a consideration of the likely future influences on road use and transport of changes in the following factors:

1. Oil price resulting from the peaking of oil and gas production and resulting from likely post-Kyoto greenhouse gas emissions limits
2. Economic conditions
3. Demographic changes
4. Technological changes

A scoping assessment was undertaken to identify the relative importance of these factors, and to focus on the most important of them to develop a Sensitivity Analysis.

This feeds into the work towards a Sustainability Assessment.

Discipline	EIS Area	Air pollution/ climate	Built heritage	Biodiversity/ Ecosystems	Economic impacts	Hydrology	Property impacts	Social impacts	Spatial planning	Traffic modelling	Transport policy
N2 Carrickmacross/ Castleblaney/ Monaghan Town											
M3 Clonoe – North of Kells (Navan Bypass)											
N3 Butler's Bridge to Belurbet Road Improvement Scheme 2005											
Outer Ring Road 2001											
Adamstown Roundabout to N4 Scheme (Outer Ring Road) 2003											
N4 Lucan Bypass Upgrade 2005											
Wickham Bypass Extension											
M50 Second Liffey Valley Bridge 1998											
M50 Upgrade 2004											
N6 Athlone to Ballinasloe											
N6 East Ballinasloe to Galway											
Ernis Northern Inner Relief Road Phase 1											
Portlaoise Orbital Road 2005											
N78 Athy Inner Relief Road											
N7 Nenagh – Limerick											
N7 Kildare Town Bypass 1993											
M7 Portlaoise – Castletown/ M8 Portlaoise to Cullahill 2002											

Table 2-1: EISs examined under the 10 named disciplines

3 Conclusions

Our work in assessing the EIS/EIA process for road-building illustrates many of the problems associated with the existing process used to design and implement Ireland's transportation network. There is a serious need to re-evaluate the process by which Ireland decides which transportation projects should be built, where, and with what effects. There is also a serious need to better appreciate the interconnections between policy goals among various departments (for example, planning, health, the environment and transportation) and strive to implement and monitor projects that are models of sustainable development.

Rather than detail the conclusions here, and then revisit the same issues with corresponding recommendations, we focus in this Synthesis Report on the recommendations.

The only exception to this approach is the Section 4 report on *Road Transport Volumes in the Future*, whose conclusions we reproduce below.

After reviewing the volume of emissions projected to be emitted by the Irish and global economies and the way emissions limits are expected to be imposed, we conclude that the government should considering the following when planning road projects:

- Emissions restrictions are likely to prevent further growth in the volume of road traffic within 15 years and possibly rather sooner.
- The world economy's growth is likely to be restricted and may well contract in the next 25 years as a result of energy shortages
- Energy prices and the cost of vehicles are likely to rise significantly in relation to people's earnings, reducing road traffic volumes, and
- In view of the need to act to slow the rate of climate change, the use of fossil fuels for road transport should be phased out over the next 25 years.

If incorporated into the cost-benefit analyses carried out for new roads, these considerations would almost certainly mean that very few road projects would show an acceptable rate of return because an increase in traffic volumes could no longer be assumed and that a reduction in volumes was more likely.

In August 2003, the NRA published its traffic forecasts up to 2040. Its goods vehicles projections were based on "forecast growth in Gross Domestic Product (GDP)" while the growth in car traffic "took account of the forecast size of the adult population and of the level of car-ownership, as well as forecasts of the country's Gross National Product (GNP)." It assumed that car-ownership per adult would reach saturation level within the 40-year period. It also assumed that that there would be "sufficient spare capacity in the road network to enable substantial growth in travel over the next 40 years." In other words, traffic growth was calculated on the assumption that there would be "capacity restraints on car-ownership levels, but not on the network itself." The report does not mention the restraints discussed in this section - the availability of oil and the restrictions on emissions.

The forecasts were that the number of kilometres travelled by heavy goods vehicles on national primary routes would increase by 125% and by 107% on national secondary

routes by 2040. Light goods and car traffic would grow by 97% on national primary routes and by 85% on national secondary routes by the same date. Of course, these projections should only be used to guide a planning process if the business-as-usual assumptions on which they are based can be accorded any credibility. In our view, they warrant almost no credibility at all.

4 Recommendations in relation to a Sustainability Assessment Process for Road-building and other Development in Ireland

4.1 The Sustainability Assessment Process: An Overview

Transport should be planned, used, and monitored with sustainability in mind. This means that planners should seek to reduce greenhouse gas emissions (and certainly not increase them) and make sure that nothing is done to jeopardize human health and quality of life.

Road-building decisions under these criteria have to be considered and evaluated not in isolation, but along with decisions about public transport and community design and planning features that enable walking and cycling for transport, leisure and daily activities such as shopping.

In order to visualize our proposed Irish Sustainability Assessment Process, a few definitions are necessary.

The Sustainability Assessment process involves the following stages (See the organizational flow charts in Appendix 1):

- **The Policy Stage:** setting out the overall objectives and a general understanding of how they can be achieved.
- **The Programme Stage:** The Programme lists all projects. Ideally, these should reflect policy and be presented in a coherent way. In the area of transport, we usually think about programmes as networks that link together transport options/modes. Projects in this context could also be management measures as well as the more obvious infrastructure investments.
- **The Project Stage:** the assessment and construction of a proposed new road (or new railway or port, etc).
- **The Post-Decision Stage:** the monitoring of roads (or other transport decisions) for their effects on sustainability over time.

We propose that Sustainability Assessments be used:

1. To assess whether a road (or particular transport option) should be built in the first place; i.e., whether a road is a sustainable policy option for a particular route. This we label as **Stage 1 Sustainability Assessment: the Programme Stage**, and would be carried out when plans and programmes such as the National Development Plan or County Development Plans were being drawn up.

2. To evaluate the effects that a particular road proposal would have on local communities, individuals, and the environment along the proposed route, once a road or other project was selected for inclusion in the National Development Plan or a County Development Plan. This more thorough assessment we call the **Stage 2 Sustainability Assessment: the Project Stage**.
3. To monitor, scientifically, a road's effects on sustainability over time once it is built. This monitoring process we label as **Stage 3 Sustainability Assessment: the Post Decision Stage**. The effects of older transport decisions should also be monitored. In some cases, this may prove that a current transport option is in need of remediation or corrective action.

Measures or reliable and valid indicators will be used at all three stages of the Sustainability Assessment. These measures are discussed in more detail in the full project report "*A sustainability assessment process for road-building and other development in Ireland.*"

In addition to these measures it is important that the Sustainability Assessment process also:

1. Strives to be an open, inclusive process that actively encourages public participation and consultation.
2. Contributes to capacity-building within strategic organisations for sustainability thinking.
3. Recognizes that hired consultants must be fully independent professionals, and should be held accountable for the quality of their reports. Consideration should be given to creating a licensing procedure that would frequently review a consultant's qualifications and the accuracy of their reports. Consultants must be properly qualified for the area of the Sustainability Assessment which they will be asked to examine. The current EIA/EIS process relies too readily on Engineers. This bias needs to be addressed where appropriate.
4. Recognizes that decisions to build roads cannot be made in a vacuum. Land-use planning and public transport planning must accompany road decisions. For example, car-oriented housing estates that minimize walking and cycling and which lack viable public transport create more demand for road use. Therefore, road-building authorities and hired consultants must take into account the nature or character of land-use that lies (or will lie) adjacent to a proposed road.

We envision the Sustainability Assessment process to be overseen by a new **Office of Sustainability Assessment**. This Office of Sustainability Assessment would have a role to play at the policy, programme, and project stages.

It would also monitor or oversee the monitoring of the consequences of various project decisions—past and present—on an ongoing basis; for example, the effects of roads, built over the past ten years, on the sustainability of the surrounding local area, the region and Ireland as a whole would be assessed regularly. The same would hold true for new projects. This monitoring would provide important empirical data that could be used to inform future decisions and, perhaps, provide reasons to re-assess and take corrective action on old decisions.

The EPA's current work in assessing the **State of the Environment** on a national basis and their planned work on County State of the Environment reports means that they are the logical existing Agency to house this Office of Sustainability Assessment.

4.2 Sustainability Assessment: Thinking About Policy First

4.2.1 Establishing the real aim

The first step in balancing our own needs with those of future generations is to be clear about what our own needs are. We need to set policy objectives that are clear, and which guide programmes and projects. We also need to think deeply about the consequences of choosing one policy over another. The Department of Transport's *Operational Programme for Transport*, for example, aims to allow vehicles to achieve an average speed between urban areas of 80 kph. This forces planners to concentrate on road building, when other solutions might be more appropriate. Before setting such a policy, we should be asking: "Why do people and goods need to move between urban areas? And "might it not be better for those people and goods, which do need to travel, to be moved in some other way?" Such questions might have caused the inter-urban road programme to be reconsidered.

4.2.2 Looking for conflicts between objectives

Every government has aims and policies in many areas besides those for transport. Indeed, it should be recognised that the demand for transport is a secondary, derived demand, which arises because people use the transport system largely in the course of doing other things. Very few people dispatch goods or travel themselves simply because it gives them pleasure. Government departments or individuals developing transport policies therefore need to consider the broader context. If particular transport policies prevent some other government or EU policy from being achieved, those transport policies might have to be abandoned or changed. At the very least, policymakers should endeavour to judge whether the specific needs that their proposed policy aims to fulfil, outweigh the reduction in other types of needs, which reduction would result from implementing the policy. Not only is such an approach commonsense, it is EU policy. For example, the *Sixth Environment Action Programme of the European Community 2002-2012*⁷ stipulates that "*integration of environmental concerns into other policies must be deepened*" in order to move towards sustainable development; the so-called "**Cardiff Process**".

The process of integrating policies with each other should recognise that there are certain paramount needs, which, if infringed by a suggested transport policy, should be an absolute bar to the policy being developed further. The Cardiff Process suggests that these include the need for the world to have a stable climate regime, and the need for people not to have anything done to them or their environment, which would damage their health. In detail, the principles of the Cardiff Process are considered as follows:

⁷ <http://ec.europa.eu/environment/newprg/index.htm>

1. **A stable climate regime:** The threat of a climate catastrophe is widely considered so great that any transport policy, which would lead to an increase in greenhouse gas emissions, should not go ahead, however effective it might be at meeting genuine, specific, pressing needs. This is because if the world's emissions are not reduced significantly over the next few decades, the damage expected in Ireland by rising temperatures and more energetic weather systems will almost certainly far outweigh any possible gains as a result of such a transport policy. It could be argued that this policy should be flexible in that it should allow a government to decide that it will allow emissions to increase as a result of a policy but reduce them somewhere else to compensate. However, many people might feel that such a trade-off is proper only when a country is already producing well below its share of the total amount of emissions which the world's greenhouse gas sinks can safely handle; i.e. whether a country has an option for tradeoffs depends in part on how responsible it has been to date.
2. **No damage to human health.** An insistence on this principle would mean that no policy would be adopted if it damaged human health by causing an overall increase in noise, accidents or harmful emissions, tended to reduce social ties or led to people taking less exercise and therefore becoming obese. According to this principle, Government should never intentionally harm the health of its citizens or their communities. Strict adherence to this principle would rule out the adoption of policies leading to any increases in relative or absolute poverty; such increases have been shown by Richard Wilkinson⁸ and others to have a very harmful effect on the health of the groups losing out. Overall, however, this principle is probably less stringent than the climate requirement because, if policymakers find any aspect of a proposal to be harmful to health, they may be able to find ways to compensate so that there is no overall health-loss.

These two principles do not currently guide transport decisions in Ireland. We recommend that they be adopted and be used to screen government policies—existing and new—and that policymakers should reject any ideas that would increase emissions or damage health. Whatever principles are adopted to shape policy for any national development plan, they should be clearly stated and well thought through.

There certainly needs to be more integration between policies. If the transport aspects of the 2000-2006 National Development Plan had been subjected to an integrated analysis, it would have necessitated an exploration of whether developing a road system that encouraged the greater use of private cars was compatible with the goal of reducing social exclusion since certain groups—the young, the elderly, the poor and the disabled—cannot be expected to own and drive vehicles. Similarly, the planners would have had to produce evidence to show that better road links with, Dublin for example, would lead to more activity in the regions rather than a concentration of activity in the capital. They would also have been required to attempt to show that the road projects they had put into the plan were better than any other

⁸ *The New Rural Health*, David Wilkinson, Ian Blue (Eds.); Oxford University Press, 2002

form of capital investment in achieving whatever primary goals they had in mind when aiming to reduce regional disparities.

4.3 Stage 1 Sustainability Assessment: The Programme Stage

If a broad-brush policy can pass the test of basic principles (outlined above), and those responsible for it are confident that it should meet real needs whilst not conflicting with other key national or regional objectives, it should be developed as a specific programme. We recommend this be done using the four capitals procedure we explain in the next paragraph. A programme should only proceed to the project assessment stage if it is entirely clear that the gains will outweigh the losses using this four capitals approach.

4.3.1 The Four Capitals Approach to Sustainability

When we talk about sustainability, one may ask the question what are we trying to sustain. The answer, surely, is the flow of benefits which not only allow human life to go on but which make it a pleasant and rewarding experience. In other words, we want to sustain, and if possible improve, the quality of human life. And what determines the quality of life? In responses to surveys, people have said that the following *thirteen* factors are important elements, although the list is not complete:

1. The quantity of goods and services produced and consumed.
2. The strength of one's family, home and community ties.
3. The quality of the environment people enjoy, including space, energy, natural resources and plant and animal species.
4. How fairly—or unfairly—the available income is distributed.
5. The fraction of time available for leisure.
6. How easy it is to get a job. Supporting oneself by one's own work is one of the essential aspects of existence and the absence of a possibility of doing so means in all probability a considerable loss of welfare.
7. The safety of the future. Humankind derives part of the meaning of existence from the company of others. These include in any case one's children and grandchildren. The prospect of a safer future is therefore a normal human need, and the dimming of this prospect has a negative effect on welfare.
8. How healthy people are.
9. The level of cultural activity, the standard of education and the ease of access to it.
10. The quality of the housing available.
11. The chance to develop a satisfactory religious or spiritual life.
12. How good or bad working conditions are.
13. Being able to participate in decision-making on key areas which affect life.

It is important to note that only the first of these factors can be measured in monetary terms. The rest are essentially non-monetary. That is why developing indicators to track the other factors is so important, and why, in this analysis, we do not try to express everything in monetary terms. All thirteen factors listed above can be regarded as the products of, or related to, *four* forms of capital which together provide a continuous flow of benefits supporting and enriching human life. The four types of capital are defined below:

- **Social capital:** Social and community *interactions and networks* that inspire trust and reciprocity among citizens. These interactions typically occur between neighbours, family members, friends, or within various community or professional groups/organizations. High levels of social capital have been linked to better health, the proper functioning of democracy, the prevention of crime, enhanced economic development, and the socialization of well-adjusted children and teenagers. Possible measures include scientific public opinion surveys of communities assessing levels of social capital. These surveys could be conducted before and after a road (or transport scheme) was built to assess the road's impact on social capital. Survey questions would focus on: levels of trust, reciprocity, social engagement with others, involvement in the community, volunteering efforts, various forms of political and community engagement, the willingness of respondents to become involved and address problems in their community, one's connection to one's community, religion, television-usage, car-dependency, fear of crime, and commuting times.
- **Human capital:** The capabilities or capacities that *reside in individuals and* allow them to work to accomplish other goals⁹. Measures would include education levels, literacy levels, technological sophistication, health (as measured by surveys and use of medical services), access to quality healthcare services, income distribution, poverty levels, household debt, savings rate, retirement-income and support, the availability and quality of childcare services and various cultural measures (e.g., knowledge of other countries, history the arts, etc).
- **Physical capital:** The source of the benefits we get from *what we produce* or make. Concepts include the quantity and quality of our housing, roads, factories, machines, public transport system, communication systems, cultural and sport amenities, parks, public squares & green spaces, architecture, walking and cycling pathways/lanes, schools, etc. (Physical Capital is sometimes referred to as Produced Capital).
- **Natural capital:** The endowment represented by *the natural world*. This takes in not only natural resources—fisheries, forests, minerals, soils etc.—but also nature's services such as climate-regulation and pollutant-disposal. The immense benefits humans derive from natural beauty are also the product of this form of capital. Concepts to be measured might include levels of air and water pollution, fertile soils, forested areas, wetlands, fishing stocks, biodiversity, handling of waste, and the sustainability of the food and energy production process.

The idea of using the **Four Capitals** to assess sustainability was popularised by the World Bank by Ismail Serageldin¹⁰. Serageldin does not give any sources for the approach but its origin is attributed to Paul Ekin¹¹, who wrote in February 1999:

'I presented [the idea] at a seminar which included World Bank people and, I think, Serageldin, at the Bank that I did to promote the book. The next thing I know it appears in all the World Bank stuff authored by Munasinghe and Serageldin et al. Well, you know what they say about imitation being the sincerest form of flattery. It appears that the promotional tour was a success!'

A more recent treatment is also available¹².

The **Four Capitals** approach is based on the idea that if the capital stock per head of the human population is diminished, the flow of benefits the stock can provide to each person is diminished too. This unavoidably leaves the next generation worse off. A continuing reduction in each generation's benefits cannot be sustainable as, at some point, it would fall below the level required for survival. On the other hand, if the total *per capita* value of the four types of capital handed on to each generation is no less than the previous generation received, sustainability ought to be assured.

One major question to be answered by those using this approach is whether—and, if so, to what extent—it is permissible to run down one type of capital if another capital stock is simultaneously being built up. For example, is it all right to reduce natural capital by consuming fossil fuels and causing pollution if human capital as represented by improvements in renewable energy technologies is simultaneously being built up? There is no hard and fast answer to this type of problem and careful judgement is required on a case-by-case basis. However, most people would probably accept that there are limits below which each type of capital should not be reduced whatever the gains in other areas. After all, there is no point in, say, improving the transport infrastructure, if, simultaneously, the social fabric is breaking down catastrophically. Ismail Serageldin's World Bank paper¹³ on the Four Capitals approach accepts that there are absolute limits that must be observed.

4.3.2 Strong and weak sustainability

In addition to discussing the absolute lower limits of the four capitals, Serageldin¹⁴ divided possible attitudes to increases in capital in some areas and losses in others into *four* categories: "weak sustainability", "sensible sustainability", "strong sustainability", and "absurdly strong sustainability."

10 *Sustainability and the Wealth of Nations: First Steps in an Ongoing Journey*, by Ismail Serageldin, Vice President for Environmentally Sustainable Development at the World Bank. (*Environmentally Sustainable Development Studies and Monographs Series*, No. 5, Washington, DC, 1996).

11. *Wealth Beyond Measure: An Atlas of the New Economics*, (Gaia Books, London, 1992).

12 'Sustainable Wealth Creation at the Local Level in an Age of Globalisation' *Regional Studies*, Vol. 32.9, pp. 863-871, 1998.

13 See above.

14 Serageldin, Ismail, & Andrew Steer. 1994. *Epilogue: expanding the capital stock*. In: Serageldin, Ismail, & Andrew Steer (eds). 1994. *Making development sustainable: from concepts to action*. *Environmentally Sustainable Development Occasional Papers 2*. The World Bank, Washington, DC.

1. **Weak sustainability** is not concerned with the level of the individual indicators, just the overall sum of the Four Capitals handed on to the next generation. Losses in any area can be made up by gains in any another.
2. **Sensible sustainability** is primarily concerned with maintaining the total stock of capital handed on but pays some attention to the parts which are assumed to be substitutable up to a point. Since that point is not known, they should be treated prudently. For example, oil may be depleted so long as the receipts are invested in renewable energy production.
3. **Strong sustainability** requires maintaining all the capitals in good condition, as well as the total capital stock. One type of capital cannot be substituted for another, and there is only limited substitutability even within the same capital type. For example, the loss of forest in one place should be replaced by the addition of a similar type of forest elsewhere, not the restoration of some other biotype.
4. **Absurdly strong sustainability** would maintain all parts completely intact and never deplete anything. Only the "over-mature" portion of a timber stand or other stock of renewable resources could be harvested, and oil and other non-renewable resources could not be used at all.

4.3.3 Getting More Specific: How Do we Make Sustainability Assessments at the Programme Stage?

The final section of *A sustainability assessment process for road-building and other development in Ireland.*, namely section “**1.7 Measuring Sustainability: The Indicators**”, proposes a variety of specific indicators that can be used to assess Sustainability, and which measure aspects of the Four Capitals outlined above. In advance of that discussion, we describe the Sustainability Assessment at the Programme stage and at the Project stage.

At the Stage 1 Sustainability Assessment: Programme stage, a limited number of these measures would be used *to make a general assessment* as to whether a list of projects were sound and should go on to the specific project stage. The project stage would require an examination of a longer list of specific indicators and how they are expected to be affected at a specific localized location.

We have prepared the following matrix for *programme planners* to use to assess whether there might be an overall net increase in the total four-capital stock as a result of the programme they are developing – see Table 4-1. Each major aspect of the programme should be tested with its own matrix, and alternative courses should be tested, one against another. For example, a transport need could be met, conceivably, in two or three ways. If each were tested, the matrix should enable the planners to state which option seemed to be superior from a sustainability perspective. In this way, various forms of transport options could be simultaneously assessed for sustainability. If the differences are not clear-cut, however, it might be

necessary to explore then options in more detail in the second assessment phase (at the project level).

	construction	0-5 years	6-15 years	16-50 years
	Nat Soc Hum Phys	Nat Soc Hum Phys	Nat Soc Hum Phys	Nat Soc Hum Phys
Local				
Regional				
National				
World				

Table 4-1: A simple programme matrix for use by planners to assess overall net increase in the total four-capital stock as a result of the programme they are developing. The terms Nat Soc Hum Phys refer to the four capitals “Natural”, “Social”, “Human” and “Physical”.

4.3.4 How would this work at the Programme Stage?

The Department of Transport would establish indicators as criteria with advice from the Office of Sustainability Assessment, such as the indicators we outline in **1.7 Measuring Sustainability: The Indicators**, which measure the four capitals. For the Programme Stage this would be a limited number of general indicators. These indicators, measuring each of the four capitals, would be given numerical values, and summed (for each capital); these numbers being placed into one of five categories¹⁵. These categories, indicating assessments of how each capital would be affected by a proposed programme scheme, would be converted into an easily understood five-colour “impact scheme” with the colours red, yellow, white, light green and dark green indicating differing levels of impact on the capital as follows:

- **Red:** if any capital is expected to decline seriously in a period for a particular location, that square is coloured red.
- **Yellow:** a moderate decline is indicated by yellow
- **White:** no change is left white,
- **Green:** a small gain is indicated by light green
- **Dark Green:** a large gain is indicated by dark green.

Obviously, the quantity of dark greens should outweigh the reds, and the local or regional gains should not be at the expense of national or international declines, such as may occur if shifting developments from one place from another. An assessment would be carried out for each of the various ways of achieving the programme's real goal; for e.g.: road versus rail; and its sustainability assessed. This assessment would be carried out in consultation both with other Government Departments and Agencies, and with the public. It is intended that the current Strategic Environmental Assessment (SEA) process be incorporated in this Sustainability Assessment.

15 We provide a clearer example of this in 1.5 Stage 2 Sustainability Assessment: The Project Stage

Clearly, the programme stage Sustainability Assessment process is general. However, putting programmes through this matrix checklist will force people to think in detail about the full implications of what is being proposed. The process goes some way towards ensuring that the EPA's definition of sustainable development comes about: *"development which occurs within the general carrying capacity of the environment and any net negative effects of which are balanced against development gains"*. In particular, it will mean that planners have to weigh losses in one form of capital against gains in another without recourse to a monetary evaluation.

4.4 Stage 2 Sustainability Assessment: The Project Stage

If and when a road project is selected for inclusion in a programme such as a roads programme under the National Development Plan or a County Development Plan, a more thorough **Stage 2 Sustainability Assessment: The Project Stage** should be used to evaluate the likely effects that a particular proposed road will have on local communities, individuals, and the environment along the proposed route. At this stage the Office of Sustainability Assessment would again draw upon our suggested list of indicators (and others) to assess a particular project. Unlike the Programme stage, the indicators used for the project stage would be comprehensive and would examine specifically the effect of a project (for e.g.: a road) on the local area and the communities contained therein.

This list of indicators would supplement the measures considered in the current Environmental Impact Statement (EIS) and be incorporated into the Environmental Impact Assessment (EIA) Process. As part of the EIA process, public and private consultation would be sought along with the assessments of the Office of Sustainability Assessment.

However, as outlined above, serious efforts would be made to involve the public and to employ qualified, licensed, independent consultants with expertise and credentials in their specific areas. The oft-charged tendency to hire consultants, whose primary duty is to confirm pre-ordained government decisions, would be avoided. Moreover, consultants who provided poor assessments or assessments that did not hold true over time could lose their license to consult on government projects. Consultants would be expected to be experts and would be held accountable for their professed expertise.

4.4.2 How do we assure that the Sustainability Assessments at the Project Level are Accurate?

The short answer is through time and experience. In the beginning, the Office of Sustainability Assessment will have to rely upon qualified experts and public consultation to utilize the long list of approved indicators and make educated predictions about the effect of a proposed project on a local area. However, over time, the Office of Sustainability Assessment will be able to acquire empirically grounded predictors based upon its monitoring of the effects of existing roads (or transport schemes). This is why the monitoring process (or post-decision assessment)

process is so critically important. Such monitoring over time will produce real data and real predictions that are reliable and valid for each of the four capitals. Of course, with some indicators the forecasting is already available (e.g., the production of air pollutants from roads). To facilitate the creation of these forecasts, the Office of Sustainability Assessment will also hire scientists to examine the scholarly research on the measurement and forecast of the four capitals in other countries and across disciplines. This empirically-based information will also be used to help provide forecasts concerning the effects of various schemes on sustainability.

4.5 An Example of how the Sustainability Assessment Process might progress early on, prior to development of accurate forecasts for all indicators

If a programme promises a four-capital gain, the next step is to look at the individual projects within it to ensure that the gains are maximised and the losses minimised. As we note in **1.7 Measuring Sustainability: The Indicators**, each researcher in our team was asked to recommend indicators that could be used to assess how a particular project might affect the future flow of benefits from his or her area of concern. Most of the indicators which the specialists recommended fitted easily into one or more of the four capital types.

The question then would be how to weigh up the capital losses shown by some indicators against the gains shown by others. How do you balance, say, an improvement in childhood dental health (a human capital gain) against a drop in the butterfly population (a natural capital loss)? There is no objective way in which these can be compared. However, we will be able to measure each capital and make forecasts about it in due time. The ultimate decision about trade-offs (or whether they should be allowed at all) is a matter to be decided by the public and its government.

Ultimately, planners assessing sustainability will have to make judgements. Early on, that is, prior to reliable forecasts being available, we propose that these judgements be applied as follows. Suppose we have 20 indicators tracking the level of human capital. The Office of Sustainability Assessment team would discuss the relative importance of each indicator and decide what weight to assign to each one, so that the total weighting added up to 100. Thus, although the average per-indicator weighting would be 5, one indicator might be assigned a value of only 2, while another might get a score of 20. We suggest that this weighting process should be carried out on a project by project basis as some indicators might be particularly crucial in some areas and, if they were already low, a further decline might matter more than a similar decline would in an area in which the indicator was high. Indeed, it might be that the baseline level of one indicator was so low already that any further decline would be disastrous. More generally, we expect that those planning projects will look at the weightings assigned to the indicators for the areas through which their roads will pass and take great pains to minimise the effects on those with the highest weightings. This is exactly the response we would want.

After the weights had been assigned, the net gains and net losses for each of the indicators would be multiplied by their respective weightings and summed, to show whether there would be an overall gain or loss in flow of benefits from each type of

capital as a result of the project during the various phases of the project's life. If some types of capital showed gains and others losses, they would then have to form the basis for a judgment on whether the gains were great enough to outweigh the losses thus allowing the project to proceed.

Apart from the assembly of the baseline data, this process would be somewhat subjective in the early phases of the Sustainability Process. As indicated, with time and monitoring and analysis, accurate forecasts and consequences would be developed, thereby removing much of the subjectivity from the process. In many ways we would be moving towards a better understanding of Sustainability overtime, all the while cautiously considering, estimating, forecasting, and debating issues of sustainability here and now.

Early on—during the here and now period—it is quite possible to imagine a different set of assessors having a different set of values and deriving quite different expectations about whether the project was likely to lead to an overall sustainability gain or not. It would not be a bad thing if this happened because it would mean that the two or more views would have to be debated and the reasons for the diverging views established before the project could proceed. The key is, especially early on, that *there actually is* a set or team of assessors for each of the different capitals.

Very probably, a limited range of indicators would be affected. Altering the project so that it paid more attention to these might mean that both sides could agree that the project made an overall contribution to sustainability.

The debate on the assumptions and values underlying the assessment should not be confined to “experts”. We would like the general public to be able to explore the likely effects of the project too by various means and in various forums. For example, we recommend that the graphs showing the baseline data for each indicator, and the specialists' projections on how that indicator might be affected by the project, be made available on internet. These should be presented in a way that allows a visitor to the website to make his or her own projections and then to assign their own weightings to these so that they can see what effect they have on the project's sustainability. We believe that this would be a much more open and transparent approach than, say, attempting to assign cash values to the gains and losses and then presenting those as hard, objective economic gains which have been derived scientifically and which only experts can discuss. In a democracy, people should be able to participate in the making of decisions which affect their and their children's futures. This is a way in which they can do so.

4.6 Stage 3 Sustainability Assessment: The Post Decision Stage

We propose that once a road or transport project is built, its sustainability should be monitored over time using scientifically attained measures. This monitoring will include the effects the road or transport project has had on subsequent land-use planning decisions because the mode of transportation chosen affects the character of land-use that follows. In **1.7 Measuring Sustainability: The Indicators** below we lay out the type of indicators that should be monitored over time. As noted above, this monitoring process should take place for both newly approved roads and public

transport options *and* also those in place or which have been built or improved over the last ten years or more. Including these older systems in the monitoring process is critical because they enable the collection and analysis of comparative data on the effects of road and transport decisions at different stages of maturity. For example, this would allow us now to improve our ability to forecast how roads, which are new, or five or ten or twenty years old, will affect sustainability in the future. Longitudinal and cross-sectional data, collected systematically and rigorously analyzed, will go a long way to reducing the subjective guesswork from assessing the effects a road will have on sustainability measures over time.

Of course, there is plenty of exciting empirical research and time-proven models on the effects of roads (or transport) on air, noise, water, likely transit use, induced traffic, and a host of other indicators that are part of our four capitals approach. We reference some of this information in our indicators section. In addition to other responsibilities, our proposed Office of Sustainability Assessment should be in charge of collecting these models and research across disciplines (and across countries) so that it could be readily applied to the sustainability assessment process.

4.7 Measuring Sustainability: The Indicators

In the report, we examine possible indicators or measures that could be used for our proposed Sustainability Assessment. *Each researcher on the team was asked to recommend measures that could be used to assess key concepts in their particular area of concern. Most of these recommended measures easily tap into one or more of the four capitals presented above.*

Our recommendation is that, with consultation with stakeholders, these measures be refined and measured nationally and locally and utilized to assess programmes and specific projects. These measures should also be used in the post-decision stage to monitor the four capitals over time. The indicators suggested below are only initial suggestions for their own fields. They are not intended to be complete. As such, they need to be fully developed by teams of experts and additionally revised by an interdisciplinary team. There are no suggestions in a few significant areas such as noise, visual amenity and landscape and loss of agricultural land. However, we felt it was important to give examples in order to explain the methodology which we are proposing and also to document potential indicators whose importance became clear to us during the research. Other work on indicators has been done by EEA with their TERM indicators¹⁶ and through Action 350 of COST¹⁷.

4.8 The Office of Sustainability Assessment

The idea of an Office of Sustainability Assessment is not entirely novel. The Netherlands, for example, has an Environmental Assessment Agency¹⁸ which focuses, in part, on sustainability assessment. The Netherlands Environmental

¹⁶ http://reports.eea.europa.eu/eea_report_2006_3/en

¹⁷ <http://www.cost.esf.org/index.php?id=418>

¹⁸ See: <http://www.mnp.nl/en/index.html>

Assessment Agency has created an inventory of existing assessment tools—called *Sustainability-A-Test*—which can be used to assess sustainability on many levels. According to their website¹⁹:

The word 'tools' refers to all kinds of methods, analytical approaches, procedures and frameworks that can be used for the assessment of policy. Examples of tools are cost-benefit analysis tools, participatory tools, scenario tools, multi-criteria tools and models.

The proposal for establishing an Office of Sustainability Assessment is discussed in greater detail in the Section 3 Integrated Report entitled *A Sustainability Assessment Process for Road-building and other Development in Ireland*. The Office would respond to a number of gaps we have identified. It would ensure that the large volumes of data and information generated in the EIA process would be fed back to and made use of in policy-making and analysis.

The Office of Sustainability Assessment will serve to provide input and professional guidance related to sustainability at all of the following stages of transportation planning (see the organizational flow chart in Appendix 1.)

- **The Policy Stage:** During this stage the Office of Sustainability Assessment will review overall policy objectives. The focus will be on guiding principles and the validity of key assumptions. Where appropriate government departments and agencies will be advised to coordinate their objectives and to reach an understanding as to how aims are to be achieved.
- **The Programme Stage:** A short list of potential transportation projects will be initially assessed using the **four capitals approach** outlined in this document. Each potential project will be assessed using a limited number of measures; a general recommendation from the perspective of sustainable development will be made for each project. The indicators used will measure aspects of the following four capitals: Social Capital, Human Capital, Physical Capital, and Natural Capital.
- **The Project Stage:** At this stage the Office of Sustainability Assessment would utilize a comprehensive sustainability assessment designed to complement and improve the existing EIS/EIA process. Unlike the Programme Stage, the indicators used for the project stage would be comprehensive and would examine specifically the effects of a proposed project (e.g. a road widening project) on the local area and the communities nearby. Several aspects of this **Sustainability Assessment** are worth highlighting:
 1. It will include real opportunities to include and actively encourage public participation and consultation.
 2. It will require that hired consultants be fully independent professionals who can be held accountable for the quality of their reports. Consideration

¹⁹ See <http://ivm5.ivm.vu.nl/sat/>

should be given to creating a licensing procedure that would frequently review a consultant's qualifications and the accuracy of their reports and forecasts in light of future monitoring. Consultants must be properly qualified for the area of the Sustainability Assessment which they will be asked to examine.

3. The Office of Sustainability Assessment will rely upon qualified experts, published empirical research, the knowledge and experiences in countries already assessing sustainability (e.g., the Netherlands) and public consultation to evaluate a long list of approved indicators and make educated predictions about the effect of a proposed project on local areas and issues of sustainable development. Over time, the Office of Sustainability Assessment forecasts will improve based upon the information gained from its monitoring of the effects of existing roads (or transport schemes). Such monitoring, over time, will produce real data and real predictions that are reliable and valid for each of the four capitals. Of course, for some indicators reliable forecasting models are already available (e.g., the production of air pollutants from roads). To facilitate the accurate monitoring and forecasting, the Office of Sustainability Assessment will hire an interdisciplinary (and perhaps internationally recognized) team of scientists and experts.
- **The Post-Decision Stage:** The Office of Sustainability Assessment will closely **monitor** the effects of roads (or other transport decisions) overtime paying close attention to how transportation decisions affect sustainability (as measured by the four capitals) and Ireland's carbon footprint. Serious monitoring of decisions and their effects is crucial. Too often the real effects of transportation and land-use planning decisions on the environment, communities, human health and quality of life are not properly monitored or evaluated. This results in the same decisions being made over and over again primarily because that is the way it was done in the past, regardless of consequence and objective circumstance. Assumptions and effects must be evaluated in light of objectively obtained monitoring data and its analysis. Monitoring efforts of the Office of Sustainability Assessment will not be limited to new projects; older projects and insights from published empirical research from other countries will also be utilized. The overall goal of this post-decision stage is to determine if policy decisions lead to results that are truly sustainable. Where they are not corrections can be made and re-monitored.

The following is a summary of our recommendations:

1. An independent Office of Sustainability Assessment should be established. This would logically fit in with the existing environmental monitoring and assessment role of the EPA and therefore should probably be part of the EPA.
2. This Office should advise and give directions on all stages of the EIA process. This should include guidance on the general process, and also on the specifics of individual schemes including detailed guidance on environmental monitoring and modelling.

3. The Office should receive the EIS when it is prepared and ensure that EIS contains the required information. Where the Office's initial reading of the EIS reveals that a particular section is clearly deficient in that it contains no information, the applicant should be required to amend the EIS
4. This Office should hold a database of all documentation generated in the process of producing EISs (When the N4 upgrade EIA began, the local authority was unable to find much of the documentation relating to the previous EIS.)
5. This Office should require that data collected in EISs adopt standardised collection formats etc. so that data and predictions from one EIS can be compared to another and can be stored in national databases.
6. This Office would develop and implement quality standards for consultants working on EISs and would provide mechanisms for holding consultants accountable. In addition, however, we believe it is important that the Office would also publicly acknowledge good work being done by consultants in what can be a difficult area.
7. It should remain clear that the responsibility for the production of a good EIS would still lie with the applicant.

For further details on this proposed Office, please see the Section 3 report: "*A Sustainability Assessment Process for Road-building and other Development in Ireland*". In particular, we direct the reader to the organisational flowcharts in Appendix 1 which are designed to illustrate the steps associated with our proposed Sustainability Assessment.

5 Recommendations in relation to Environmental Impact Assessment

The conclusions of individual researchers are given in each of their reports, and in the "*Section 1 Integrated Report*". In the interest of brevity, we reproduce here the recommendations which reflect those conclusions.

In making these recommendations, the authors see themselves as contributing to the continuum of improvements that have taken place in the 21 years since the Directive was first enacted. We recognise the efforts of the many before us, particularly within the EPA and the NRA, and the many that will follow, refining and improving this process that is so vital to proper sustainable development.

There are overlaps and common threads in the recommendations from each discipline. Therefore following the production of the individual reports, the research team put together the integrated reports to bring together the recommendations made by the researchers in a structured fashion. The recommendations have been adjusted and added to by the multi-disciplinary team to form a coherent whole and represent a product of the collective process.

We have inserted footnotes in this document to relate it back to the individual reports where the background information on each recommendation is available.

Our recommendations fall within a number of headings:

1. **Recommendations (*for inclusion in the guidelines*) on the preparation of Environmental Impact Statements:** These are recommendations as to the content of an EIS. We have drafted recommendations on the preparation of Environmental Impact Statements for road schemes. (*As these are not intended as a substitute for existing guidelines but as additions or alterations to them, we present them as “Recommendations for inclusion in the guidelines on the preparation of Environmental Impact Statements.”*)
2. **Recommendations for changes in An Bord Pleanála's practice in carrying out Environmental Impact Assessment:** This set of recommendations is directed at how An Bord Pleanála carries out the process of public consultation, information gathering and environmental impact assessment for which it is responsible.
3. **Recommendations in relation to an independent agency responsible for Environmental Assessment:** In a number of different areas of research, the value of an independent body with responsibilities for the quality of EIA and an overview of the collection of data became apparent.
4. **Recommendations in relation to compliance with conditions and monitoring after consent:** Unlike other consent processes such as planning permissions or EPA licences, there is no body with a statutory role for monitoring compliance with a consent granted under the Roads Act. We make recommendations as to how this gap could be filled.
5. **Recommendations for Further Research:** We make some recommendations in relation to further research on issues arising in different disciplines.
6. **Other recommendations:** Some recommendations do not fall under the above headings and relate to policy-making and assessment outside the EPA framework. We include them here for completeness.

The above recommendations are important outputs arising from the research. Consequently, we detail them in this synthesis report.

5.1 Recommendations in relation to the preparation of Environmental Impact Statements

In some instances the EIAs were in breach of the EPA Guidelines; in others, the Guidelines should be amended in scope and detail to address issues raised in our study. Some of the recommendations are of relevance to more than one discipline and are referred to in those locations.

5.1.1 Air and climate

There is a need for specific guidelines in relation to how air and climate issues are handled in the preparation of EISs. All of the following recommendations focus the content of these guidelines. They are not exhaustive but are intended as a basis for the preparation of draft guidelines for this area of EIS. We also recommend later that the independent body for EIA be involved in specifying the monitoring and modelling to be done for each EIS.

1. Set guidelines for determination of existing air quality, such as the advice in the UK Local Air Quality Management Technical Guidance.
2. Clarify confusion between the process of assessing environmental impact and the process of determining compliance with other standards/legislation.
3. Specify “significance criteria” for air pollutant concentrations:
 - a. use impact thresholds where identified
 - b. make estimates of health-impact where no impact threshold is identified.
4. Require that all locations for air pollution monitoring are marked in specific detail on a map and supplied as grid references so that the exact site for monitoring can be identified.
5. Require that all modelling carried out of air pollution should include the monitoring sites used to establish baseline levels, as well as all other relevant receptor sites.
6. Modelling should be carried out for the baseline monitoring period and locations to enable an assessment to be made of the accuracy of the modelling by comparison with baseline data. (Described in the UK as “verification” of the model.)
7. Monitoring datasets and input/output files of modelling data should be made available to the public in digital form when the EIS is published and any supplementary data should also made available to the public as soon as they are produced.

5.1.2 Biodiversity and Ecosystems

8. Proper transposition of all information to the non-technical summary.
9. Timely responses to statutory consultations by the NPWS.
10. No permission to be given by the Board without first assembling all the information deemed lacking by the NPWS.
11. Full consideration, at the stage of alternative route consideration, of the impact of proposals on designated areas was.
12. Full assessment of the impact on Annex I species and priority habitats listed in the Habitats Directive.

5.1.3 Built Heritage

13. Limitations and deficiencies in both the data and sources used in the desktop-study phase and in the fieldwork along the route itself should be explicitly stated and explained, not only in the body of the report but also in the non-technical summary.
14. The NRA Draft Guidelines as they stand are inadequate in several areas. Their revision should involve a far wider consultancy process than appears to have been the case with the initial set which seems to have merely codified existing practice. The following points should be included in that revision:
 - a. Large self-contained archaeological landscapes do not lend themselves well to the recommended mitigation measures in the Draft Guidelines.
 - b. If it proves possible to route the road around many of the sensitive areas within a corridor then a route corridor with an apparently greater number of monuments and areas of archaeological potential can potentially have a lower archaeological impact than what appears at first to be the best option.
15. Given the fact that changes to the road network are not once-off developments but bring a series of other developments in their train, this issue should be addressed in the EIA process.
16. Ensure that the division between archaeology and architecture is bridged and that the entire archaeological record is taken into account in all studies. *(Develop this more)*
17. The large scale destruction of field boundaries is one of the largest single impacts that road projects have on the archaeological landscape and should be consistently addressed.
18. Previously de-listed sites should be considered as potential sites during the creation of Planning Constraint Maps.
19. Ensure indirect effects on buried archaeology including physical, chemical and biological effects are included in the analysis.
20. Consult a wider range of individuals and groups with knowledge of archaeology, including The National Museum of Ireland, An Taisce, The Department of the Environment, The Heritage Council, The Discovery Programme, Local Heritage Officers, County Archaeologists, Local Museum Staff, Local Field Clubs and Archaeological/Historical Societies, Archaeology Departments of the National Universities, Landowners across whose land the proposed routes (during route selection) will pass.

5.1.4 Economic Impacts

21. If any economic analysis or statements are to be included in an EIS they should be based on analysis substantiated by data/methodology like any other information in an EIS.

5.1.5 Material Assets [Property]

22. The Guidelines on the content of EISs to be updated to provide guidance on the appropriate treatment of property in an EIS.
23. The notion of property in an EIS to be treated in more depth than is currently the case.
24. The Guidelines to require a quantum indication of financial impacts on property in EISs, and the inclusion of monetary values for financial impacts to be included.
25. A Chartered Surveyor [General Practice or Planning and Development Divisions] to be employed to arrive at that quantum.
26. The evidence to reinforce these figures to be presented within the EIS.
27. Analysis must be undertaken in EISs of the broader and more indirect property value impacts of the proposals.
28. Considerable attention should be paid to situations in which compensation is payable to property owners, who will in addition benefit from the construction of the proposal, through, for example, their lands on another boundary increasing significantly in value upon completion of the project, and who in effect are left in a situation of significant financial gain through an increase in the overall value of their property, despite having received compensation.
29. Consultants to be required to fulfil the requirements of assessment to the full, and to carry out adequate estimation of the direct *and* indirect impacts of the proposal.

5.1.6 Noise

30. The establishment of an embedded protocol or target level for construction or residual noise in respect of land which contains no dwellings.
31. The establishment of guidelines that take account of night-time residual noise.

5.1.7 Public Participation

32. The EPA guidelines should be revised to include the provisions outlined in Appendix IV of the Section 1 report.

33. Provide free EIS documents to the public. The number obtained by the public is usually relatively low, so the costs are not prohibitive; particularly in comparison with the costs of the schemes.
34. Soft-copy PDF documents should have security properties adjusted to allow: "Content Copying or Extraction" and in particular "Content Extraction for Accessibility". The latter is required for accessibility for readers with special needs. This accessibility setting permits the content of the file to be read aloud by text-to-speech programs, or to be captured and rendered by programs that increase the size of fonts. Such measures would increase accessibility and participation from members of the public with specific disabilities, including visual impairment and intellectual disabilities.
35. The EPA Guidelines section on Public Participation should be revised to incorporate the relevant section of the EU Guidelines.

5.1.8 Social and Community Impacts

36. Research into social and community impacts should use a transparent and scientifically-based objective methodology. Scientific and numerical precision must be required to substantiate decisions.
37. The criteria used to assess the likely effects of a road scheme on a local community should be wider than those apparently used at the moment and should be clearly specified.
38. A wider range of impacts including health and social capital should be included in the assessment of social and community impacts.
39. Serious, innovative, inclusive efforts designed to involve local residents in decisions that affect their communities should be undertaken. Innovative use of planning charrettes and other community-based planning efforts should be utilised.
40. There should also be an effort to use scientifically-attained public opinion information to assess how the residents of affected communities perceive issues of severance, connectivity, pedestrian and cycling issues, the use of public transit, and the value of a road or road-widening project through their community. Serious efforts to assess how a community feels about proposed changes should be undertaken.

5.1.9 Spatial planning

41. The definition in the Directive of a "project" should be followed and the impacts of the wider project included in the EIA process. Wider impacts caused through the supply of materials used (for e.g. quarries) should be assessed.
42. Road projects should be considered in their entirety, not piecemeal.
43. Public screening of sub-threshold projects should be mandatory.

44. Detailed design work should be completed prior to permission being given.
45. Scoping advice given to a project proposer must be made publicly available at the time when it is given.
46. Environmental NGOs should be given the standing proscribed in the amended Directive at oral hearings.
47. An Bord Pleanála inspectors should have available to them a wide enough expertise to enable them to make decisions about specific aspects of individual EIAs.
48. The scope of the examination of possible environmental impacts should be as wide, within the definition of the Directive, as any person wishes it to be.
49. Non-statutory policies should not be used to over-rule the statutory requirement for the review of alternatives.
50. Land use and transportation conditions should be applied to road schemes including conditions to link approved road schemes to traffic management measures in bypassed cities and towns which relevant road schemes were stated to benefit.
51. Development plans should not be amended or ignored to facilitate road projects.
52. Compliance information regarding road projects should be made available at particular locations during office hours, and this should be widely advertised.
53. There should be regular and independent evaluation by professional staff or Board members of the adequacy of EISs, conduct of Oral Hearings and competence of Inspectors' Reports.
54. The enforcement function of mitigation measures attached to the EIS in the case of roads should be given to the Board.
55. Adequate vetting procedures should be put in place to ensure that, in the case of schemes constructed or under construction, waste deposition locations are authorised sites.

5.1.10 Traffic modelling

56. Employ micro-simulation traffic models.
57. Incorporate induced traffic into model in accordance with International best practice.
58. Include traffic model validation results in EISs along with all necessary tables of data to facilitate independent analyses.

59. Include traffic model network and zonal maps in EIS.
60. Provide baseline data-sets to allow independent modelling.
61. Provide all validation data, baseline and forecast data-sets, network and zonal maps on CDROM accompanying EIS.
62. Perform PM peak model predictions. These can be achieved with micro-simulation models.
63. Perform a proper empirical analysis of policy implementation to determine a “rate of advancement of policy initiatives” in an Irish context. Use this to derive a likely-case scenario for public transport and other infrastructural initiatives, instead of using the aspirational best-case scenario.
64. An Bord Pleanála should ensure that the Inspector/Board possesses or has access to the necessary technical expertise to address issues raised at the hearing. However, in circumstances where the DTO are used by a scheme proposer as supporters of the traffic modelling work, such as occurs with the provision by the DTO of model-validation certificates, then alternative, independent experts should be used to assess the traffic modelling work undertaken and presented in the EIS.
65. Calculate likely opening year of scheme, and perform and present model predictions for that year. Proposed opening year of a scheme should not be year of the oral hearing!

5.1.11 Transport policy

66. The EPA Guidelines on EIA should be revised to follow the EU Directive so that the consideration of alternatives is not limited to alternative *routes* but also encompasses alternative *means* of achieving the goals of the project.

5.2 Recommendations for changes in An Bord Pleanála's practice in carrying out Environmental Impact Assessment

While some of the following recommendations are specific to some disciplines the majority are general across all subjects or across a number of subjects.

1. In the absence of the independent Office of Sustainability Assessment referred to below, An Bord Pleanála (ABP) should ensure that the EIS contains the required information:
 - a. Where an initial reading of the EIS reveals that a particular section is clearly deficient in that it contains no information, the applicant should be required to amend and re-advertise the EIS.
 - b. Where deficiencies in the EIS become apparent during the assessment process, the applicant should be required to produce a supplement to the EIS and re-advertise it.

2. ABP should ensure that the Inspector/Board has or has access to the necessary technical expertise to address issues raised at the hearing. Every EIS and relevant submissions should be reviewed by qualified experts in each relevant field, and where these issues are being raised at oral hearings, those experts should attend to gather evidence and ask questions.
3. ABP should ensure that the Inspector's report makes conclusions in relation to issues raised in the consultation process, *and* that the Inspector gives reasons for these conclusions.
4. ABP should acknowledge that the role of the Inspector/Board is to make the assessment and to ensure that all necessary information is available to them to do so, and that it is not the responsibility of local residents or objectors to ensure that ABP has the information.
5. ABP should ensure that its conditions are highly specific and enforceable; for example: conditions in relation to monitoring must specify precisely where monitoring is to be carried out and precisely when it must start (and can end, if relevant).
6. Inspectors' Reports should contain evidence of assessment of the detail or adequacy of the ecological information provided and evidence of sufficient assessment of the effectiveness of mitigation measures provided.
7. An Bord Pleanála Inspectors' Reports must be harmonised in format, made transparent in all respects, and be explicitly referenced to the EU/EPA Guidelines.
8. Inspectors should be required to assess a broader range of community effects than those outlined in existing documents.
9. An Bord should employ its own traffic modelling experts, independent of the DTO, and make the experts available to Inspectors. The confrontational, unfair and out-moded Oral Hearing process should be replaced by, for example, a modern workshop-based approach at both the scoping and final consent stages. This would ensure the genuine public participation and involvement envisaged in the EU EIA Guidelines. This should be organised to take account of public participants' needs, such as normal working and living patterns, and be adequately resourced to cover participants' expenses.

5.3 Recommendations in relation to compliance with conditions and monitoring after consent

1. **Interpretation:** There is no body other than the High Court competent to determine the meaning of conditions attached to road schemes, which as discussed above are often quite vague. Unlike planning permissions, none of these conditions require agreement with ABP or any other consent authority. We recommend that Section 5 of Planning and Development Act be extended to cover conditions attached to consents under the Road Act.

2. **Compliance and Enforcement:** Unlike planning permissions, where local authorities act as the enforcement bodies under the Planning and Development Act, there are no enforcement provisions for consents under the Roads Act. As ABP holds the files and has or should have access to the relevant technical expertise to carry out compliance inspections and enforcement actions, we recommend that compliance and enforcement powers and duties in relation to consents which ABP has granted under the Roads Act be allocated to ABP.

Additionally, the Planning and Development Act provides for access to the courts by third parties in relation to enforcement. This right should also logically be extended to road schemes which have been given permission by An Bord Pleanála. This could be done by extending the scope of sections 150 to 160 of Planning Act.

5.4 Recommendations for Further Research and Other Recommendations

5.4.1 Property

Research should be conducted into the specific issue of the impact of road proposals on rating revaluations for commercial premises, given the restricted nature of grounds for applying for a revaluation under the Valuation Act 2001.

5.4.2 Social and Community Impacts

More scientifically-based research on likely “community effects” should be conducted. Data and conclusions on the community effects experienced by similar road schemes in other communities (in and outside Ireland) should be collected, analysed, and consulted. There is plenty of research on the proper ways to build roads; we also ought to be conducting and consulting research on the effects that such roads have on people and their communities.

5.4.3 Economic Impact Assessment

An Economic Impact Assessment should be prepared for every major public project, and for every major private project requiring planning approval. An “Econo IA” would not be confined to construction projects but required whenever it was proposed to spend more than a certain sum. It would not be possible to avoid commissioning an Econo IS (arising from an Econo IA) by breaking a project, such as the re-construction of a major road, into smaller parts. The factors to be assessed in an Econo IA are discussed in more detail in the Section 3 report.

5.4.4 Social and Community Impacts

Proper transportation planning cannot be divorced from land-use planning. The two go together like hand-in-glove. Future land-use planning and transportation efforts should require joint consultation. American-style Euclidean zoning is unsustainable and should be avoided. The planning of mixed-use pedestrian-oriented communities should be encouraged if not required. Dependence on the automobile for transit should be avoided.

Appendix 1 Sustainability Assessment Flowcharts

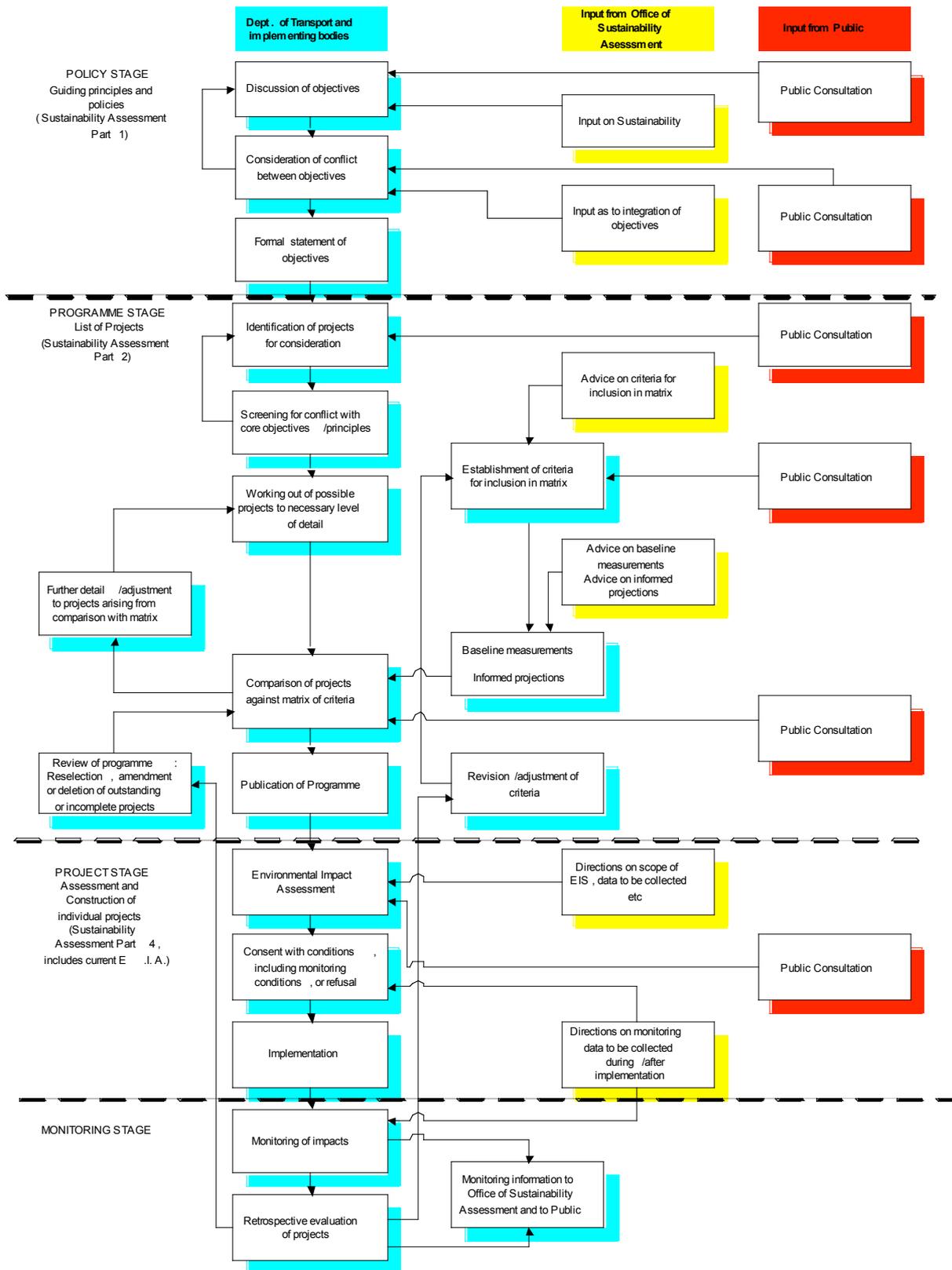


Figure 1: Integrated flow chart of the entire Sustainability Assessment Process.

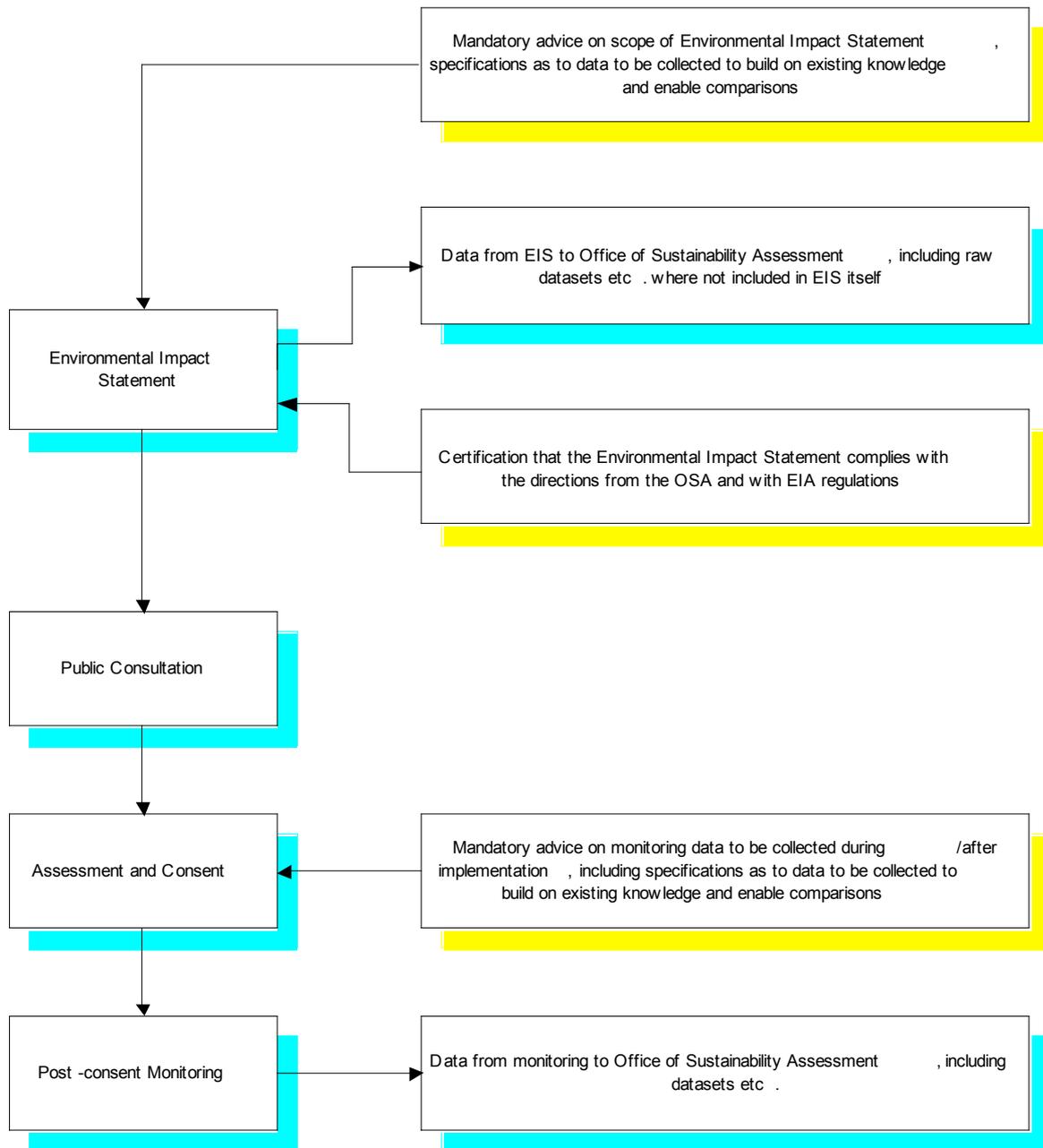


Figure 2: Role of the Office of Sustainability Assessment in Environmental Impact Assessment.

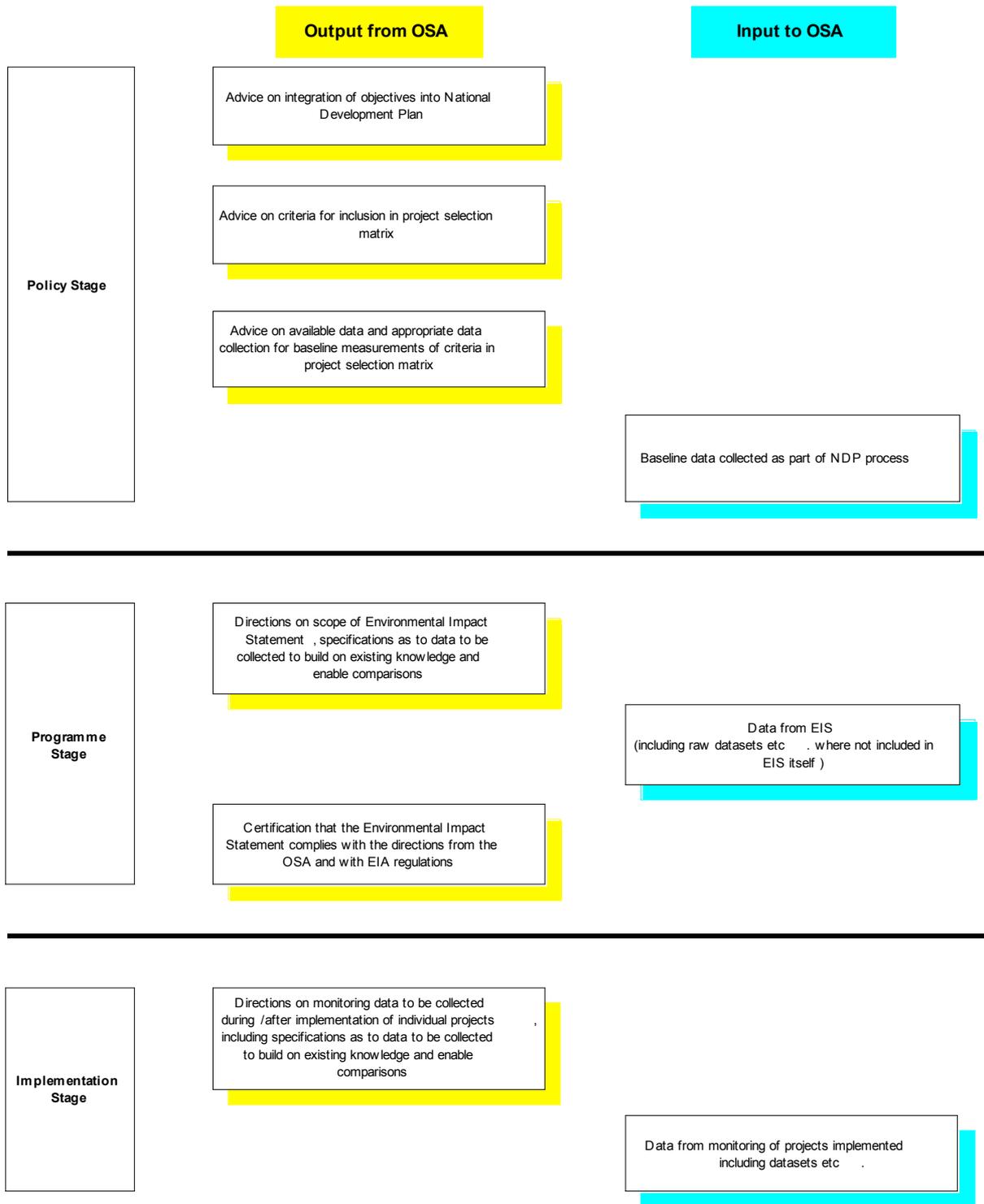


Figure 3: Inputs to, and Outputs from, the Office of Sustainability Assessment.

Appendix 2 Full List of Reports and where to Obtain Them

All of the Integrated and Individual reports are available on Feasta's website at the following address²⁰:

http://www.feasta.org/documents/epa_transport/

Below is a full list of the Integrated Reports and their Authors.

A1.1 Integrated Reports

Section 1 & 2: Assessment of EIA Process on Roads in Ireland Integrated Report
David Healy *et al.*

Section 3: A sustainability assessment process for road-building and other development in Ireland
Prof. Kevin Leyden *et al.*

Section 4: Road Transport Volumes in the Future
Richard Douthwaite

A2.1 Individual Reports

Evaluation of the Assessment of the Impacts of Road Projects on Biodiversity
Anja Murray

Environmental Impact Assessment and Transport Policy
Brian Guckian

Handling of Air and Climate Issues in Road Infrastructure EIA in Ireland
David Healy

EIA Directive Compliance and National Road Plans in Ireland
Ian Lumley

Handling of Traffic Modelling Issues in Road Infrastructure EIA in Ireland
Dr. Kevin Farrell

²⁰ Note that the last part of this address contains an underscore; i.e. "epa_transport"

**Evaluating the Social and Community Impacts of the Outer Ring Road:
An Examination of the EIS Report and additional documents**

Prof. Kevin Leyden

Environmental Impact Assessment, Sustainability and Archaeology

Michael Gibbons

**The Economic Content of Environmental Impact Statements for Irish Road
Projects**

Richard Douthwaite

**The Treatment of Material Assets (Property) in Environmental Impact Statements
in Ireland**

Lorcan Sirr

A Study of the Hydrological Sustainability of the Roads Programme in Ireland

Orla Sweeney, Dr. Paul Johnston

Sustainability Assessment and Transport Policy

Brian Guckian

**Evaluation of handling of Air and Climate issues at the policy/programme level of
road infrastructure investment.**

David Healy

Assessment of Processes for National Roads Programme

Ian Lumley

Sustainability Assessment of Land Use and Transport Planning in Ireland

Ian Lumley