

STRIVE

Report Series No.90

Integrated Biodiversity Impact Assessment Streamlining AA, SEA and EIA Processes Best Practice Guidance

STRIVE

Environmental Protection
Agency Programme

2007-2013

Environmental Protection Agency

The Environmental Protection Agency (EPA) is a statutory body responsible for protecting the environment in Ireland. We regulate and police activities that might otherwise cause pollution. We ensure there is solid information on environmental trends so that necessary actions are taken. Our priorities are protecting the Irish environment and ensuring that development is sustainable.

The EPA is an independent public body established in July 1993 under the Environmental Protection Agency Act, 1992. Its sponsor in Government is the Department of the Environment, Community and Local Government.

OUR RESPONSIBILITIES

LICENSING

We license the following to ensure that their emissions do not endanger human health or harm the environment:

- waste facilities (e.g., landfills, incinerators, waste transfer stations);
- large scale industrial activities (e.g., pharmaceutical manufacturing, cement manufacturing, power plants);
- intensive agriculture;
- the contained use and controlled release of Genetically Modified Organisms (GMOs);
- large petrol storage facilities;
- waste water discharges.

NATIONAL ENVIRONMENTAL ENFORCEMENT

- Conducting over 2,000 audits and inspections of EPA licensed facilities every year.
- Overseeing local authorities' environmental protection responsibilities in the areas of - air, noise, waste, waste-water and water quality.
- Working with local authorities and the Gardaí to stamp out illegal waste activity by co-ordinating a national enforcement network, targeting offenders, conducting investigations and overseeing remediation.
- Prosecuting those who flout environmental law and damage the environment as a result of their actions.

MONITORING, ANALYSING AND REPORTING ON THE ENVIRONMENT

- Monitoring air quality and the quality of rivers, lakes, tidal waters and ground waters; measuring water levels and river flows.
- Independent reporting to inform decision making by national and local government.

REGULATING IRELAND'S GREENHOUSE GAS EMISSIONS

- Quantifying Ireland's emissions of greenhouse gases in the context of our Kyoto commitments.
- Implementing the Emissions Trading Directive, involving over 100 companies who are major generators of carbon dioxide in Ireland.

ENVIRONMENTAL RESEARCH AND DEVELOPMENT

- Co-ordinating research on environmental issues (including air and water quality, climate change, biodiversity, environmental technologies).

STRATEGIC ENVIRONMENTAL ASSESSMENT

- Assessing the impact of plans and programmes on the Irish environment (such as waste management and development plans).

ENVIRONMENTAL PLANNING, EDUCATION AND GUIDANCE

- Providing guidance to the public and to industry on various environmental topics (including licence applications, waste prevention and environmental regulations).
- Generating greater environmental awareness (through environmental television programmes and primary and secondary schools' resource packs).

PROACTIVE WASTE MANAGEMENT

- Promoting waste prevention and minimisation projects through the co-ordination of the National Waste Prevention Programme, including input into the implementation of Producer Responsibility Initiatives.
- Enforcing Regulations such as Waste Electrical and Electronic Equipment (WEEE) and Restriction of Hazardous Substances (RoHS) and substances that deplete the ozone layer.
- Developing a National Hazardous Waste Management Plan to prevent and manage hazardous waste.

MANAGEMENT AND STRUCTURE OF THE EPA

The organisation is managed by a full time Board, consisting of a Director General and four Directors.

The work of the EPA is carried out across four offices:

- Office of Climate, Licensing and Resource Use
- Office of Environmental Enforcement
- Office of Environmental Assessment
- Office of Communications and Corporate Services

The EPA is assisted by an Advisory Committee of twelve members who meet several times a year to discuss issues of concern and offer advice to the Board.

An Ghníomhaireacht um Chaomhnú Comhshaoil

Is í an Ghníomhaireacht um Chaomhnú Comhshaoil (EPA) comhlachta reachtúil a chosnaíonn an comhshaol do mhuintir na tíre go léir. Rialaímid agus déanaimid maoirsiú ar ghníomhaíochtaí a d'fhéadfadh truailliú a chruthú murach sin. Cinntímid go bhfuil eolas cruinn ann ar threochtaí comhshaoil ionas go nglactar aon chéim is gá. Is iad na príomh-nithe a bhfuilimid gníomhach leo ná comhshaol na hÉireann a chosaint agus cinntiú go bhfuil forbairt inbhuanaithe.

Is comhlacht poiblí neamhspleách í an Ghníomhaireacht um Chaomhnú Comhshaoil (EPA) a bunaíodh i mí Iúil 1993 faoin Acht fán nGníomhaireacht um Chaomhnú Comhshaoil 1992. Ó thaobh an Rialtais, is í an Roinn Comhshaoil, Pobal agus Rialtais Áitiúil.

ÁR bhFREAGRACHTAÍ

CEADÚNÚ

Bíonn ceadúnais á n-eisiúint againn i gcomhair na nithe seo a leanas chun a chinntiú nach mbíonn astuithe uathu ag cur sláinte an phobail ná an comhshaol i mbaol:

- áiseanna dramhaíola (m.sh., líonadh talún, loisceoirí, stáisiúin aistrithe dramhaíola);
- gníomhaíochtaí tionsclaíocha ar scála mór (m.sh., déantúsaíocht cógaisíochta, déantúsaíocht stroighne, stáisiúin chumhachta);
- diantalmhaíocht;
- úsáid faoi shrian agus scaoileadh smachtaithe Orgánach Géinathraithe (GMO);
- mór-áiseanna stórais peitreal;
- scardadh dramhuisce.

FEIDHMIÚ COMHSHAOIL NÁISIÚNTA

- Stiúradh os cionn 2,000 iniúchadh agus cigireacht de áiseanna a fuair ceadúnas ón nGníomhaireacht gach bliain.
- Maoirsiú freagrachtaí cosanta comhshaoil údarás áitiúla thar sé earnáil - aer, fuaim, dramhaíl, dramhuisce agus caighdeán uisce.
- Obair le húdaráis áitiúla agus leis na Gardaí chun stop a chur le gníomhaíocht mhídhleathach dramhaíola trí chomhordú a dhéanamh ar líonra forfheidhmithe náisiúnta, díriú isteach ar chiontóirí, stiúradh fiosrúcháin agus maoirsiú leigheas na bhfadhbanna.
- An dlí a chur orthu siúd a bhriseann dlí comhshaoil agus a dhéanann dochar don chomhshaol mar thoradh ar a ngníomhaíochtaí.

MONATÓIREACHT, ANAILÍS AGUS TUAIRISCIÚ AR AN GCOMHSHAOL

- Monatóireacht ar chaighdeán aer agus caighdeáin aibhneacha, locha, uiscí taoide agus uiscí talaimh; leibhéil agus sruth aibhneacha a thomhas.
- Tuairisciú neamhspleách chun cabhrú le rialtais náisiúnta agus áitiúla cinntiú a dhéanamh.

RIALÚ ASTUITHE GÁIS CEAPTHA TEASA NA HÉIREANN

- Caimníochtú astuithe gáis ceaptha teasa na hÉireann i gcomhthéacs ár dtiomantas Kyoto.
- Cur i bhfeidhm na Treorach um Thrádáil Astuithe, a bhfuil baint aige le hos cionn 100 cuideachta atá ina mór-ghineadóirí dé-ocsaíd charbóin in Éirinn.

TAIGHDE AGUS FORBAIRT COMHSHAOIL

- Taighde ar shaincheisteanna comhshaoil a chomhordú (cosúil le caighdeán aer agus uisce, athrú aeráide, bithéagsúlacht, teicneolaíochtaí comhshaoil).

MEASÚNÚ STRAITÉISEACH COMHSHAOIL

- Ag déanamh measúnú ar thionchar phleananna agus chláracha ar chomhshaol na hÉireann (cosúil le pleananna bainistíochta dramhaíola agus forbartha).

PLEANÁIL, OIDEACHAS AGUS TREOIR CHOMHSHAOIL

- Treoir a thabhairt don phobal agus do thionscal ar cheisteanna comhshaoil éagsúla (m.sh., iarratais ar cheadúnais, seachaint dramhaíola agus rialacháin chomhshaoil).
- Eolas níos fearr ar an gcomhshaol a scaipeadh (trí cláracha teilifíse comhshaoil agus pacáistí acmhainne do bhunscoileanna agus do mheánscoileanna).

BAINISTÍOCHT DRAMHAÍOLA FHORGHNÍOMHACH

- Cur chun cinn seachaint agus laghdú dramhaíola trí chomhordú An Chláir Náisiúnta um Chosc Dramhaíola, lena n-áirítear cur i bhfeidhm na dTionscnamh Freagrachta Táirgeoirí.
- Cur i bhfeidhm Rialachán ar nós na treoracha maidir le Trealamh Leictreach agus Leictreonach Caite agus le Srianadh Substaintí Ghuaiseacha agus substaintí a dhéanann ídiú ar an gcrios ózóin.
- Plean Náisiúnta Bainistíochta um Dramhaíl Ghuaiseach a fhorbairt chun dramhaíl ghuaiseach a sheachaint agus a bhainistiú.

STRUCHTÚR NA GNÍOMHAIREACHTA

Bunaíodh an Ghníomhaireacht i 1993 chun comhshaol na hÉireann a chosaint. Tá an eagraíocht á bhainistiú ag Bord lánaimseartha, ar a bhfuil Príomhstíúrthóir agus ceithre Stíúrthóir.

Tá obair na Ghníomhaireachta ar siúl trí ceithre Oifig:

- An Oifig Aeráide, Ceadúnaithe agus Úsáide Acmhainní
- An Oifig um Fhorfheidhmiúchán Comhshaoil
- An Oifig um Measúnacht Comhshaoil
- An Oifig Cumarsáide agus Seirbhísí Corparáide

Tá Coiste Comhairleach ag an nGníomhaireacht le cabhrú léi. Tá dáréag ball air agus tagann siad le chéile cúpla uair in aghaidh na bliana le plé a dhéanamh ar cheisteanna ar ábhar imní iad agus le comhairle a thabhairt don Bhord.

EPA STRIVE Programme 2007-2013

INTEGRATED BIODIVERSITY IMPACT ASSESSMENT

STREAMLINING AA, SEA AND EIA PROCESSES

BEST PRACTICE GUIDANCE

2010-B-DS-4

STRIVE Report

*End of Project Report available for download on
<http://www.epa.ie/downloads/pubs/research/biodiversity/>*

Prepared for the Environmental Protection Agency

by

University College Dublin

Authors:

*Ainhoa González, Tamara Hochstrasser, John Fry, Paul Scott,
Peter Carvill, Mike Jones, Berna Grist*

ENVIRONMENTAL PROTECTION AGENCY

An Ghníomhaireacht um Chaomhnú Comhshaoil
PO Box 3000, Johnstown Castle, Co. Wexford, Ireland
Telephone: +353 53 916 0600 Fax: +353 53 916 0699
Email: info@epa.ie Website: www.epa.ie

DISCLAIMER

Although every effort has been made to ensure the accuracy of the material contained in this publication, complete accuracy cannot be guaranteed. Neither the Environmental Protection Agency nor the author(s) accept any responsibility whatsoever for loss or damage occasioned or claimed to have been occasioned, in part or in full, as a consequence of any person acting, or refraining from acting, as a result of a matter contained in this publication. All or part of this publication may be reproduced without further permission, provided the source is acknowledged.

The EPA STRIVE Programme addresses the need for research in Ireland to inform policymakers and other stakeholders on a range of questions in relation to environmental protection. These reports are intended as contributions to the necessary debate on the protection of the environment.

EPA STRIVE PROGRAMME 2007-2013

Published by the Environmental Protection Agency, Ireland

ISBN: 978-1-84095-441-8

Price: Free

TABLE OF CONTENTS

Disclaimer	ii
List of Figures, Tables and Boxes	vii
Acronyms	ix
Glossary	x
Acknowledgements	xiii

CHAPTER 1. INTRODUCTION

1.1. Purpose of this Guidance	1
1.2. Link to Other Guidance and Studies	2
1.3. Integrated Biodiversity Impact Assessment	3
1.3.1. Defining Biodiversity and Conservation Goals	3
1.3.2. Biodiversity Impact Assessment	3
1.3.3. Effectiveness in Biodiversity Impact Assessment	4
1.4. Legislative Framework for Biodiversity Impact Assessment	5
1.4.1. Commonalities and Divergences in the Requirements for Biodiversity Assessment	5
1.4.2. Opportunities for Integrated Biodiversity Impact Assessment	6
1.4.3. Challenges to Integrated Biodiversity Impact Assessment	7
1.4.4. Integrating Multiple Consent Processes	7
1.5. Objectives of IBIA	8
1.6. Spatial Data and Geographic Information Systems as Support Tools	8
1.7. Consultation with the National Parks and Wildlife Service	9

CHAPTER 2. METHODOLOGICAL FRAMEWORK

2.1. SEA/EIA Screening and Scoping & AA Stage One (Screening)	10
2.1.1. Procedural Considerations	10
2.1.2. Integration of Legislative Requirements	12
2.1.3. Geographical Scope and Assessment Detail	13
2.1.4. Data Sources	14
2.1.5. GIS-supported Methodology: Approaches and Techniques	14
2.1.6. Consultation and Participation	16
2.1.7. Current Practice Issues and Actions	17

2.2. SEA/EIA Baseline Environment & AA Stage One (Screening: Qualifying Interests)	19
2.2.1. Procedural Considerations	19
2.2.2. Integration of Legislative Requirements	20
2.2.3. Geographical Scope and Assessment Detail	21
2.2.4. Data Sources	21
2.2.5. GIS-supported Methodology: Approaches and Techniques	23
2.2.6. Consultation and Communication	25
2.2.7. Current Practice Issues and Actions	25
2.3. SEA/EIA Definition of Alternatives & AA Stage Three (Ecological Solutions)	27
2.3.1. Procedural Considerations	27
2.3.2. Integration of Legislative Requirements	28
2.3.3. Geographical Scope, Supporting Data and Consultation	29
2.3.4. Current Practice Issues and Actions	30
2.4. SEA/EIA Assessment of Impacts & AA Stage Two (Appropriate Assessment)	30
2.4.1. Procedural Considerations	30
2.4.2. Integration of Legislative Requirements	32
2.4.3. Geographical Scope and Assessment Detail	32
2.4.4. Data Sources	33
2.4.5. GIS-supported Methodology: Approaches and Techniques	34
2.4.6. Consultation and Communication	36
2.4.7. Current Practice Issues and Actions	36
2.5. SEA/EIA Mitigation and Monitoring & AA Mitigation	37
2.5.1. Procedural Considerations	37
2.5.2. Integration of Legislative Requirements	39
2.5.3. Geographical Scope, Supporting Data and Consultation	39
2.5.4. Current Practice Issues and Actions	41
2.6. Reporting	42
2.6.1. Integrated Biodiversity Impact Assessment Reporting	42
2.6.2. Data Creation and Dissemination	43
2.6.3. Metadata	44
2.7. Strategic Recommendations	46
2.8. Next Steps	47

CHAPTER 3. Step-by-Step IBIA Guidance

3.1. Step-by-step Overall Recommendations	48
3.2. Screening and Scoping	51
3.2.1. Methodological steps	51
3.2.2. Data Gathering, Creation and Manipulation	52
3.2.3. Application of GIS Methods and Techniques	53
3.2.4. Communication, Consultation and Public Involvement	53
3.3. Baseline	54
3.3.1. Methodological steps	54
3.3.2. Data Gathering, Creation and Manipulation	55
3.3.3. Application of GIS Methods and Techniques	56
3.3.4. Communication, Consultation and Public Involvement	57
3.4. Alternatives	57
3.4.1. Methodological steps	57
3.4.2. Data Gathering, Creation and Manipulation	58
3.4.3. Application of GIS Methods and Techniques	59
3.4.4. Communication, Consultation and Public Involvement	59
3.5. Impact Assessment	60
3.5.1. Methodological steps	60
3.5.2. Data Gathering, Creation and Manipulation	61
3.5.3. Application of GIS Methods and Techniques	61
3.5.4. Communication, Consultation and Public Involvement	62
3.6. Mitigation Measures and Monitoring	63
3.6.1. Methodological steps	63
3.6.2. Data Gathering, Creation and Manipulation	63
3.6.3. Application of GIS Methods and Techniques	64
3.6.4. Communication, Consultation and Public Involvement	65
3.7. Reporting	65
3.7.1. Methodological steps	65
3.7.2. Data Gathering, Creation and Manipulation	66

3.7.3. Application of GIS Methods and Techniques	67
3.7.4. Communication, Consultation and Public Involvement	67
APPENDIX A – Part 1: Biodiversity Datasets Available in Ireland	69
APPENDIX A – Part 2: Biodiversity-related Research Projects in Ireland	84
APPENDIX B: Application of Spatial Data and GIS Diagram	85
APPENDIX C: IBIA Indicators	86
APPENDIX D: IBIA Review Package	91
APPENDIX E: IBIA Project Input into the Birds and Natural Habitats Regulations 2011	97
References and Bibliography	99

LIST OF TABLES, FIGURES AND BOXES

FIGURES

Figure 1.1. Focus of the IBIA Guidance.	2
Figure 1.2. Components of biodiversity.	4
Figure 1.3. Comparison of main legal and procedural differences between SEA, EIA and AA.	6
Figure 1.4. Integrating biodiversity impact assessment processes for AA, SEA and EIA.	8
Figure 2.1. Correlating methodological steps and interactions between AA, SEA and EIA.	11
Figure 2.2. Existing linkages between legislative instruments at screening/scoping.	12
Figure 2.3. Sample maps of Natura 2000 sites within 5/10/15 km buffer for Athy.	15
Figure 2.4. Sample maps of Natura 2000 sites within 5/10/15 km buffer for N. Tipperary.	16
Figure 2.5. Existing linkages between legislative instruments at baseline.	20
Figure 2.6. Samples of thematic GIS mapping: Natura 2000 sites & habitat mapping.	24
Figure 2.7. Sample of weighted overlay GIS mapping: composite ecological sensitivity.	24
Figure 2.8. Existing linkages between legislative instruments at definition of alternatives.	28
Figure 2.9. Existing linkages between legislative instruments at impact assessment.	31
Figure 2.10. Existing linkages between legislative instruments at mitigation & monitoring.	38
Figure 3.1. Flowchart diagram illustrating overall recommendations.	50
Figure 3.2. Flowchart guide for integrating AA screening and SEA/EIA screening /scoping.	51
Figure 3.3. Flowchart guide for data gathering and creation during screening and scoping.	52
Figure 3.4. Flowchart on assessment techniques during screening and scoping.	53
Figure 3.5. Flowchart guide for consultation during screening and scoping.	54
Figure 3.6. Flowchart guide for integrating AA screening and SEA/EIA baseline.	55
Figure 3.7. Flowchart guide for data gathering and creation during baseline.	56
Figure 3.8. Flowchart on the application of spatial approaches during baseline.	56
Figure 3.9. Flowchart guide for communication during baseline.	57
Figure 3.10. Flowchart guide for integrating AA Stage 2 and alternatives in SEA/EIA.	58
Figure 3.11. Flowchart guide for data use and creation during definition of alternatives.	59
Figure 3.12. Flowchart on the application of spatial approaches during alternatives.	59
Figure 3.13. Flowchart guide for communication during the definition of alternatives.	60
Figure 3.14. Flowchart guide for integrating AA Stage 2 and impact assessment in SEA/EIA.	60
Figure 3.15. Flowchart guide for data use and manipulation during impact assessment.	61
Figure 3.16. Flowchart on the application of spatial approaches for impact assessment.	62
Figure 3.17. Flowchart guide for communication during impact assessment.	62
Figure 3.18. Flowchart guide for integrating AA Stage 2 & SEA/EIA mitigation/monitoring.	63
Figure 3.19. Flowchart guide for data use and manipulation during mitigation/monitoring.	64
Figure 3.20. Flowchart on the application of spatial approaches for mitigation/monitoring.	64

Figure 3.21. Flowchart guide for communication when defining mitigation and monitoring.	65
Figure 3.22. Flowchart guide for integrating AA and SEA/EIA results when reporting.	66
Figure 3.23. Flowchart guide for data use and manipulation during reporting.	66
Figure 3.24. Flowchart on the application of spatial approaches for reporting.	67
Figure 3.25. Flowchart guide for communication during reporting.	67

TABLES

Table 2.1. Spatial biodiversity datasets commonly available in the EU.	22
Table 2.2. Reporting Checklist.	43
Table 2.3. Minimum set of parameters to be provided when creating metadata.	45

BOXES

Box 1. Case Study: Clare County Council - North, South, East and West Local Area Plans	29
Box 2. Case Study: 2030 Vision – Transport Strategy for the Greater Dublin Area	34
Box 3. Case Study Example: Globio-Clue Decision Support Tool	35
Box 4. Case Study: Lee Catchment Flood Risk Assessment and Management Study	40

ACRONYMS

AA	Appropriate Assessment
ABP	An Bord Pleanála
BAP	Biodiversity Action Plan
CEC	Commission of the European Communities
CFRAMS	Catchment Flood Risk Assessment and Management Study
Co. Co.	County Council
CORINE	CoORdinate INformation on the Environment
DAFF	Department of Agriculture, Fisheries and Food
DAHG	Department of Arts, Heritage and the Gaeltacht
DCENR	Department of Communications Energy and Natural Resources
DECLG	Department of Environment, Community and Local Government
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
ELD	Environmental Liability Directive
EPA	Environmental Protection Agency
EU	European Union
FRD	Flood Risk Directive
GBIF	Global Biodiversity Information Facility
GIS	Geographic Information Systems
GMO	Genetically Modified Organism
GNSS	Global Navigation Satellite Systems
GPS	Global Positioning Systems
GSI	Geological Survey of Ireland
HC	The Heritage Council
IBIA	Integrated Biodiversity Impact Assessment
INSPIRE	INfrastructure for SPatial Information in the European Community
IROPI	Imperative Reasons of Overriding Public Interest
ISO	International Standards Organisation
MIDA	Marine Irish Digital Atlas
NBDC	National Biodiversity Data Centre
NBP	National Biodiversity Plan
NHA	Natural Heritage Areas
NIS	Natura Impact Statement
NIR	Natura Impact Report
NPWS	National Parks and Wildlife Service
NTA	National Transport Authority
OPW	Office of Public Works
OSI	Ordnance Survey Ireland
pNHA	Proposed Natural Heritage Areas
RBD	River Basin District
SAC	Special Areas of Conservation
SEA ER	Strategic Environmental Assessment Environmental Report
SEA	Strategic Environmental Assessment
SEO	Strategic Environmental Objectives
SI	Statutory Instrument
SPA	Special Protection Areas
WFD	Water Framework Directive

GLOSSARY

Alternatives	Options for accommodating the future development needs of an area within the constraints imposed by intrinsic environmental conditions.
Appropriate Assessment	Assessment of the likely significant effects of a plan, programme or project on a European site in view of its conservation objectives. The assessment is underpinned by the precautionary principle, whereby a proposal cannot be granted permission if significant impacts are anticipated or cannot be ruled out. It entails the preparation of a Natura Impact Report (for plans/programmes) or Natura Impact Statement (for projects).
Biodiversity Impact Assessment	Assessment of the potential implications of a plan, programme or project for biodiversity undertaken to ensure that it conserves biodiversity, results in sustainable use of biodiversity resources, it is legally compliant and provides fair and equitable sharing of the benefits arising from use of biodiversity. It is commonly referred to
Conservation Objectives	They refer to the maintenance at favourable status or restoration to such favourable status of the habitat and species for which a site has been designated as a European site.
Cumulative Effect	Incremental effects resulting from a combination of two or more individual effects, or from an interaction between individual effects – which may lead to a synergistic effect (i.e. greater than the sum of individual effects), or any progressive effect likely to emerge over time.
Designated	In the context of this guidance and in recognition of common usage, and unless otherwise specified, the term ‘designated’ is used to refer to international sites (e.g. Ramsar, Biosphere Reserve), European sites (i.e. SACs and SPAs) and national sites (e.g. NHA, Nature Reserve, National Parks) that are legally designated or are going through the process of designation.
Ecological Impact Assessment	Process of identifying, quantifying and evaluating the potential impacts of defined actions on ecosystems or their components. It can be carried out as part of a formal EIA/SEA or to support other forms of environmental assessment or appraisal.
Environmental Impact Assessment	Assessment of the effects of certain projects on the environment. It entails the preparation of an Environmental Impact Statement to inform decision-making.
European Site	In the context of this guidance, and unless otherwise specified, the term ‘European site’ is used interchangeably with Natura 2000 site (see also Natura 2000 network below).
Global Biodiversity Information Facility	Organisation that encourages free and open access to biodiversity data, and facilitates the mobilization, access, discovery and use of information about the occurrence of organisms over time and across the planet (www.gbif.org).
Geographic Information Systems	Array of technological tools for the management, analysis and display of spatial data which can provide evidence-based information to support biodiversity impact assessment.

In-combination Effects	Incremental effects resulting from a combination of two or more plans and/or projects, an assessment requirement under the Habitats Directive. For the purpose of this guidance, and unless otherwise specified, the term ‘in-combination effect’ is used interchangeable with cumulative effect.
Indicators	Data that provide information about more than itself (i.e. about the overall status of a specific biodiversity or the environment parameter).
INSPIRE Directive	Establishes an infrastructure for spatial information in Europe to support Community environmental policies, and policies or activities which may have an impact on the environment (http://inspire.jrc.ec.europa.eu/).
Integrated Biodiversity Impact Assessment	Practical and consistent framework for biodiversity impact assessment that integrates SEA requirements with AA for plans and programmes and EIA with AA for projects. The framework is envisaged to: amalgamate assessment processes and coordinate efforts; promote best practice; optimise time and resources; reduce/avoid duplication of efforts by improving communication channels and data sharing; enhance the congruence and efficiency of legal, administrative and operational processes; and achieve best results for the protection and conservation of biodiversity.
Intervention	In the context of this guidance, and unless otherwise specified, the term ‘intervention’ is used to refer to any plan/programme policy, objective or action, as well as to any specific development at project level.
Metadata	Information identifying, locating and describing the characteristics of spatial datasets, to facilitate cataloguing and accessing them, as well as establishing their fitness for use (i.e. quality) and their fitness for purpose (i.e. usability).
Mitigation Measures	Measures envisaged to prevent, reduce and, as fully as possible, offset any significant adverse impacts on biodiversity (and other environment components) of implementing a plan/programme or project.
Monitoring	The periodic or continuous observation of biodiversity indicators and of other parameters that may affect biodiversity for any changes that may occur over time, so as to confirm predictions made with respect to likely effects and identify adverse changes that may require remedial action.
Natura 2000 Network	EU-wide network of nature protection areas established under the 1992 Habitats Directive. The aim of the network is to assure the long-term survival of Europe’s most valuable and threatened species and habitats. It includes Special Areas of Conservation and Special Protection Areas.
Non-designated	In the context of this guidance and in recognition of common usage, the term ‘non-designated’ is used to refer to biodiversity-relevant areas or areas of ecological interest that are not designated.
Proponent	In the context of this guidance, and unless otherwise specified, the term ‘proponent’ is used to refer to either the planning team in charge of drafting the plan/programme or the project promoter. The planning team may comprise/act on behalf of an authority or other, or may act on behalf of a project promoter.
Proposal	In the context of this guidance, and unless otherwise specified, the term ‘proposal’ is used to encompass any and all of plan/programme/project.

Note that plan/programmes refer to SEA, while projects relate with EIA. In the context of AA, Article 6(3) refers to plans and projects only, programmes and collection of projects being embedded within the term 'plans'.

Proxy Data	Data that substitutes or act as a proxy to the relevant data when these do not exist or have not been gathered.
Qualifying Interests	Habitats and species of interest, under the Birds and Habitats Directives, that establish the reason/s for designating a site or making a site candidate for designation as an SAC or SPA.
Spatial Data	Field observations/measurements linked to a location, also known as geographic information or geospatial data.
Screening	Determination of the need for an environmental assessment (under the SEA and EIA Directives) or Appropriate Assessment (under the Habitats Directive).
Spatial Analysis	Analytical techniques associated with the study of locations of geographic phenomena, their spatial dimensions and their associated attributes.
Strategic Environmental Assessment	Assessment of the effects of certain plans and programmes (and, in some jurisdictions, policies) on the environment. It presents a structured and participative process containing a set of tools to assist in the integration of environmental considerations and promote informed decision-making at plan/programme level.
Transboundary	In impact assessment, it refers to any potential environmental effects that may occur across administrative boundaries, such as townlands, counties or national, and commonly refers to transboundary resources (e.g. protected areas or waterbodies shared by two or more jurisdictions).
Zone of Influence	A zone of influence of a proposal is the potential geographic area that could be affected by the implementation of such proposal. Governmental guidance recommends consideration of an ex-situ 15 km buffer area for Natura 2000 sites around the proposal boundary. Nevertheless, the zone of influence should be regarded to have flexible boundaries which may change during the assessment: more extensive areas may be considered where there are hydrological connections or smaller areas may suffice at project level.

Acknowledgements

The authors wish to give special thanks to the Environmental Protection Agency for funding this project and promoting more effective and holistic ways to undertake biodiversity impact assessment. Many thanks to the members of the steering committee for their time, support, advice and valuable comments: Tadhg O'Mahony, Scientific Officer at the EPA's Strategic Environmental Assessment Unit; Niamh Connolly, Environmental Research Officer at the EPA; and Cliona O'Brian, Wildlife Officer at the Heritage Council.

Thanks also to the national and international reviewers (in alphabetical order):

Bernie Guest (Heritage/SEA Officer, Waterford County Council)

Bill Sheate (Associate with Collingwood Environmental Planning and Reader at Imperial College London)

Cian O'Mahony (Scientific Officer, EPA)

Elaine Bennett (Ecologist and Programme Officer, EirGrid)

Fiona Rice (Policy and Advice Manager, Scottish Natural Heritage)

Fiona Simpson (Head of SEA Unit, The Scottish Government)

Julie Fossitt (Divisional Ecologist, NPWS)

Karl Fuller (Principal Environmental Project Manager, Environment Agency UK)

Kelly Kasperczyk (Consultant, Jacobs Engineering)

Linda Patton (Divisional Ecologist, NPWS)

Nicola Foley (SEA Research Assistant, EPA)

Riki Therivel (Partner of Levett-Therivel Sustainability Consultants and Visiting Professor at Oxford Brookes University)

Shane Casey (Biodiversity Officer, Clare County Council)

Their submissions on the consultation draft of this IBIA Guidance have provided detailed and valuable comments that have contributed to its betterment.

Many thanks to the members of International Association for Impact Assessment that responded to the IBIA questionnaire, as well as to all the participants of the IBIA national workshop held in Dublin on the 7th of October 2011.

CHAPTER 1. INTRODUCTION

1.1. Purpose of this Guidance

The purpose of this report is to provide guidance on ***how best to integrate the methodological processes for Appropriate Assessment (AA)*** under the Habitats Directive (CEC, 1992)¹ and other environmental assessment, including both the ***Strategic Environmental Assessment*** – SEA Directive (CEC, 2001)² ***and Environmental Impact Assessment*** – EIA Directive (CEC, 1985)³, as amended, with regards to biodiversity impact assessment. Where relevant, reference is also made to the requirements of the Water Framework Directive – WFD (CEC, 2000)⁴, the Flood Risk Directive – FRD (CEC, 2007a)⁵ and the Environmental Liability Directive – ELD (CEC, 2004)⁶. It is not intended as an interpretation of the law and does not represent a legally binding document.

The guidance sets out a methodological approach to Integrated Biodiversity Impact Assessment (IBIA) that aims at ***integrating SEA with AA at plan/programme level, and EIA with AA at project level***. It is intended to ***inform practitioners, plan/project proponents and consent authorities in integrating the requirements for biodiversity impact assessment*** as part of SEA, EIA and AA. It is not the purpose of this guidance to develop a new assessment process with discrete biodiversity impact assessment outputs. The purpose of IBIA is rather to ensure that the relevant processes required under the different EU directives and national law connect effectively and efficiently in order to provide a holistic approach to biodiversity impact assessment, optimise time and resources, and avoid unnecessary duplication of efforts (sections 1.4.2, 1.4.4, 1.5 and 2.8). It should not be seen as a replacement of existing procedures but rather as a framework for coordinating them. Similarly, it should not be seen as a mechanism to promote the application of rigid methods and suppress the development of flexible and context-relevant approaches. Its objective is to inform the scope and outcomes of the different processes in a timely manner and encourage best practice. In this context, a thorough review of current practice has been undertaken in chapter 2 to highlight critical issues in current SEA/EIA and AA practice and opportunities for integration. The identification of commonalities and divergences between SEA/EIA and AA procedures, as well as the identification of best practice for data collation, GIS applications and consultation have contributed to the development of the step-by-step recommendations provided in chapter 3. Therefore, ***end-users with sufficient knowledge on SEA/EIA and AA should directly refer to chapter 3***. In all cases, note that these recommendations reflect current best practice but are not intended as statutory requirements.

Given that the large majority of SEAs prepared in the Republic of Ireland relate to land-use planning and that EIAs commonly deal with onshore transport, industry, infrastructural and housing developments, the ***guidance makes particular reference to spatial planning***, but it is equally applicable to other onshore and offshore plans, programmes and projects, including river basin management plans associated with the WFD.

The guidance acknowledges the variability in the legislative time-frames allocated to the drafting, consultation and approval of plans, programmes and projects. In this context, it is proposed that the guidance be piloted (under strict terms of reference to ensure reporting of process integration) to ascertain its applicability and highlight any procedural steps where timing or resource constraints may act as barriers to its effective implementation.

¹ Transposed into Irish law by the European Communities (Birds and Natural Habitats) Regulations, Statutory Instrument (SI) No. 477 of 2011. Refer to Appendix E for details on the input of this project to the drafting of the new Regulations.

² Transposed into Irish law under the Planning and Development Act and Regulations – SEA Regulations: SI No. 200 and 201 of 2011 (amendment).

³ Transposed into Irish law under the Planning and Development Act and Regulations – EIA Regulations: SI No. 659 of 2006.

⁴ Transposed into Irish law by the European Communities (Water Policy) Regulations, SI No. 722 of 2003.

⁵ Transposed into Irish law by the European Communities (Assessment and Management of Flood Risk) Regulations, SI No. 122 of 2010.

⁶ Transposed into Irish law by the European Communities (Environmental Liability) Regulations, SI No. 547 of 2008.

1.2. Link to Other Guidance and Studies

This guidance supports the integrated implementation of the Habitats Directive and the SEA Directive, as well as the Habitats Directive and the EIA Directive, supported by a GIS framework (Figure 1.1), and draws upon the WFD, FRD and ELD, as well as the INSPIRE Directive (CEC, 2007). Specific guidance exists in Ireland for each of these processes and legislative requirements and, therefore, this guidance should be used in conjunction with the following national guidance:

- Good Practice Guidance: Cumulative Effects Assessment in SEA and AA (EPA, 2012);
- Appropriate Assessment of Plans and Projects in Ireland Guidance for Planning Authorities (DEHLG, 2009a);
- Implementation of SEA Directive 2001/42/EC: Assessment of the Effects of Certain Plans and Programmes on the Environment – Guidelines for Regional Authorities and Planning Authorities (DEHLG, 2004);
- Synthesis Report on the Development of Strategic Environmental Assessment Methodologies for Plans and Programmes in Ireland (EPA, 2003);
- SEA Process Checklist (EPA, consultation draft, 2008);
- Guidelines on the Information to be Contained in EIS (EPA; 2002);
- Advice Notes on Current Practice in the Preparation of EIS (EPA, 2003);
- The Planning System and Flood Risk Management – Guidelines for Planning Authorities (DEHLG, 2009b);
- GISEA Manual (EPA, consultation draft, 2009); and
- Future guidelines and guidance to be issued by the relevant Government Departments and agencies of the State.

Other relevant international guidance should also be consulted for specific aspects, such as the 'Methodological Guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC' (EC, 2002) which contains assessment worksheets, the 'Voluntary Guidelines for Biodiversity-Inclusive Impact Assessment' (CBD, 2006) which includes best practice case studies, or the 'Guidelines for Ecological Impact Assessment in the UK' (IEEM, 2006) which provides guidance on how to assign values to ecological features and resources, and how to evaluate and determine the significance of impacts in ecological impact assessment.

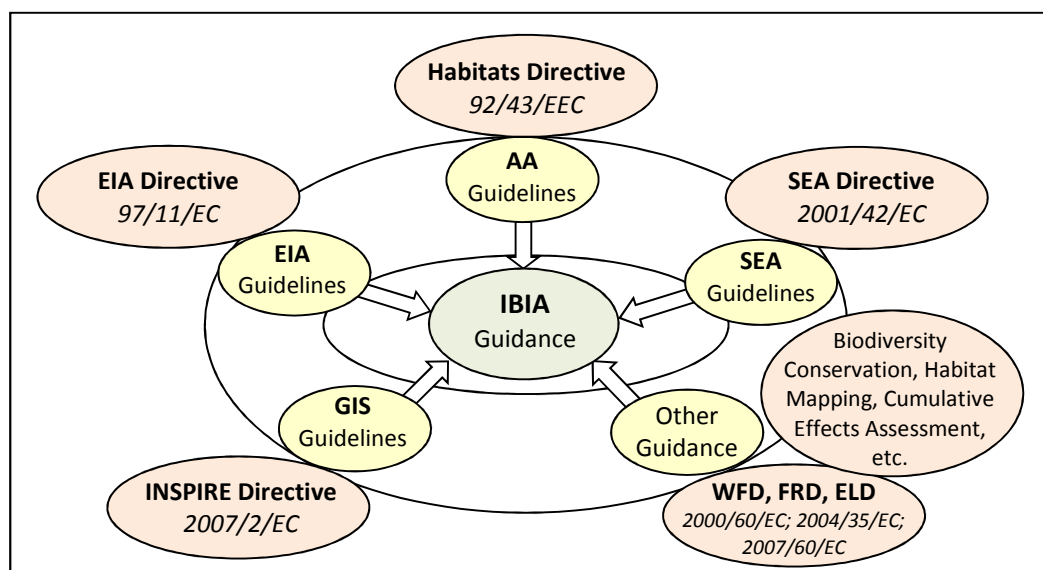


Figure 1.1. The IBIA Guidance focuses on addressing the effective integration of existing procedures for biodiversity impact assessment, supported by a GIS framework. In the light of this, it should be read in conjunction with other relevant guidelines, advice notes and guidance.

1.3. Integrated Biodiversity Impact Assessment

1.3.1. Defining Biodiversity and Conservation Goals

Biodiversity, as defined by the 1992 Convention on Biological Diversity, refers to the variability among living organisms from all sources including, *inter alia*, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part: this includes diversity within species, between species and of ecosystems.

In the context of sustainability, biodiversity conservation is the core goal on which the socio-economic sustainability goals (such as ecosystem services, food security, environmental quality and human wellbeing) depend. There is global concern about biodiversity losses caused by human development (resulting in habitat loss or damage) and climate change (resulting in changes in environmental conditions). In this context, the Convention on Biological Diversity defined three key objectives: 1) to conserve biodiversity; 2) to enhance its sustainable use; and 3) to ensure an equitable sharing of benefits linked to the exploitation of genetic resources. In an island-ecology such as Ireland's, the emphasis is on halting biodiversity loss and enhancing the status of native species, while being watchful for, and as far as practicable, excluding, controlling or eradicating invasive non-native species and/or genes.

1.3.2. Biodiversity Impact Assessment

Biodiversity impact assessment can be defined as a decision-support tool to help biodiversity-inclusive development planning and implementation. It aims at ensuring that development proposals integrate biodiversity considerations and are legally compliant, and include mechanisms for the conservation of biodiversity (with the aim of no net loss of biodiversity), result in sustainable use of biodiversity resources, and provide fair and equitable sharing of the benefits arising from use of biodiversity.

The meaning of the term “biodiversity”, in the context of biodiversity impact assessment, is determined by the legal parameters of national and international law regarding impact assessment. There are three dimensions to this definition, entailing an assessment of the potential impacts on: a) quality of the physical environment needed to sustain ecosystems and the species that they support; b) species that form natural elements of indigenous biodiversity; and c) habitat types, comprising the different physical characteristics of the environment (e.g. hydrological regime) and the different interdependent associations of species of organisms that spend all or part of their life-cycles there.

The overall objective of the biodiversity assessment is to optimise the biodiversity outcome of plan, programme or project development. In order to achieve this, the proposal in question needs to be informed by the current state of biodiversity and the potential assets derived from biodiversity in the area. Provided that the necessary knowledge base on the current state of biodiversity in the area exists the assessment can then predict potential impacts of the proposal on biodiversity, which in turn allows for its revision in order to minimize impacts on biodiversity and/or realize opportunities; the overall objective being no net biodiversity loss.



1.3.3. Effectiveness in Biodiversity Impact Assessment

Biodiversity impact assessment processes need to take into consideration several aspects:

- Fulfillment of legal requirements (Section 1.4);
- Effective integration, communication and access to scientific knowledge; and
- Integration of biodiversity aspects with a variety of other concerns during the planning process.

Effective integration and communication of scientific knowledge on the current state of biodiversity is at the base of every biodiversity impact assessment process. For the assessment to be effective, adequate information and necessary expertise to derive and communicate this information must be available. All practitioners contributing to formalised impact assessment processes need to be more than just subject specialists and have an understanding of issues outside biodiversity (e.g. planning, hydrogeology, etc.) and of how other issues interact with biodiversity. Assessors must understand the proposal, and in order to evaluate whether or not such proposal should move forward in its current form they may also need to consult with the scientific community. In the case of IBIA, those questions should clarify the proposal (with the aim of improving it if possible), but should also allow for an effective inventory of biodiversity assets and the potential benefits that biodiversity can represent as part of the common wealth.

Effective integration of biodiversity aspects along with a variety of other concerns during the planning process depends on a clear understanding of the different aspects of biodiversity. Several aspects of biodiversity conservation have been or are being addressed from a policy perspective under a variety of environmental legislation (Figure 1.2). However, this does not mean that there is coherence in either the approach or the definitions being used, nor that this legislation is collectively comprehensive in identifying and addressing the full range of threats to biodiversity. Biodiversity inclusive assessment incorporates many dynamically different components of the environment, ranging from species through communities to habitats, and encompassing variability in numbers of individuals and species, genetic variability within population of varying sizes, and inter-related physical aspects supporting habitats. Therefore, an all-embracing definition of biodiversity can generate incompatible conservation objectives that defy assessment in a coherent fashion, particularly where different competent authorities and legislative requirements are operating in isolation. Moreover, there is generally a lack of comprehensive or even adequate scientific knowledge available in practice to explain the dynamic relationships between social and ecological systems and thus make a scientifically robust assessment of impacts in the time provided by statute for assessment. These issues can only be resolved through open dialogue pre-assessment or early-on in the assessment process between all stakeholders. The highly complex nature of balancing different interests during the assessment process should not lead to a simplification of issues, but to an informed prioritisation.

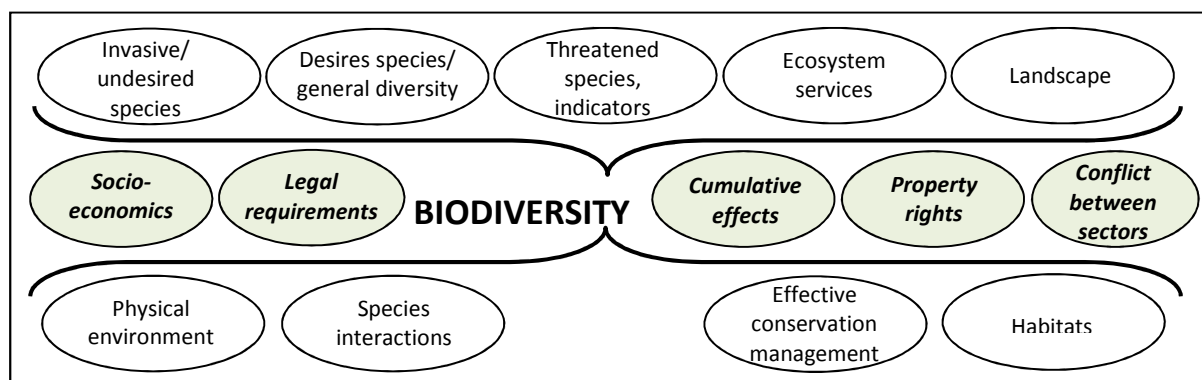


Figure 1.2: Components of biodiversity that are often addressed in a policy or planning context (top line) and elements of the environment necessary to maintain biodiversity (bottom line). The factors in the shaded ellipses are key aspects considered in the biodiversity impact assessment process.

1.4. Legislative Framework for Biodiversity Impact Assessment

In the EU legislative framework, biodiversity impact assessment issues arise under three key Directives, namely the Habitats Directive (CEC, 1992) and EIA and SEA Directives (CEC 1985; CEC, 2001) – see section 1.1 for details on their transposition into Irish law. The Habitats Directive subsumes assessment responsibility for the Birds Directive (CEC, 1979/2009) under the umbrella of European sites or Natura 2000 sites – which include Special Areas of Conservation (SACs) and Special Protection Areas (SPAs). In addition, Article 4 of the Birds Directive requires that efforts are made to protect bird habitats outside SPAs from pollution or deterioration; Article 10 of the Habitats Directive addresses the protection of landscape features which are of major importance for wild flora and fauna, and Articles 12-16 address specifically the protection of annexed species. Natural Heritage Areas (NHAs), designated at national level under the Wildlife Acts 1976-2000, together with flora protection orders and other international and national designations (e.g. Biosphere Reserves, Ramsar sites and National Parks) are also of consideration in the context of SEA and EIA.



Other provisions, notably the WFD (CEC, 2000), the FRD (CEC, 2007a) and the ELD (CEC, 2004) draw upon the Birds and Habitats Directives as far as biodiversity impact assessment issues go. Article 6.3 of the Habitats Directive requires 'appropriate assessment' of any plan, programme or project that is likely to have a significant effect upon the integrity of the habitats or species that fall under its provisions. This means that many plans, programmes and projects (including those associated with flood defences and river basin management, among others) will need to be assessed under the Habitats Directive in addition to their respective assessment requirements under the SEA or EIA Directives. Under the ELD, liabilities can arise in relation to

environmental damage on annexed habitats and species in circumstances where they are protected under the Birds and Habitats Directives, as well as in the wider countryside.

Within the context of spatial planning, the *principal* responsibility for SEA is given to planning authorities which prepare a variety of land use plans. This statutory assignation of responsibility reflects the fact that planning authorities prepare a greater variety of spatial plans than other sectors. An Bord Pleanála is required to give advice on EIA scoping, particularly for strategic infrastructure development, and is the competent authority for the Habitats Directive in respect of all strategic infrastructure projects. Both planning authorities and the Board have complementary responsibilities with regard to planning applications/appeals and to the substitute consent procedures introduced by the 2010 Planning Act.

1.4.1. Commonalities and Divergences in the Requirements for Biodiversity Assessment

Compared with SEA and EIA, AA is more specific and has a much narrower focus restricted to the impact of plans, programmes and projects on discrete European sites that form the Natura 2000 network, with specific attention to their qualifying interests, conservation objectives and site integrity (Figure 1.3). Any other features of biodiversity interest in the site that are not encompassed by the conservation objectives will not generally be a matter for consideration in an AA, even if they need to be addressed in either an SEA or EIA.

In contrast, SEA and EIA have a wide environmental focus. Under the SEA and EIA Directives, the assessment process commonly encompasses an evaluation of the quality and, where applicable, the protection status of fauna, flora, population, human health, soil, water, air, climatic factors, material assets, cultural heritage and landscape, as well as the assessment of any interactions (EIA) or inter-

relationship (SEA) between such factors (e.g. water quality and flora/fauna). The above list of environmental topics has been expanded in the SEA Directive by specific mention of 'biodiversity'. In addition, the EIA Directive requires specific consideration of Natura 2000 sites (Article 4(3) and Annex III). Therefore, both SEA and EIA assess potential impacts on habitats and species within designated and non-designated areas, examining the overall implications for biodiversity (including potential secondary impacts associated with changes in water, soil or climatic conditions, for example). Such assessments often take the form of ecological impact assessments. In many instances, information obtained in EIA or SEA is of importance in carrying out AA. SEA and EIA need also to address the Birds and Habitats Directives' requirements that are not covered by site-based AA processes, such as pollution or deterioration of landscape features which are of major importance for wild flora and fauna. It would also be prudent for SEA, and in particular, EIA, to assess potential liabilities that might arise under the ELD.

SEA	EIA	AA
Assessment of potential impacts of certain plans and programmes on the environment; informs decision-making	Assessment of potential impacts of certain projects on the environment; informs decision-making	Assessment of potential impacts of proposals on European sites; determines decision based on the precautionary principle
Potential short/long-term, direct/indirect, synergistic and cumulative effects on a range of environmental factors, including flora, fauna and biodiversity and their inter-relationship	Potential short/long-term, direct/indirect effects on a range of environmental receptors, including flora and fauna	Potential short/long-term, direct/indirect and in-combination effects on conservation interest, objectives and site integrity of the European sites only

Figure 1.3. Comparison of main legal and procedural differences between SEA, EIA and AA.

1.4.2. Opportunities for Integrated Biodiversity Impact Assessment

The SEA Directive, while not being prescriptive, clearly encourages integrated, or at least coordinated (i.e. simultaneous and harmonized), assessment. This possibility is raised in Article 5 paragraphs (2) and (3), and in particular, Article 11 paragraph (2) which states:

'For plans and programmes for which the obligation to carry out assessments of the effects on the environment arises simultaneously from this Directive and other Community legislation, Member States may provide for coordinated or joint procedures fulfilling the requirements of the relevant Community legislation in order, inter alia, to avoid duplication of assessment'.

In addition, the Commission's guidance (CEC, 2003) on SEA recognises the desirability, or indeed the necessity, of adopting a coordinated approach. This is of significant relevance to the Irish, and European, practice in the context of biodiversity impact assessment given the relationship and overlap in legislative and procedural requirements under AA, SEA and EIA. SEA and EIA, being of wider scope, have the potential to support the carrying out of AA by contributing information on, for example, hydrological and geophysical conditions and water quality, thus addressing other requirements of the Birds and Habitats Directives, and identifying liability risks under the ELD (CEC, 2004). SEA and EIA are likely to address those impacts *per se* and thereby, given the essential interrelationship between such impacts on the physical environment and impacts on biodiversity, provide information that will better inform the conclusions of AA. Similarly, important elements of assessing the broader impact of a proposal on biodiversity will be fulfilled by SEA or EIA, under the environmental topics defined in the relevant Directive. Therefore, an opportunity exists to integrate SEA with AA at plan/programme level and EIA with AA at project level, and thus provide a more holistic biodiversity impact assessment.

1.4.3. Challenges to Integrated Biodiversity Impact Assessment

The effective implementation of this IBIA methodology faces a number of challenges, particularly in relation to the practicalities of the process and the provision of appropriate evidence base. These challenges can be listed as follows:

- Current poor administrative and procedural integration of EU and national assessment requirements addressing biodiversity issues;
- Constraints on potential opportunities for biodiversity enhancement during development resulting from the minimalist conservation/protection approach of the assessment directives.
- Existing shortcomings in public consultation effectiveness;
- Discrepancies, lack of standards and accessibility issues with regards to biodiversity (spatial) data;
- Lack of complete and up-to-date fundamental biodiversity data for many parts of Ireland;
- Conservation objectives and site management plans are often incomplete or rudimentary;
- Inadequate range and availability of biodiversity and taxonomic expertise in Ireland and current limitations with regards to the optimum use of such expertise;
- The inconsistent quality of individual assessments; and
- The need for additional guidance to establish a minimum national standard for biodiversity data gathering and impact assessment.

1.4.4. Integrating Multiple Consent Processes

The principal legal obstacle to integrating biodiversity impact assessment is a twofold one. Firstly, the existence of multiple statutory consent processes that are legally stand-alone, and secondly, the separate legislative provisions for SEA/EIA and AA. To address multiple consent processes, provision is made in Birds and Habitats Regulation 42(21) to take into account any screening for AA or AA previously carried out by the first authority (e.g. planning authority) when considering giving consent to a project that has already been considered by another authority. The Regulations authorize the second consent authority (e.g. Commission for Energy Regulation in the context of windfarm developments) to seek such supplementary information as it considers it requires, rather than requiring a complete new screening for AA or Stage 2 AA. Although no statutory time limit exists on the validity of screening for AA or AA findings, if an extended period of time had lapsed between the screening/AA carried out by the first authority and the application to the second authority for its consent, the second authority would need to consider whether over that period changes had occurred that would need to be addressed in a second screening or AA.

A recent judgment of the Court of Justice of the EU against Ireland (Case C-50/09) is highly relevant in addressing how separate agencies of the State that have consent functions in relation to the same project need to coordinate their assessment. Although this case relates to EIA, its reasoning is clearly applicable to SEA and, in particular, AA. The essence of the position taken by the Court is that a competent authority cannot give consent based on a partial EIA, i.e. of selected aspects (e.g. planning aspects) of a project, ignoring other aspects because they are to be dealt with by another consent authority (in this case, the EPA). The reasoning of this judgment suggests that where a plan or project requires EIA or SEA or AA and is the subject of separate regulatory consents, an integrated assessment involving all of the competent authorities is not only desirable but may indeed be legally necessary to comply with the assessment requirements of the applicable directive. While the argument in support of the other strand of integration, i.e. between SEA/EIA and AA, is not expressly affected by the above judgment, that argument is strengthened by the requirement that different competent authorities should assess a project in an integrated manner to ensure that all relevant information is taken into account in addressing the requirements under each of the Directives. Moreover, the SEA and EIA Directives make provision for coordinated or joint procedures where appropriate in order to avoid duplication of assessments (e.g. recital 19 of the SEA Directive).

In seeking an integrative approach to biodiversity impact assessment, administrative procedures could be facilitated by enabling screening for AA to be undertaken by the proponent (i.e. the planning team or the project promoter), particularly in the planning context. In order to facilitate this, planning authorities and public organizations (e.g. Iarnród Éireann, National Roads Authority, Board Gais, Waterways Ireland, etc.) should appoint ecological expertise in-house. Moreover, and in order to ensure informed and robust screening for AA, local authorities could be assisted by either National Parks and Wildlife Service – NPWS rangers for addressing specific local issues or a centralized/regionalized pool of NPWS and other relevant expertise (e.g. EPA, OPW, River Basin Districts – RBDs), resources and information for larger and more strategic plans/programmes. Pre-screening guidelines could also be published for local authorities to facilitate screening out projects without requiring NPWS consultation.

1.5. Objectives of Integrated Biodiversity Impact Assessment

The IBIA methodology presented in this guidance document provides a practical framework for biodiversity impact assessment that integrates EU requirements for EIA and SEA, and Appropriate Assessment under the Habitats Directive, while taking into consideration other relevant legislative requirements for biodiversity protection and conservation under the WFD, FRD and ELD (Figure 1.4). The methodology has been envisaged to:

- Amalgamate assessment processes and coordinate efforts;
- Promote best practice in biodiversity impact assessment;
- Improve time and resource management in the assessment;
- Improve the effectiveness, efficiency and comprehensiveness of the assessment;
- Minimise duplication of efforts by optimising communication channels and data sharing;
- Enhance the congruence and efficiency of legal, administrative and operational procedures; and
- Achieve best results for the protection and conservation of biodiversity.

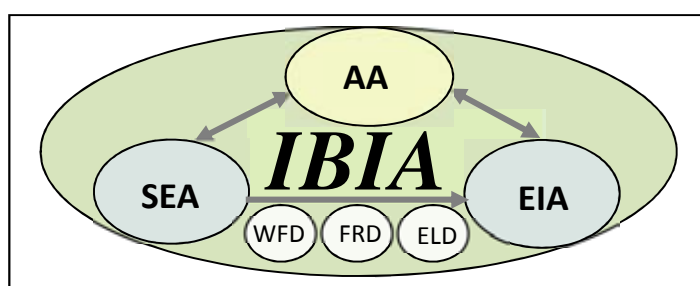


Figure 1.4. Integrating biodiversity impact assessment processes for AA, SEA and EIA, taking into consideration the legislative requirements of the WFD, FRD and ELD.

1.6. Spatial Data and Geographic Information Systems as Support Tools

Population growth, natural resource consumption and over-exploitation, climate change, land-use change (e.g. urbanisation), habitat removal, invasive species and environmental degradation represent the major threats to biodiversity. While these drivers are linked to site-specific activities and actions (commonly associated with spatial planning), and can lead to localised removal, disturbance and/or fragmentation of habitats and species, they are spatially interconnected. Their negative effects can potentially expand to adjacent areas by transport of pollution through air or water or by altering the hydrogeophysical environment. The spatial distribution of habitats and species is largely determined by climatic and environmental conditions, as well as human activities. Therefore, biodiversity conservation and impact assessment need to pay special attention to spatial structures (e.g. land-uses and environmental variables) affecting species and habitats distribution. With this in mind, this guidance draws on spatial data and Geographic Information Systems (GIS) as

support tools for IBIA, recommending that GIS and ecological specialists work together to enhance the evidence base. To facilitate this, training in the use of GIS for SEA/EIA and AA may be required. It is considered that spatial approaches can significantly enhance biodiversity impact assessment by providing evidence-based and spatially-specific information to better support biodiversity conservation, monitoring, plan/programme review and policy-making. Therefore, ongoing spatial data collation and GIS management should be undertaken to facilitate and enhance IBIA.

1.7. Consultation with the National Parks and Wildlife Service

In this guidance, reference is made to the role of the NPWS of the Department of Arts, Heritage and the Gaeltacht (DAHG). The Minister for Arts, Heritage and the Gaeltacht is the National Competent Authority for the Birds Directive and the Habitats Directive, as well as the responsible Minister under the Wildlife Acts. This gives the Minister a central role and responsibility in the protection of biodiversity. Moreover, the DAGH is a statutory consultee for AA regarding planning applications under the Planning and Development Regulations (including regional planning guidelines, development plans and variations, local area plans and variations, strategic infrastructure development, SEA and EIA).

This guidance seeks to set out a framework of best practice to enhance Ireland's compliance with the Birds, Habitats, EIA and SEA Directives and to ensure that biodiversity issues are fully integrated into planning and development proposals. Among other aspects, this will require closer integration of the work of the different Departments and agencies of Government - integration that may require legislative provisions and further guidance that are beyond the current brief. However, effective IBIA demands more immediate involvement of professional ecologists and environmental scientists in the preparation of plans, programmes and projects to support assessment by the statutory authorities. Given its role and competency in the protection and conservation of biodiversity, this guidance makes best practice recommendations for ongoing consultation with the NPWS during the IBIA process. The new Birds and Habitats Regulations provide for the Minister to give advice and proposal-specific guidance on AA, and provide a statutory basis for public authorities to consult with and seek advice of the Minister in relation to AA. This consultation entails provision of sufficient and appropriate information to verify that the proposal will not, either individually or in combination with other plans or projects, have a significant effect on or adversely affect the integrity of a European site or cause any adverse effects to annexed species. However, there is no mandatory requirement for a response, it being at the initiative and discretion of the Minister). Moreover, there is no statutory provision for 'ongoing' consultation – and such activity would currently be subject to significant resource constraints. This means that consultation may entail correspondence to, rather than dialogue with NPWS. In some case, informal consultation may be undertaken for key infrastructural projects by contacting local rangers or divisional ecologists. Nevertheless, the NPWS website (www.npws.ie) should be consulted on a regular basis as a key source of information that is updated on an ongoing basis (although it should be noted that this is not the only source of up-to-date information). Requests for additional data may also be submitted to NPWS through the website.

Formal consultation with the NPWS should be undertaken via the Development Applications Unit (DAU) of the DAHG (manager.dau@ahg.gov.ie). NPWS should be informed early in the planning process about the proposal, in order to give a timely opportunity to engage in the process or provide feedback to the proposal. Ideally, such communication with NPWS should occur at the pre-planning or scoping stage to identify early in the process aspects of the proposal that may result in potential significant effects, but where appropriate pre-application consultation should also be undertaken to verify that no biodiversity-relevant issues have been overlooked. Ongoing communication may be required for high planning tiers (e.g. strategic regional plans) and key infrastructural projects, and for any other proposals where significant ecological issues arise. All such communication should be documented.

CHAPTER 2. METHODOLOGICAL FRAMEWORK

The legal and procedural requirements of the SEA, EIA and Habitat Directives are commonly fulfilled through a series of actions (i.e. methodological steps) undertaken during plan/programme-making or project design and consent processes. The IBIA methodology integrates such legal and procedural requirements of each of the SEA, EIA and AA processes combining them in a practical and systematic process. This is achieved by grouping/correlating critical methodological stages and merging their requirements in relation to scope, scale and detail in order to ensure legislative compliance (Figure 2.1). The grouping is based on common SEA/EIA stages and is as follows:

- Stage 1: SEA/EIA Screening and Scoping & AA Stage One (Screening)
- Stage 2: SEA/EIA Baseline Environment & AA Stage One (Screening: Qualifying Interests)
- Stage 3: SEA/EIA Definition of Alternatives & AA Stage Three (Ecological Solutions)
- Stage 4: SEA/EIA Assessment of Impacts & AA Stage Two (Appropriate Assessment)
- Stage 5: SEA/EIA Mitigation and Monitoring & AA Mitigation

2.1. SEA/EIA Screening and Scoping & AA Stage One (Screening)

2.1.1. Procedural Considerations

Screening initiates the methodological stages, so it is essential to establish whether the preparation or review of a plan/programme must undergo SEA/AA or a project proposal is subject to EIA/AA (Figure 2.2). In the context of IBIA, it is implicit that failure to undertake biodiversity impact assessment as part of such processes, where it would be required, contravenes legislative requirements and fails to integrate biodiversity considerations into decision-making; while undertaking impact assessment where it is not required or is beyond the scope of the requirements will lead to wasting time and resources.

There are two general approaches to screening: 1) based on established thresholds and criteria (such as those determined in Article 3, paragraphs 2(a) and 2(b), of the SEA Directive or Article 4 and Annex I of the EIA Directive) for which SEA/EIA is automatically required; or 2) determination for the need of SEA/EIA/AA via case-by-case examination (in concordance with paragraphs 4, 5 and 6 of Article 3 of the SEA Directive, Article 4 and Annex II of the EIA Directive, and Article 6(3) of the Habitats Directive) based on the characteristics of the proposal, the magnitude of the potential effects and the vulnerability of the area/s likely to be affected. In some instances, particularly in the context of AA, ongoing or iterative screening may be required to rule out the potential for significant effects at different stages of plan-making or project design (i.e. the final proposal has to pass the AA test). In the context of iterative screening, project-level screening should also be informed by plan-level assessments.

SEA/EIA and AA screening are independently carried out based on legislative thresholds and requirements.

Scoping in IBIA identifies all important biodiversity issues, in consultation with environmental authorities and stakeholders, to be brought forward in the assessment.

Once the need for SEA/EIA/AA is determined, the potentially significant effects on all environmental aspects, including biodiversity, are identified through scoping. In practice, impact assessment screening and scoping stages often partially or fully overlap, and this can also be anticipated in IBIA. Consultation with environmental authorities and stakeholders during scoping (section 2.1.6) enables the appraisal framework to be set up by identifying the biodiversity issues of concern, level of assessment detail, physical and temporal extent of the assessment, affected groups and

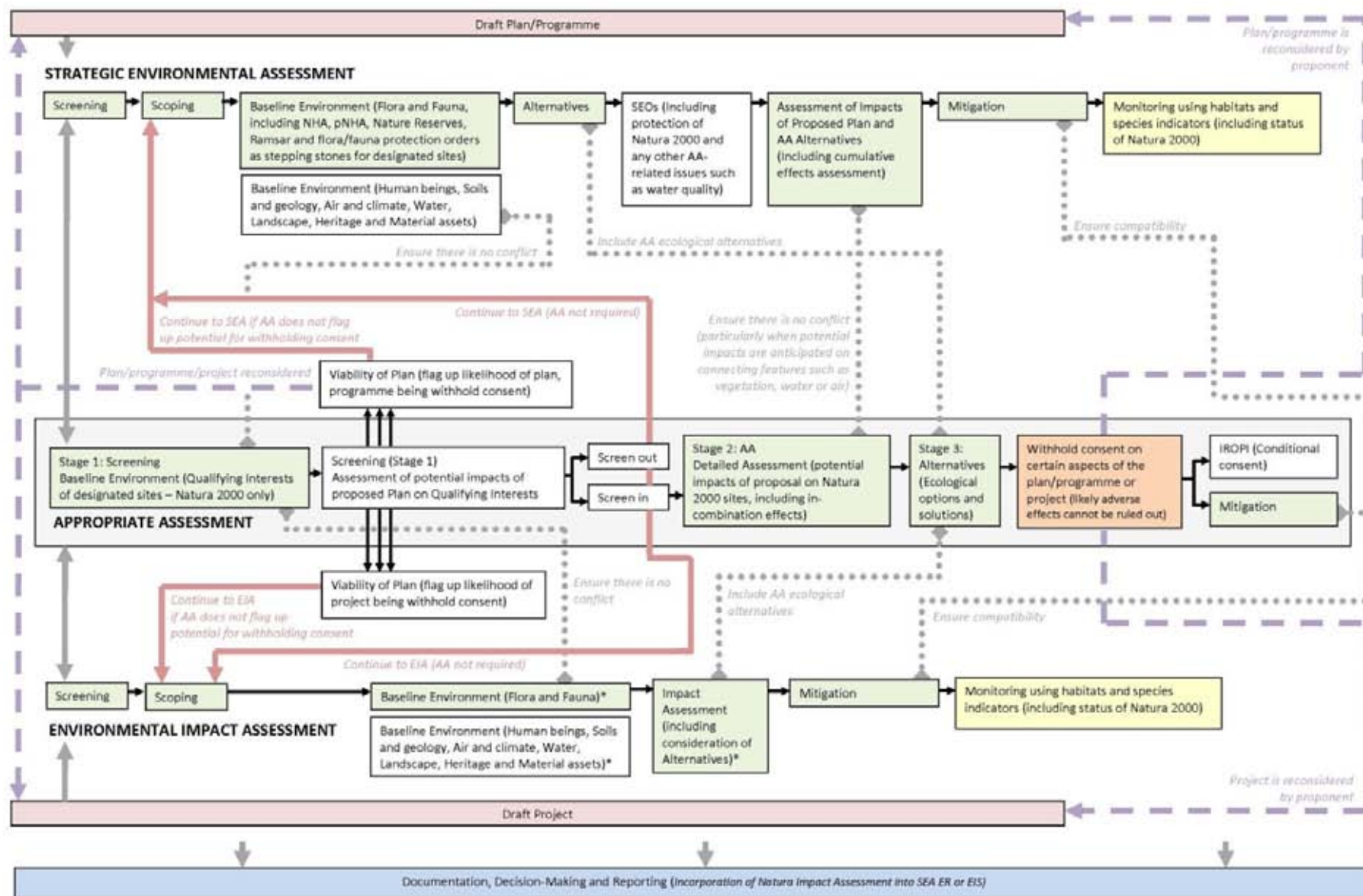


Figure 2.1. Correlating methodological stages and interactions between SEA-AA and EIA-AA. Note: green boxes indicate 'common' procedural stages; yellow boxes indicate correlation between some of the processes; white refers to those stages solely applicable to one of the processes; and the orange highlights the primacy of this legislative process for refusing consent. Red arrows refer to the critical outcomes of screening for AA; grey dotted arrows link all the rest of relevant stages; discontinuous grey arrows point to reconsideration of proposals in light of IROPI.

stakeholders, sources and availability of data, and expertise required. Scoping can thus ensure that the assessment remains focused on the significant biodiversity issues and does not waste resources on unnecessary tasks.

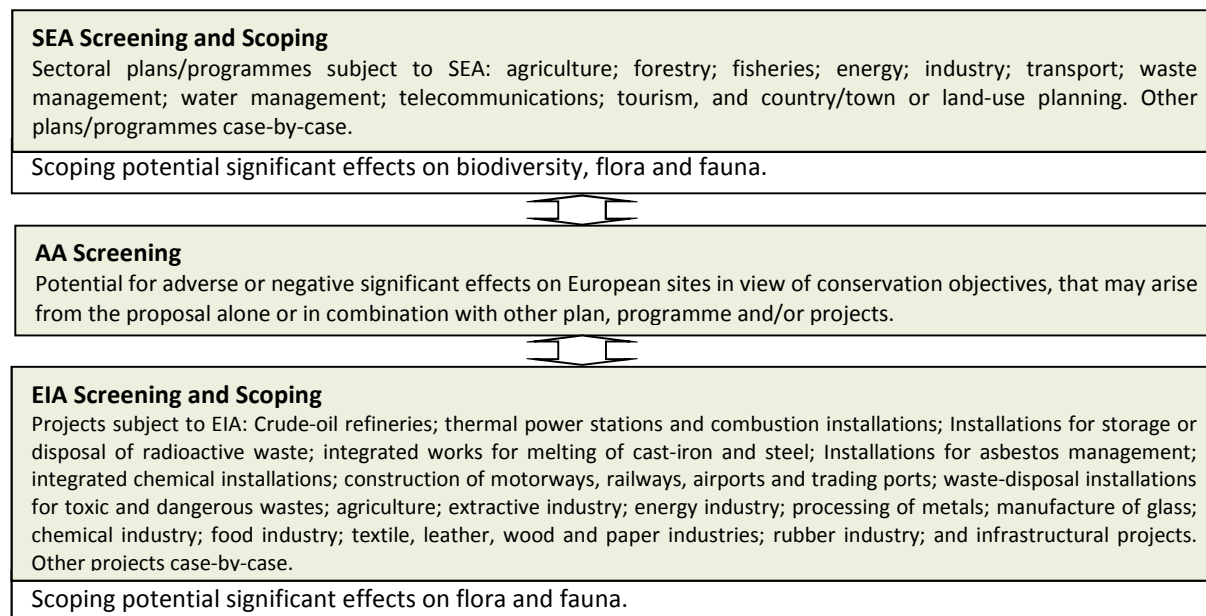


Figure 2.2. Existing linkages between various legislative instruments at the screening/scoping stages. Refer to the relevant Directives for more detail on criteria and thresholds.

2.1.2. Integration of Legislative Requirements

Article 6 of the Habitats Directive obliges member states to exercise their statutory power to withhold consent if it is determined following AA that the proposal has potential to significantly impact on the integrity of Natura 2000 sites or if such potential for significant impacts cannot be ruled out (i.e. precautionary principle). Therefore, it is proposed that AA processes initiate IBIA (i.e. AA screening is undertaken before SEA scoping; or AA screening is undertaken before EIA scoping). In this way, the screening for AA stage can flag up any potential issues on Natura 2000 sites that may lead to consent refusal and inform the SEA/EIA scoping stage to consider whether the assessment of the alternative in question should move forward in its proposed form. This may not always be possible, in particular for strategic plans that need further expansion before they can be assessed in more detail. Nevertheless, presenting the findings of this AA stage to the proponent enables reconsideration of the proposal if it appears that significant adverse effects cannot be avoided. AA can facilitate development of suitable mitigation measures to address any potential significant impacts on biodiversity and thus ensure that the integrity of Natura 2000 sites is not compromised. Imperative Reasons of Overriding Public Interest ('IROPI test') under Article 6(4) may also be applicable, in exceptional cases only, for essential public projects under the Habitats Directive where there are no alternatives. In this context, both AA mitigation (e.g. compensatory measures) and whether a statement of case for IROPI may be made need to be considered during SEA/EIA scoping.

AA initiates IBIA due to its statutory powers to withhold consent.

The plan, programme or project alternative should be reconsidered, before moving forward to SEA/EIA scoping, where AA screening flags up any potential issues that may lead to consent refusal or IROPI.

Where AA does not identify any significant reasons to withhold consent or when such reasons have been satisfactorily addressed by mitigation involving reconsidering, redrafting or modifying the

proposal to avoid impacting the integrity of designated European habitats, species and/or sites, the SEA/EIA process can progress to completion. SEA/EIA scoping will ensure the consideration of potential impacts on biodiversity associated with interventions deriving from the FRD and the WFD, as well as the examination of any potential effects on protected species, sites designated under the Wildlife Acts, or on Ramsar sites, and the identification of instances where licenses or permits to allow works affecting such species and sites to proceed may be required.

2.1.3. Geographical Scope and Assessment Detail

The geographical extent and level of assessment detail are defined at scoping stage, commonly in consultation with environmental authorities (section 2.1.6) and stakeholders. The geographical scope is largely influenced by the spatial extent of the plan, programme or project area but also by the zone of influence, including indirect impacts of any proposed interventions and in combination impacts with other plans and projects. Therefore, it is generally assumed that the plan/programme/project area represents the immediate boundary of the assessment when it comes to evaluating direct impacts. In addition, a zone of influence outside this boundary is commonly adopted to examine any potential secondary effects. This zone of influence may vary to take in or exclude various Natura 2000 sites as the assessment process progresses.

Geographical scope is defined by the spatial extent of the plan/programme or project, while the planning tier determines the level of detail for the assessment.

In general, impact assessment in SEA tends to be contained within administrative boundaries although, where applicable, transboundary areas/counties/countries are also included. Similarly, assessments at EIA level focus on the site boundary but *ex-situ* areas (within the zone of influence), transboundary scoped sites and species are also considered where relevant. Although it has no legal or ecological basis, governmental guidance recommends consideration of an *ex-situ* 15 km buffer area for Natura 2000 sites around the proposal boundary when undertaking AAs. Nevertheless,

larger zones of influence may need to be considered if there are ecological and hydrological connections between the plan area and any European sites beyond the recommended 15 km buffer. Such connections may only become apparent during later stages of the plan/programme or project design process so practitioners should maintain a watching brief during all stages. In contrast, smaller zones of influence can often be defined at project level. In the context of IBIA, the adoption of the larger geographical extent for SEA and plan/programme AA, or EIA and project AA, as defined during scoping, would be most appropriate to ensure compliance with the various legislative requirements.

The level of detail of the assessment is commonly defined by the scale of plan/programme or project intervention. It is generally accepted that the environmental aspects in SEA at higher planning-tiers cannot be described, and therefore assessed, in great spatial detail due to the larger geographic context and the strategic and broad nature of proposed policies and objectives. However, for these plans/programmes it is essential that a long-term view of the conservation and sustainable use of biodiversity in the area is taken and strategies for increasing the knowledge base for biodiversity assessment and biodiversity enhancement are considered. At lower planning tiers, including local area planning and project design, more specific actions are common (e.g. specific zoning of lands or detailed development layouts) and, therefore, a higher level of assessment detail is required. In all cases, screening and scoping should identify and maintain clear focus on the biodiversity-relevant features, qualifying interests or conservation objectives that require further assessment.

In the context of the Irish planning system, a County Development Plan and any associated SEA maps are commonly represented at 1:50,000 scale, while 6-inch (i.e. 1:10,560) maps down to 1:2,500 datasets are used at local area level. The scale adopted for project-level (and associated EIA maps) can vary from 1:2,500 to 1:100 depending on the magnitude of the development. These scales give

an indication of the assessment detail needed at different planning tiers. In practice, the level of detail adopted for biodiversity impact assessment is often determined by the scale and detail of available datasets, but due consideration should be given to data limitations in such circumstances.

2.1.4. Data Sources

Given that screening for AA requires establishing the potential for any significant effects, taking the precautionary approach into account, on the integrity of Natura 2000 sites, the location, extent, physical characteristics, qualifying interests and conservation objectives of both SACs and SPAs represent minimum data requirements in IBIA. These aspects should be contrasted against specific and relevant threats posed by the proposal to identify any potential key issues. Spatial datasets for Natura 2000 sites, and a description of their respective qualifying interests, are digitally available from the NPWS (Appendix A – Part 1). Although few of these have specific conservation management plans, the National Conservation Objectives to be published by the NPWS could be used to link site-specific qualifying interests with corresponding conservation objectives, thus facilitating the identification of any possible threats to their integrity from implementing the proposal.

Additional datasets are readily available to support the scoping stage and identify key issues that would set up the framework for the appraisal (section 2.2.4 and Appendix A – Part 1). These datasets can also facilitate screening for AA by identifying potential pollution vectors (e.g. water, air, soil) that link with European sites and, consequently, result in secondary impacts on the integrity of such sites. Moreover, national designations and non-designated areas (e.g. Natural Heritage Areas – NHAs, proposed Natural Heritage Areas – pNHAs or native woodlands) with their capacity to provide ecological connectivity and stepping-stones for wildlife, could also significantly contribute to the assessment of the viability and robustness of Natura 2000 sites as well as to the IBIA process in the context of overall biodiversity conservation. Where available, habitat maps should also be consulted to screen for any non-designated areas of potentially high conservation interest.

Natura 2000 designations represent the key dataset for AA screening.

Spatial datasets for national designations, non-designated areas and other environmental parameters (particularly water, air and soil) support SEA/EIA scoping and inform AA screening, and are an integral part of IBIA.

Existing online data browsers, such as Myplan.ie (a planning information system) or Environ (www.epa.ie), may be used to identify potential issues at scoping stage. For in-house GIS applications, data requests (to the relevant authorities listed in Appendix A – Part 1) need to be submitted prior to scoping, and additional datasets may need to be gathered for those key issues identified during scoping that are to be brought forward into the assessment. Data collection both informs the identification of potential impacts and is informed by this process and, as a result, data gathering may be spread throughout the process. In all cases, early data gathering efforts will help ensure that all relevant datasets are available for baseline and impact assessment stages, as well as identify any data gaps and determine the need for additional data generation. In this case, biodiversity data collation and creation methods, and the associated pertinent arrangements, would need to be established to ensure that sufficient information is made available in a timely manner throughout the impact assessment processes. This is particularly relevant at EIA and project-level AA, where site-specific observations and field surveys are likely to be required (at the baseline stage).

2.1.5. GIS-supported Methodology: Approaches and Techniques

GIS tools can assist in rapidly bringing spatial data together, overlay them with the plan/programme/project boundary and thus undertake a preliminary assessment of biodiversity and

other environmental aspect. Only simple mapping tools are needed (e.g. adding datasets, editing layer properties and applying layer transparency) to enable the visualisation of any spatial correlations. GIS approaches facilitate the rapid and objective identification of biodiversity-relevant features (and their degree of overlap) within and adjacent to the study area which is of particular value when determining the existence of Natura 2000 sites within the area (Figures 2.3 and 2.4).

GIS-supported screening and scoping approaches are commonly undertaken in-house on a desktop GIS (which enables overlaying several biodiversity datasets from different sources on a single interface) or through on-line spatial data viewers. The latter are increasingly provided by data creators (Appendix A) but do not permit combining datasets from different sources. Available and relevant biodiversity spatial datasets can also be mapped and printed at this stage to subsequently use them for consultation (section 2.1.6).

Mapping and overlays enable the rapid, systematic, objective and visual identification of biodiversity sensitivities within the study area.

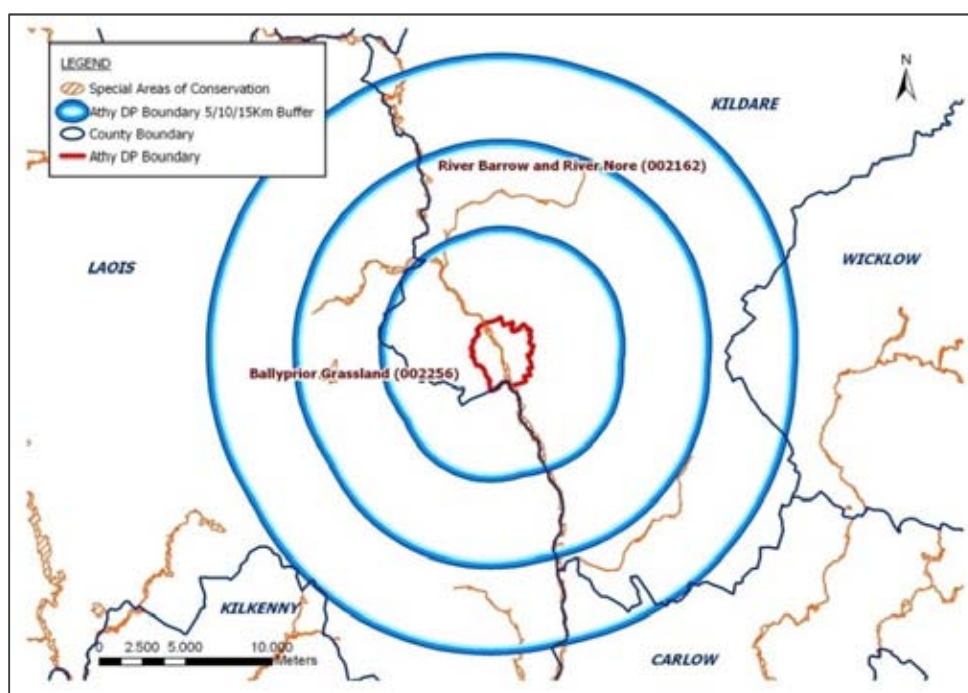
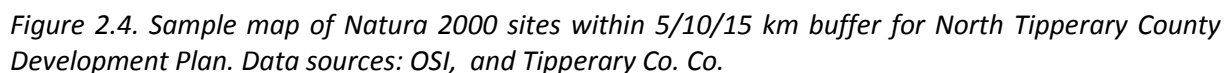


Figure 2.3. Sample map of Natura 2000 sites within 5/10/15 km buffer for the Athy Town Plan. Data sources: OSI, NPWS and Kildare Co. Co.

GIS-based approaches enable case-by-case screening for AA and SEA/EIA, and facilitate the identification of key aspects during SEA/EIA scoping. However, where relevant and up-to-date spatial datasets are not readily available on-line the tight time-frames often allocated to these assessment stages can hinder spatial data gathering efforts. Therefore, in some cases, spatial data accessibility constraints and gaps in key biodiversity information may constrain the effective application of GIS techniques at these assessment stages. In such cases, other published information, such as the *State of the Environment* reports published by the EPA⁷, the strategic objectives set in the National Biodiversity Plan – NBP (2011-2016) or the findings of biodiversity research studies undertaken at national, regional or local level (Appendix A – Part 2), are potential sources of valuable information that need to be taken into consideration to ensure that all biodiversity-related aspects are given adequate consideration before scoping them out from IBIA, while acknowledging that biodiversity issues may turn up at a later stage in the assessment process.

⁷ <http://www.epa.ie/downloads/pubs/other/indicators/irlenv/>



An efficient IBIA process is dependent on effective consultation, as this is often the only way of rapidly identifying key issues. The establishment of communication channels between the proponent and the assessment team/s, as well as the relevant environmental authorities, stakeholder groups (including county biodiversity and heritage officers, and NGOs such as BirdWatch) and individuals, is critical to ensure the full integration of the IBIA methodological stages and a thorough consideration and examination of all relevant biodiversity data, as well as biodiversity conservation priorities and perceptions (see also section 3.2). This is commonly initiated by a scoping workshop – commonly supported by an ‘issues paper’ that is previously prepared and distributed, and where the main potential issues are presented for debate. representatives participating in such workshop will vary depending plan/programme/project, but also on time-frame and resources. and maps could be used to support discussions.

Dynamic communications channels need to be established and maintained throughout the assessment.

- Environmental Protection Agency (EPA);
- Department of Environment, Community and Local Government (DECLG);
- Department of Agriculture, Fisheries and Food (DAFF) and Department of Communications Energy and Natural Resources (DCENR), where it appears that the plan or programme might have significant effects on fisheries or the marine environment; and

- Department of Arts, Heritage and the Gaeltacht (DAHG), where it appears that the plan or programme might have significant effects on built heritage (including archaeology) or nature conservation.

In addition, within the context of land-use planning, any adjoining planning authority whose area is contiguous to the plan or programme area must also be consulted (i.e. transboundary consultation) as part of SEA. Consultation with the planning authority is not a requirement in EIA; nonetheless it is advisable and reasonably common at project planning stage. In the context of screening for AA, although not a legal requisite either, the NPWS is also commonly consulted (particularly at high planning-tiers and for key infrastructural projects). Consultation with the NPWS is good practice and, ideally, it should be initiated at screening stage for the early identification of any potential effects on Natura 2000 sites or protected species. Moreover, such consultation should span the entire assessment process, to the extent feasible, in order to obtain any updates on sensitive biodiversity issues and threats.

The statutory public consultation period during SEA scoping (i.e. pre-planning consultation) is 8 weeks for national, regional and county plans, and no less than 4 weeks for local area plans. The statutory public consultation period for SEA once the draft plan/programme has been prepared (i.e. SEA ER) is 12 to 16 weeks for national and regional plans/programmes, 10 weeks for county development plans and 6 weeks for local area plans. In contrast, there is no statutory requirement for pre-planning public consultation in EIA – although advocated as best practice in scoping. However, an opportunity to comment/object is provided for 5 weeks from the date of submission of an application, and for at least 6 weeks in the case of a Strategic Infrastructural Development (SID). These time frames are accordingly applied in AA, and should be similarly adopted in IBIA. Non-statutory consultation and stakeholder involvement should also be sought to increase the effectiveness of IBIA.

The adoption of a dynamic and proactive communication approach to IBIA will help in:

- obtaining information and expert judgment on potential biodiversity effects early in the process;
- providing a more comprehensive understanding of the baseline environment and associated issues and values;
- identifying any critical data gaps and flagging up any technique and database updates throughout the assessment;
- through increased understanding, avoiding unnecessary controversy and delays; and
- promoting transparency in the planning and decision-making processes.

2.1.7. Current Practice Issues and Actions

A review of Irish AA screening reports for plans has revealed a **lack of standardised approaches** and consequent variation in the methodologies used and the level of detail of information provided, which are rarely described in detail (e.g. matrix-based assessments against conservation objectives based on expert judgment *versus* site-specific surveys; variation from 15 km down to 1 km buffer spatial catchment for potentially affected sites; “guesstimates” based on limited baseline information, etc.). The lack of standardised approaches is also resulting in variations in the way cumulative (in the case of SEA/EIA) or in-combination effects (in the case of AA) are assessed. Such potential effects are commonly not detailed enough to be meaningfully fed into the assessment (e.g. listing interacting plan/programme/projects and outlining possible in-combination effects). The review also indicates **inadequate appreciation of ecological integrity and connectivity of protected areas** (according to Article 10 of the Habitats Directive) or other green infrastructure issues (i.e. wider biodiversity considerations at the landscape level).

While the SEA and EIA Directives clearly set out the content of the documents to be prepared, the Habitats Directive simply states that AA tests must be passed to allow approval of a plan/programme or project; although the new Regulations recommend that the information is provided in the form of a Natura Impact Statement (NIS) for projects or Natura Impact Report (NIR) for plans and programmes. There is currently no clear guidance on **responsibilities for undertaking screening for AA** and preparing NIS/NIR. The responsibility for screening is placed on the competent authority but practice varies as to whom actually collects the data to undertake it. This is particularly relevant at project level, where the proponent is accountable for ensuring the proposal undergoes Stage2 AA where required in order to ascertain that it will have no significant impacts on Natura 2000 sites. However, the competent authority is responsible for verifying this which may lead to difficulties in establishing who is to undertake screening for AA, particularly where a plan or project requires consent from more than one authority.



Commonly, it is up to the plan/programme-maker or project proponent to decide the level of detail of information they will provide to the competent authority. Ensuring 'completeness of information' requires *a priori* knowledge on when sufficient data comprehensiveness and level of detail are reached, which can be subjective. This can lead to **inadequate identification of potential impacts** with conclusions that are judgmental rather than scientifically based. This could be partially addressed by providing expert NPWS input and advice during screening and scoping. Moreover, although it is inevitable that some elements of the AA are passed down to lower planning tiers as certainty of impact on site integrity can, in some cases, be difficult to establish, it should always be acknowledged when certain issues are likely to arise at lower planning tiers. Any potential issues should be flagged up and provisions set at higher planning tiers in order to either avoid sites when zoning or to

address their specific implications at project level. In this context, it should also be noted that inadequate screening judgments can occur if based on unreasonable assumptions, or (on the basis of the precautionary approach) lack of evidence 'beyond reasonable doubt' that the integrity of a Natura 2000 site will not be affected.

Since the precautionary principle underlies all of the protective elements of the Habitats Directive, it is up to the proponent to provide all the information and to leave no reasonable doubt as to the existence of adverse impacts. In order to ensure completeness and quality of information for reasonable and objective screening for AA, as well as to address the ecological integrity of protected sites, all existing biodiversity-relevant data sources should be queried, and where appropriate field-surveys undertaken. In this context, the current lack of preparation and limited **use of habitat mapping** studies at SEA level (which are not commonly undertaken for SEA unless vital for the assessment process), **environmental data** gathered during SEA scoping (e.g. status of water bodies, soil contamination, etc.), and data gathered at EIA level should be resolved. Similarly, adequate time should be built in for **ecological investigations and seasonal change assessments** when required. To ensure that no biodiversity-related issues are overlooked, screening and scoping are combined in terms of focusing in on relevant sites and relevant policies or issues to address. Moreover, in order to ensure that all findings are integrated into the proposal, an iterative process should be promoted where planning, SEA/EIA and AA are linked to ensure ongoing communication and exchange of information throughout the process. To facilitate this, planning, SEA/EIA and AA teams, as well as key stakeholders (e.g. heritage officers or NPWS representatives), should meet on a regular basis from the beginning of the plan/programme or project (section 2.1.6).

Current practice indicates that the large majority of screening for AA is undertaken by independent consultancies. The preparation of SEAs and plan/programme **in-house screening for AA** was recommended by the representatives consulted during this research. To optimise these processes and ensure full integration of biodiversity considerations, additional training and capacity building is required at local authority level in order to provide adequate in-house expertise. To support in-house screening for AA, additional pre-screening guidelines should be published for local authorities to screen out plan/programme and projects which do not concern the NPWS, thus optimising resources and avoiding NPWS consultation during screening and scoping when unnecessary. In addition, environmental authorities (in consultation with environmental organisations, including NGOs, and in agreement with local authorities) should highlight key particular concerns within their remit and set biodiversity priorities for geographical areas, linking them to administrative boundaries and providing a core evidence base for planning. Nevertheless, given the current state of knowledge, commissioning expert AA advice at local authority level (rather than accepting without due objective interrogation the conclusions reached by the proponent) may be advisable for undertaking screening for AA or for a thorough scrutiny of AA findings for strategic plans, key infrastructural projects and large urban developments, before a planning decision is reached.

Key recommendations to address current practice issues in screening and scoping:

- **Guidance on standardised approaches for biodiversity impact assessment (including assessment detail, data sources, assessment techniques for discrete/cumulative impacts, etc.).**
- **Clear definition of responsibilities (for screening, data gathering and preparation of NIS).**
- **NPWS input and advice during screening/scoping for full identification of potential impacts.**
- **Preparation of a national habitat map.**
- **Undertaking ecological investigations and seasonal change assessments where evidence 'beyond reasonable doubt' cannot be obtained in AA screening (particularly at project-level).**
- **Ongoing and proactive communication between planning and assessment teams, as well as key local and transboundary stakeholders (e.g. NPWS and biodiversity/heritage officers).**
- **Training, capacity building and setting up regional biodiversity priorities to facilitate in-house screening.**
- **Evaluation of AA screening findings to ensure that they are reasonable, impartial and correct.**

2.2. SEA/EIA Baseline Environment & AA Stage One (Screening: Qualifying Interests)

2.2.1. Procedural Considerations

Biodiversity Impact Assessment processes under the SEA, EIA and Habitats Directives entail a thorough understanding of existing environmental conditions and problems, as well as their likely evolution in the absence of any proposed intervention/s. Similarly, the FRD and WFD and the Ramsar Convention include provisions to report progress on managing flood risk and improving biological and ecological status of water bodies and wetlands against a baseline or reference background. Merging the baseline requirements under the relevant processes (Figure 2.5) can provide a comprehensive and holistic reference basis for biodiversity impact assessment; rather than the fragmented picture provided by each of the different assessments and consents. In order to achieve this, SEA/EIA and AA should run in parallel and baseline information integrated at this procedural stage (Section 2.2.6). A landscape or ecosystem-based biodiversity impact assessment approach should be promoted (i.e. that which addresses ecological integrity and connectivity between

Merging baseline requirements of the various processes provides a comprehensive reference basis for informed biodiversity impact assessment and monitoring.

Baseline environment should cover designated and non-designated sites, as well as supporting and connecting environmental resources such as soil or water.

designated areas), in order to protect not only the qualifying interests of Natura 2000 areas but also their ecological coherence through the protection of national designations, non-designated areas and species, and the environmental resources (e.g. water, soils, air and climate) that support them.

Baseline information represents the critical basis for both informed biodiversity impact assessment and monitoring. Providing an overall picture of the state of habitats, and species of flora and fauna (i.e. a composite illustration of existing biodiversity sensitivities) and describing the anticipated changes has the potential to help in the prompt identification of existing and future biodiversity-related pressures, impacts and problems – which in turn facilitates the formulation of measures to avoid, ameliorate and remedy such impacts.

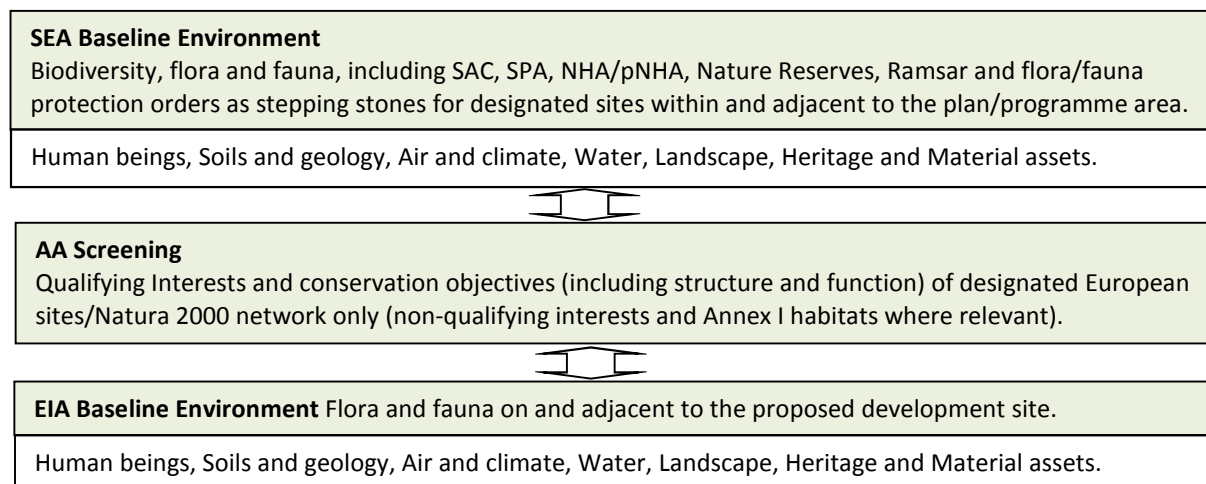


Figure 2.5. Existing linkages between various legislative instruments at the baseline stage.

2.2.2. Integration of Legislative Requirements

Under Annexes I(f) and III(3) of the SEA and EIA Directives respectively, the environmental baseline commonly addresses the quality and, where applicable, the protection status of the following: biodiversity (only in SEA), population, human health, fauna, flora, soil, water, air, climatic factors, material assets, cultural heritage and landscape, and the inter-relationship between these factors. Both SEA and EIA evaluate potential impacts on designated and non-designated sites and species, examining the overall implications for biodiversity (including those potential secondary impacts associated with changes in water, soil or climatic conditions). Under the screening stage of the Habitats Directive, the baseline mainly refers to the qualifying interests and conservation objectives of discrete European sites. The Ramsar Convention recognises the ecological characteristics of wetlands in the context of their value for birds, while the WFD deals with nutrient sensitive water bodies and protected areas such as salmonid waters, SACs, SPAs and other species-specific sensitivities (e.g. freshwater pearl mussel).

The scope and the level of detail in the baseline information vary for each process.

IBIA should entail a comprehensive account of all biodiversity-relevant information and data.

The scope and the level of detail in the baseline information vary for each process. While the SEA Directive does not require new data collation or generation, EIA practice relies on site-specific, often intensive, field surveys for data gathering (section 2.2.4). These approaches to baseline detail have been respectively transferred to plan/programme and project AAs; as a result, plan/programme AAs rely on NPWS' information on Natura 2000 sites, while project AA are likely to require ground-truthing or site surveys. In the context of IBIA, the provision of baseline information entails a comprehensive account of all biodiversity-relevant data.

2.2.3. Geographical Scope and Assessment Detail

The wider geographical scope of SEA or plan/programme AA enables a landscape or ecosystem-based approach to biodiversity impact assessment, entailing larger geographical extents and encompassing specific designated and non-designated areas, as well as providing the opportunity to address species distribution, connectivity of wildlife corridors and ecological stepping stones. In the case of EIA or project AA, the baseline tends to be more detailed and focuses on localised habitats and species.

The level of detail provided for each biodiversity aspect depends on their significance and the geographic scale of the plan/programme/project as defined during the scoping stage (section 2.1.3). In general, the description of the biodiversity (and environmental) baseline in both SEA ERs and EISs is contained within administrative or site boundaries respectively. Nevertheless, scoped ex-situ, transboundary sites and species are also considered where relevant; commonly to an extent of the recommended 15 km Natura 2000 buffer around the plan/programme and project boundary sites (smaller buffer areas may be considered for certain projects) when undertaking AA.

Plan/programme-level assessments provide more appropriate geographical extents for assessing biodiversity at the landscape level and enable better consideration of potential (cumulative or in-combination) effects than project-level assessments; although they may contain coarser data, and thus provide lower assessment detail. In contrast, project-level assessments, while covering a limited spatial extent which constrains consideration of cumulative or in-combination effects, should provide detailed relevant data, at high spatial resolution. The geographical scope and detail of available datasets often determines the accuracy and detail of the baseline. In all cases, efforts should be made to gather accurate, updated and sufficient biodiversity-related information for baseline and future conditions in order to make adequate and reasonable judgments.

Plans/programmes enable ecosystem-based biodiversity impact assessment and better consideration of in-combination and cumulative effects, but contain coarser data and low assessment detail.

Project-level assessments contain high level of detail for localised habitats and species

2.2.4. Data Sources

Baseline data commonly cover environmental resources (e.g. ecological designations) and environmental sensitivities (e.g. red list species). In addition, biodiversity-related environmental pressures (e.g. expansion of urban settlements, water contamination or climate change) need to be considered to anticipate potential biodiversity impacts. In all cases, ecological expertise is needed for an accurate and objective interpretation of the data, as well as to analyse trends and identify key issues from the baseline data.

The type and number of biodiversity-relevant datasets used depends on the scope and purpose of the study.

Datasets should cover environmental resources, designations and sensitivities, together with environmental pressures.

The ecological sites designated and protected under European and national law have been surveyed by the NPWS (to determine species and habitat types and vulnerability) and mapped, and are commonly available in digital form from the NPWS website (Table 2.1). These include, among others: a) Natura 2000 sites that protect sensitive habitats and species through SAC and SPA designations (CEC, 1992; 2009); b) national designations such as NHAs protected under the Irish Wildlife Acts 1976-2000; and c) species protected under the Flora and Fauna Protection Order 1999. Site-specific surveys have been undertaken to determine species and habitat types and vulnerability.

Dataset	EU Coverage	Applicability	Comment
Ramsar <i>Wetlands of international importance</i>	All Member States	Plans, programmes and projects	International designation Boundaries being revised for Ireland (not released yet)
Natura 2000 <i>Special Protection Areas, Special Areas of Conservation</i>	All Member States	Plans, programmes and projects	Statutory designation Available at www.npws.ie
National Designations <i>Natural Heritage Areas, Biosphere Reserves, Refuges for Flora/Fauna, Wildfowl Sanctuaries, National Parks, Nature Reserves</i>	Member States	Plans, programmes and projects	Statutory designation Available at www.npws.ie
CORINE <i>CoORdinated Information on the Environment - Land Cover</i>	All Member States	Plans and programmes	Proxy. Minimum mapping unit constrains application at project level Available at www.epa.ie
Habitat maps <i>Inventory of land and sea-bed cover, habitat indicator map</i>	Limited geographical areas in some Member States	Plans and projects	Application at project level can be constrained by scale of data capture Available for some counties/areas in Ireland (from Local Authorities). A national habitat indicator map has been prepared by Teagasc
Green infrastructure and ecological corridors <i>Inventory of green areas and corridors</i>	Limited geographical areas in some Member States	Plans and projects	Often prepared at the local level as part of urban planning Not currently available in Ireland
Forest Inventories <i>Inventory of green canopy coverage and forest types</i>	Some Member States	Plans, programmes and projects	Proxy. Project level application constrained by scale of data capture In Ireland: Forest Inventory and Planning Database (FIPS) and Coillte
Water Framework Directive <i>Record of protected areas, water bodies and their ecological status</i>	All Member States	Plans, programmes and projects	Includes water-dependant habitats. Application at project level can be constrained by scale of reporting and map creation. Available at www.wfdireland.ie
Site-specific surveys <i>Research based marine and terrestrial flora and fauna surveys; EIA-related surveys</i>	Very limited geographical areas in all Member States	Projects	Detailed datasets commonly not relevant at plan/programme level Available for some areas in Ireland at www.biodiversityireland.ie

Table 2.1. Spatial biodiversity-relevant datasets commonly available in the EU and applicable in Ireland.

Additional datasets are available in Europe, such as the internationally designated wetlands of international importance (Ramsar Convention), CORINE – a pan-European spatial classification of land cover (and, thus, biotopes or habitats) based on satellite imagery, or other proxy data such as national forest inventories. CORINE, in particular, can be very relevant for biodiversity impact assessment and planning, as land-use changes (which are mapped at 1ha resolution) are one of the key drivers of biodiversity loss; scale and currency limitations must, however, be taken into consideration (section 2.2.7).

Other biodiversity-relevant datasets are also applicable (Appendix A) and additional data may need to be collated in the field for lower planning and project AAs (section 2.6.2). The type and number of datasets used depends on the scope and purpose of the assessment. AAs, for example, only require the consideration of Natura 2000 sites and any information in relation to their qualifying interest,

conservation status and objectives; so additional datasets may become irrelevant. At SEA and EIA levels incorporation of datasets generally depends on their scale and relevance to the proposal.

2.2.5. GIS-supported Methodology: Approaches and Techniques

The description of the biodiversity baseline can be enhanced through graphic illustration of the location and spatial distribution of sensitive habitats and species. This can be achieved by using Global Navigation Satellite Systems (GNSS) for data collation on species location and distribution during field surveys, or defining sensitive habitats and biodiversity-relevant areas over a map commonly using remotely sensed data such as satellite imagery (section 2.6.2). GIS can then bring together biodiversity-relevant spatial data for the creation of thematic maps and a rapid and visual examination of any spatial correlations and juxtapositions amongst data. Prepared maps can subsequently be used in the SEA environmental reports, EISs, or NIS/NIRs, as well as used for stakeholder and public consultation.

Creation of individual maps for each biodiversity consideration supports a spatially-specific depiction of the baseline.

Weighted overlay techniques enable the creation of composite maps illustrating the relative sensitivity of the different areas.

Basic data display and mapping tools (e.g. editing of layer properties and categorisation based on attribute data to enhance the illustration of information) can be applied for descriptive data display and layout creation. Editing tools can also be used to complete and correct any data inconsistencies, and appropriately integrate data into the GIS interface. The creation of individual maps for each biodiversity consideration (e.g. significant, protected or threatened flora and fauna features) supports a spatially-specific depiction of the baseline environment (Figure 2.6). The relevant thematic layers can also be overlaid and transparency tools used to visually observe any spatial correlations and determine the degree of overlap of concurring biodiversity sensitivities (e.g. protected woodland habitat and occurrence of red squirrel). This can also be achieved by using weighted overlay tools, where a significance weight can be assigned to each biodiversity dataset to emphasise the relative importance of individual biodiversity considerations in the area or threats associated with the proposal, and obtain a composite map with relative vulnerability areas (Figure 2.7). These approaches help, at a later stage, explore potential cumulative or in-combination effects (section 2.3.5). However, consideration may need to be given to the development and application of a context-specific (i.e. area- and proposal-specific) weighting system at national level that gives due consideration to all hierarchies of biodiversity protection (e.g. from European sites through national designations to local biodiversity) to make biodiversity impact assessments comparable.

The number and type of applied datasets vary (section 2.2.4), but the application of spatial data and GIS should aim at a time-effective generation of sufficient, reliable and usable information on biodiversity baseline. It must, however, be noted that SEA and plan/programme AA maps are usually based on available spatial datasets which generally refer to designated sites (Natura 2000 sites only in the case of AAs); this frequently leads to the omission of non-available sites/features in the mapped description of biodiversity baseline conditions. In contrast, and even though EIAs are based on field surveys, there is a common lack of GNSS/GIS application for identifying key features within sites which impedes detailed spatially-specific illustration of the biodiversity baseline within the study area. These limitations must be addressed wherever feasible, and acknowledged in the relevant output documents.

Although not common practice, the use of modelling tools can also assist in providing a more comprehensive biodiversity baseline for both SEA and plan/project AA by, for example, simulating habitat suitability and population viability for rare species and connectivity of wildlife corridors or by identifying gaps in green infrastructure. Air quality, flood risk and water catchment modelling for

assimilative capacity (among others) can also support IBIA by providing reasonable information on baseline and future environmental pressures. Several research and practical model applications have been developed worldwide to support biodiversity impact assessment (section 2.4.5).

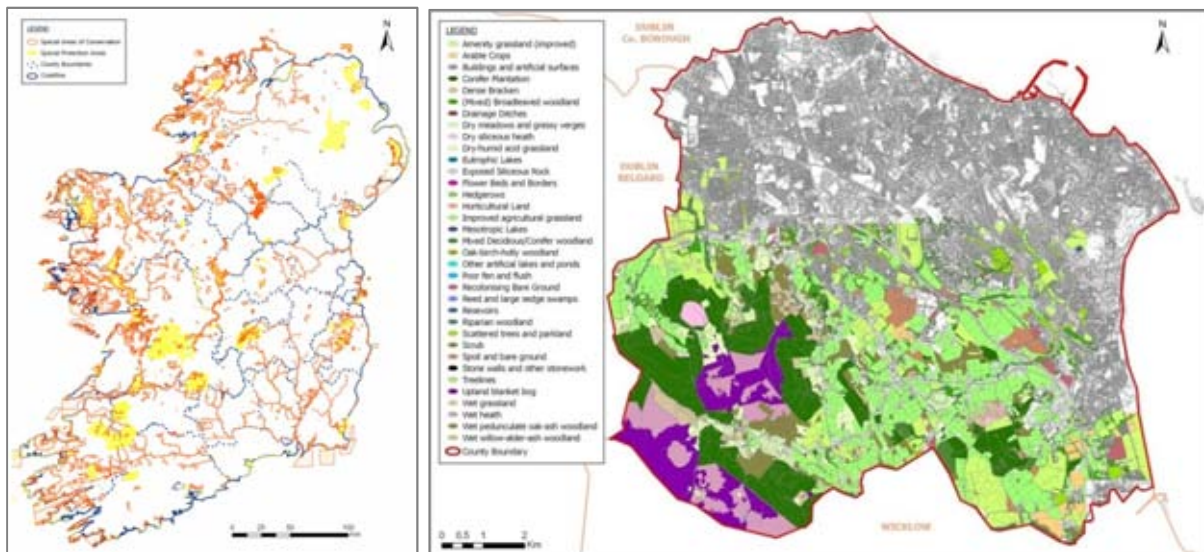


Figure 2.6. Samples of thematic GIS mapping: national Natura 2000 sites (left) and habitat mapping for Dun Laoghaire Rathdown County Council (right). Data sources: OSI, NPWS and Dun Laoghaire Rathdown Co. Co.

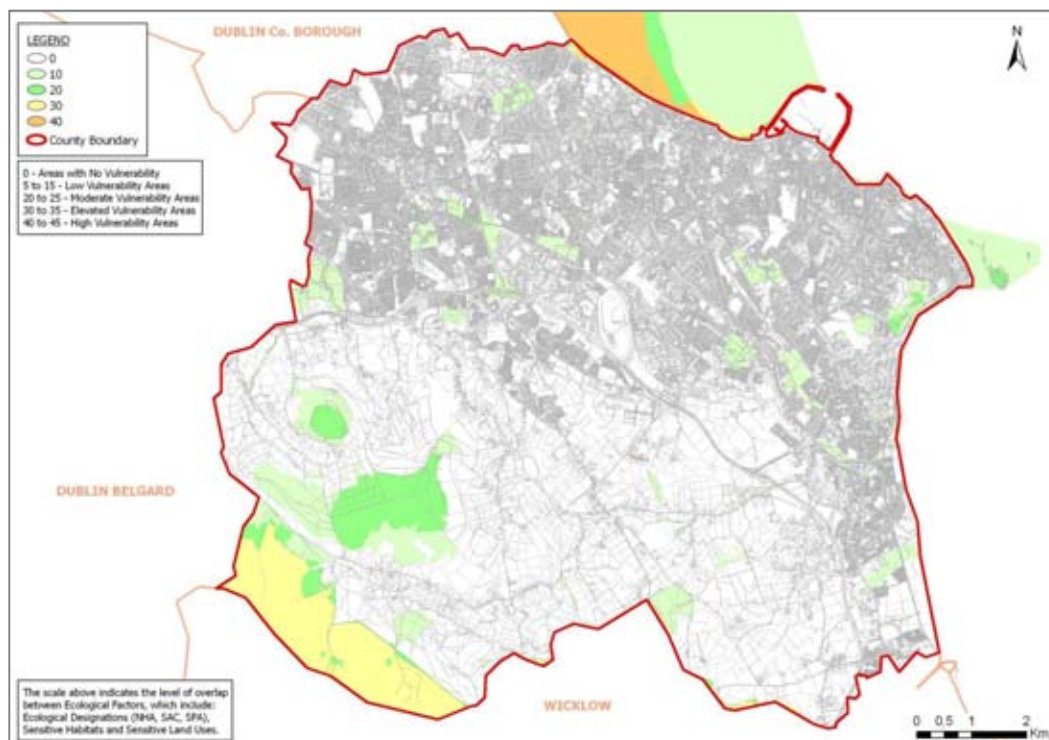


Figure 2.7. Sample of weighted overlay GIS mapping: composite view of the relative ecological sensitivity of the different areas for County Dun Laoighaire Rathdown. Note: all biodiversity considerations are given equal weight (i.e. level of importance); the resulting relative sensitivity relates to the level of overlap between ecological designations and sensitive habitats/land-uses. Data sources: OSI and Dun Laoghaire Rathdown Co. Co.

2.2.6. Consultation and Communication

To ensure baseline information from SEA/EIA and screening for AA are integrated, and data obtained through each process provide a comprehensive and updated understanding of the biodiversity baseline, both assessment teams should maintain regular communication (section 2.1.6).

There is no statutory requirement to consult the planning authority, the environmental authorities, the NPWS or the public during the baseline environment stage of SEA; however, the NPWS is often consulted during AA screening for strategic proposals (section 2.1.6). Although there is no legal requirement for consultation at this stage within the EIA process either, consultation with the planning authority is reasonably common, and slightly less so with the NPWS. In all cases where a plan, programme or project AA is undertaken, the NPWS should be informally consulted at this stage in relation to any updates on sensitive biodiversity issues, conservation objectives and/or threats and pressures on habitats and species. Ideally, the organisations consulted during screening and scoping, (which generally include the NPWS, the EPA and other significant data holding/generating authorities) should form part of a steering group that maintains regular communication with the planners or project proponent and both the SEA/EIA and AA teams.

Planners/proponent, and SEA/EIA and AA teams should maintain regular communication for any updates on biodiversity-relevant data.

Informal consultation with the planning authority and NPWS can also assist identifying any data updates.

2.2.7. Current Practice Issues and Actions

Assessments (and, therefore, description of baseline biodiversity conditions) generally focus on local protected species and sites, **rarely considering the ecosystem level and commonly omitting unprotected species and areas** that may contain biodiversity values and/or fulfil important functions in the ecosystem. The most common reason for this approach is the lack of relevant and detailed data on non-designated sites. However, data from research and EIA studies, as well as proxy data can be used to facilitate the provision of a more comprehensive biodiversity baseline.

Data quality and scale present key considerations when providing evidence for supporting informed decisions. Data quality is directly associated with data availability, currency and completeness. Data scale largely depends on data gathering and creation methodologies. To ensure that the relevant information appropriately supports the description of the baseline environment and the content and level of detail of the plan/programme/project assessment, the type, quality and scale of the information utilised must be adequate. Inconsistencies in this regard can affect the appropriate consideration of all relevant biodiversity aspects as well as assessment outputs, particularly when relying on spatial datasets and assessments. Therefore, identified **data gaps and inconsistencies** must be documented in the final report (i.e. NIS/NIR, SEA ER or EIS) to ensure transparency in both the assessment and decision-making processes.

Given that SEA and plan/programme AAs tend to rely on available and secondary datasets (e.g. national designations, CORINE land uses), the suitability of available biodiversity data at this level may be compromised due to the quality, scale and, subsequently, high level of uncertainty of such datasets. In contrast, site-specific surveys required in EIA and project-level AA have the potential to provide a more accurate (i.e. detailed and site-specific) description of the baseline environment. However, such surveys are undertaken within a given scope and purpose and the **lack of standardised methods for data collation** (e.g. scale, taxonomy, etc.) compromise their applicability in other studies with different scope or project details. In addition to practical re-usability and comparability constraints, there is currently no administrative or regulatory framework in Ireland for EIA data sharing and, consequently, the results of EIAs or project AAs are rarely re-used as further discussed below.



SEA biodiversity, flora and fauna sections (and plan/programme AAs) are commonly based on NPWS online data on Natura 2000 and other national ecological designations (NHA, pNHA, Nature Reserves, etc.). However, some of the **surveys of such sites are incomplete, outdated or currently under review**, and site boundaries are occasionally revised for accuracy or redrawn to reflect other changes. In addition, data gaps and inconsistencies in relation to, for example, accuracy of boundaries, lack of management plans and/or conservation objectives associated with Natura 2000 sites are often overlooked in SEAs and NIRs. There are occasional references to conservation status, threats and sensitivities; nevertheless, there are difficulties in knowing where qualifying interests are located within Natura 2000 sites, and references to connectivity between sites (as per Article 10 of the Habitats

Directive) are rare. CORINE is also frequently used as proxy data in SEA. However, the last published update of this dataset was undertaken in 2006 (the 2009 update is currently being processed and has not been published yet) and the minimum mapping unit (or spatial resolution) adopted in CORINE is 25ha, although a 5ha unit is available for land cover changes over time (e.g. from CORINE 2000 to 2006) and an update at 1ha is planned. The currently available resolution entails the grouping of categories that cover areas less than 25ha as mixed classes. This resolution is appropriate for high level proposals (e.g. regional catchment plans/programmes) but has significant implications for biodiversity impact assessment at the local scale (i.e. local area plan or project level); categories may not always match reality on the ground and the low level of detail (and accuracy of the inventory) may lead to misleading assessment results. Other **relevant data sources such as habitat maps**, forest inventories and RAMSAR sites are **under-developed and/or underused** in current Irish practice; an issue that needs immediate attention, particularly with regards to the creation of a national habitat map that provides the basis for biodiversity conservation and impact assessment.

EIAs (and project AAs) are generally based on the findings of site surveys; although practice varies, NPWS online data is also most commonly used. The **lack of data sharing mechanism** as well as the lack of ready access to biodiversity information leads to unnecessary duplication of data gathering, management and interpretation efforts, particularly at EIA and/or project AA level. Moreover, time and cost implications of biodiversity data collation frequently result in a degree of 'cut and paste' amongst EISs. An international survey undertaken as part of this project has revealed that lack of knowledge on available datasets together with scale and quality considerations are the most common constraint to biodiversity data access and use. To resolve this, a centralised directory of biodiversity-relevant datasets (with a clear set of data collation and compilation standards) should be created, similar to that available in the National Biodiversity Data Centre (NBDC). This centralised directory can provide the means for automatically uploading and freely distributing existing biodiversity-relevant datasets and biodiversity data gathered during EIA and research campaigns. This accumulative database can significantly help control duplication, enhance data sharing and use, and assist in the assessment of in-combination effects⁸.

A review of plan/programme AAs undertaken in Ireland as part of this project has revealed that baseline surveys are, in many cases, either incomplete or nonexistent; highlighting the need to enhance **quality information and comprehensiveness of assessments**. It has been argued in international literature that existing species occurrence surveys, and resulting data, are biased towards some taxonomic groups and that data gaps and errors are not uncommon. Moreover, baseline is rarely detailed enough, and there is often insufficient understanding on other proposals,

⁸ See, for example, Scottish Executive website on SEA: www.scotland.gov.uk/Topics/Environment/environmental-assessment/sea/SEAG

to support cumulative effects assessment. In this context, the importance of scale becomes significant. Due to the lack of specifications in the relevant directives, while acknowledging that scale must be fit for purpose, EIA, SEA and AA practitioners have the responsibility and flexibility to identify and select the relevant scale(s) at which the assessment, and description of the baseline environment, should be performed. Ecological scale refers to the extent of the area surveyed and/or examined, as well as to the environmental variables affecting species diversity distribution (commonly influenced by habitat type – e.g. wetland habitats can have a larger zone of influence than a forest patch). The common practice of adopting the scale of available baseline datasets can potentially compromise data quality and accuracy of assessments. A multiple-scale approach is therefore recommended, making optimum use of available datasets at various scales, applying appropriate techniques to the scale of assessment, and acknowledging data availability, quality and scale limitations and associated uncertainties at each assessment stage.

Key recommendations to address current practice issues in setting up the baseline:

- **Description of the baseline at ecosystem level, including non-designated areas and species and addressing connectivity between designated sites, and potential for cumulative effects.**
- **Reporting data gaps and inconsistencies to acknowledge assessment limitations.**
- **Applying standardised methods for data collation and sharing (e.g. HC, 2011 or GBIF, 2011).**
- **Adopting a multiple-scale assessment approach to make optimum use of data.**
- **Preparation of Natura 2000 management plans and definition of conservation objectives.**
- **Creation of a robust and mandatory biodiversity data sharing mechanism (e.g. NBDC).**
- **Establishment of a data quality control body.**

2.3. SEA/EIA Definition of Alternatives & AA Stage Three (Ecological Solutions)

2.3.1. Procedural Considerations

EIA/SEA practitioners can adopt a proactive approach by identifying alternatives early in the planning and assessment processes, while AA only requires consideration of alternatives where Stage 2 has identified the potential for significant impacts in the assessed option. In addition, EIA and SEA look at broader environmental considerations (including biodiversity) when identifying reasonable and realistic alternatives; in contrast, AA focuses on identifying ecological solutions that specifically address the previously identified potential impacts on Natura 2000 sites.

The consideration of alternatives in general provides an opportunity to identify development scenarios that entail no significant risk for ecological features or assess alternative ways for accommodating the future development needs of the area within the constraints imposed by intrinsic biodiversity (and environmental) conditions.

The formulation of alternatives generally entails a minimum comparison between the 'do-nothing' and the proposed intervention, in order to also address the evolution of relevant biodiversity aspects without implementing the proposed project, plan or programme. It should however be noted that 'do-nothing' is ruled out as a reasonable/realistic alternative in Irish land-use planning as there is a legal obligation to produce a plan. Alternatives considered should reflect the scale of the project, plan or programme. Therefore, at higher planning tiers, alternatives generally entail broader and more strategic biodiversity conservation principles; at lower planning tiers or project level, alternatives focus on developments and land-use zoning options that ensure no

Alternatives should consider strategic ecological solution, and land use zonings and development specifications that ensure protection of sensitive biodiversity areas.

sensitive biodiversity features (i.e. qualifying interests) and/or areas are affected. In all cases, alternatives should be realistic and capable of implementation (Figure 2.8).

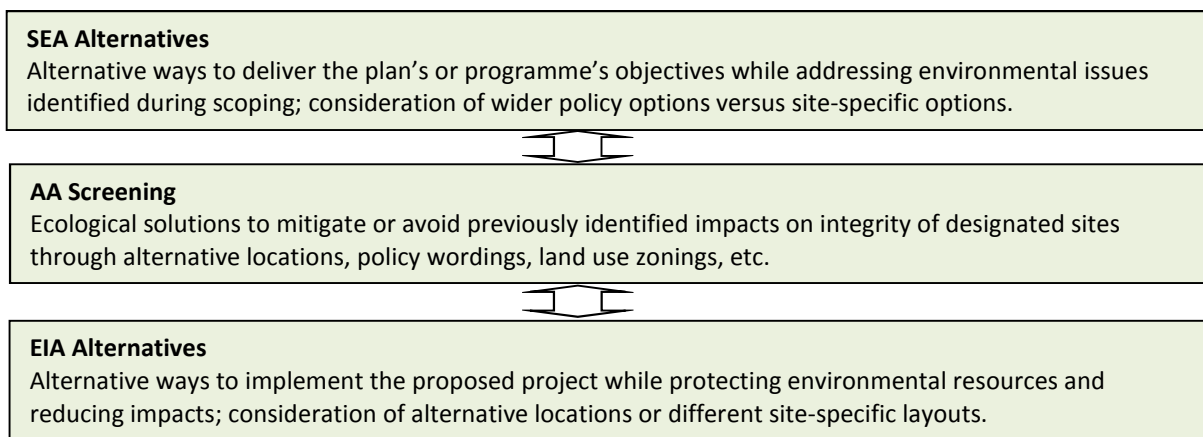


Figure 2.8. Existing linkages between various legislative instruments at the alternatives stage.

2.3.2. Integration of Legislative Requirements

SEA/EIA and AA stage 3 alternatives should be compatible.

AA ecological solutions should be incorporated into SEA/EIA for their assessment.

Article 5 of the SEA Directive requires that due consideration be given to reasonable alternatives; article 5 of the EIA Directive requires the provision of an outline of the alternatives considered. Similarly, Stage 3 of the AA process requires consideration of ecological alternatives where it has been identified that the proposal has the potential to significantly affect the integrity of Natura 2000 sites. Therefore, AA alternatives solely occur where a risk of impact on the integrity of the site/s is identified and cannot be easily mitigated (although in considering mitigation to prevent such a risk arising, alternatives may be considered and adopted).

AA alternatives commonly amount to a sub-set of SEA/EIA alternatives, if any, since they solely cover the Natura 2000 sites requirements of a plan/programme or project and, as such, do not address all biodiversity considerations (although, in some instances such as for designated wetlands, AA alternatives must take account of hydrogeological considerations). Although it is recommended that AA precedes SEA/EIA in the IBIA framework, defining the alternatives of all processes should be timed in order to permit all reasonable and realistic options to be considered and to ensure their compatibility and their applicability across the Directives. In the context of IBIA, ecological solutions developed in Stage 3 may occur on a par or at a later stage than the definition of alternatives required in SEA/EIA which occurs early in the assessment process. In all cases, the processes must be coordinated through ongoing communication between the assessment teams to ensure that the ecological alternatives developed at this AA stage are incorporated into the alternatives developed in SEA/EIA, and correspondingly assessed.

SEA and EIA have an additional role to play in relation to the Habitats Directive. AA does not address the requirements of Article 10 and Articles 12 to 16 in relation to connectivity and protection of annexed habitats and species outside the Natura 2000 network, and SEA/EIA are the appropriate strand of IBIA to identify alternatives that avoid any issues with regards to these Articles or, failing that, to identify the need to seek an IROPI derogation license under Article 12.

2.3.3. Geographical Scope, Supporting Data and Consultation

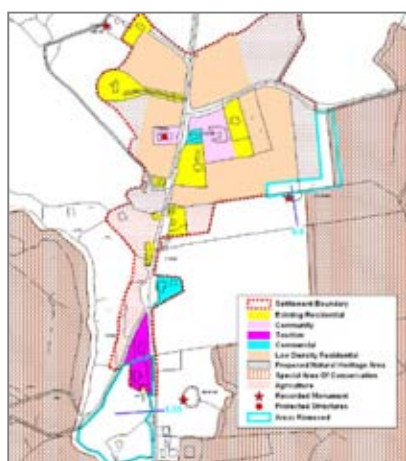
The geographical scope of the alternatives developed as part of the SEA/EIA process or AA Stage 3 is determined by the administrative or site boundaries of the proposed plan/programme or project respectively. Alternatives in SEA and EIA are commonly based on desktop approaches. SEA alternatives commonly entail land-use zoning and route options, or considerations of strategic policy objectives. In EIA, alternatives are more specifically linked to the intrinsic constraints of development sites (alternative sites rarely being considered), and provide additional site-specific detail on layouts and design solutions. AA Stage 3 looks at site- or project-specific ecological solutions for previously identified potential impacts on qualifying interests and, therefore, entails precise measures to mitigate such impacts within and outside European sites so as to avoid any effect on their integrity.

The development of alternatives can be undertaken in consultation with the planning authority and, where appropriate, the NPWS and relevant stakeholders. SEA/EIA and AA teams should also collaborate in developing alternatives to ensure their compatibility and consistency. This process can be aided by using baseline data and mapping outputs in a workshop environment (i.e. informal consultation between SEA, AA and planning teams; or between the developer and the planning authority for projects). In the context of land-use planning and individual planning applications, the spatial identification of biodiversity sensitivities supports devising and exploring land-use and development alternatives that avoid such sites and/or features. Incorporating knowledge and data on threats and pressures (e.g. climate change scenarios for temperature and sea level rise based on IPCC predictions⁹, or land-use change based on the EU MOLAND project on land-use and land cover dynamics¹⁰) can also help develop climate-proof and robust alternatives for biodiversity conservation. At higher planning tiers, alternatives may entail broad or generic biodiversity conservation strategies and may, therefore, be spatially undefined or vague in their application. Nevertheless, the legal constraints of Natura 2000 sites demand that such strategic alternatives are considered in relation to general proximity to, and impacts on, affected sites.

Alternatives should ensure that any potential impacts on biodiversity are mitigated.

Use baseline data to identify biodiversity vulnerabilities and develop alternatives around these.

Box 1. Case Study: Clare County Council - North, South, East and West Local Area Plans



One of the critical outcomes of the AA of these LAPs is a significant removal of zoned lands in some of the settlements. The AA includes alternative maps illustrating lands that are excluded from development due to their ecological sensitivity and/or proximity to European sites. The AA also proposes the inclusion of buffer zones around some SACs and SPAs to mitigate against any negative impacts.

Carron Settlement Plan illustrating in light blue the areas that have been removed from the proposed zoning (source: Clare Co.Co.).

⁹ <http://www.ipcc.ch/>

¹⁰ <http://moland.jrc.ec.europa.eu/>

2.3.4. Current Practice Issues and Actions

Current SEA practice, suggests **limited consideration of plausible alternatives**; these are arguably generated to fulfil the minimum requirements of the Directive rather than to consider comprehensively a number of reasonable and pragmatic ways for achieving the overall strategic goals. At EIA level, the consideration of alternatives is similarly weak, and usually limited to possible project-level options within the proposed location (some exceptions can be found in current practice, where alternative locations are explored on the basis of flood risk), rather than examining alternative locations or solutions. In addition, a review of Irish NISs and NIRs reveals that such wider alternatives are rarely considered at the AA Stage 3 exercises of identifying implementation choices that avoid adverse impacts on the integrity of Natura 2000 sites.



Alternatives are generally developed by the SEA, AA and planning teams – commonly in a workshop environment, or by the developer in consultation with the planning authority. However, there is a general **lack of consistent approaches** to their development. They are very occasionally assessed in a spatially-specific manner against site sensitivities, thus overlooking spatial repercussions and failing to give full consideration to intrinsic biodiversity (and related environmental) vulnerabilities in order to present means of mitigation. Moreover, in the context of biodiversity impact assessment, there is a common **lack of expert ecological input in the definition of alternatives** in both SEA and EIA.

Greater efforts are needed to develop realistic alternatives that take into consideration biodiversity (and other environmental) values and that can be effectively implemented. A way to achieve this is by adopting participatory approaches to their development and, where feasible, incorporating expert judgment into such process in order to objectively formulate feasible options. This helps ensure that they provide opportunities to deliver the objectives of the proposal while dealing with the issues identified during scoping and their spatial connotations (e.g. applying buffer areas that avoid development in river corridors which are linked to Natura 2000 sites). It is generally to be expected that, for the satisfactory completion of the AA process, expert ecological input will be required to reach an objective, scientifically-grounded conclusion.

Key recommendations to address current practice issues in defining alternatives:

- Development of alternatives as pragmatic strategic ecological solutions, land use zonings or development specifications that ensure protection of sensitive biodiversity areas.
- Taking into consideration intrinsic biodiversity (and environmental) vulnerabilities when defining alternatives.
- Adoption of a participative approach by engaging practitioners and stakeholders to ensure expert ecological input in the definition of alternatives.

2.4. SEA/EIA Assessment of Impacts & AA Stage Two (Appropriate Assessment)

2.4.1. Procedural Considerations

Biodiversity impact assessment seeks to examine proposed strategic alternatives and/or specific interventions in order to establish whether they are likely to improve, have a neutral interaction or conflict with biodiversity-relevant factors. While AA solely focuses on potential significant impacts on the qualifying interests, conservation objectives and/or integrity of Natura 2000 sites, SEA and EIA

take account of the wider environment. In the context of IBIA, biodiversity impact assessment shall encompass international and national designated areas and protected species, non-designated areas and species, and supporting features and resources (particularly water and other linear or stepping stone features, soil and climate). Therefore, the assessment of impacts should adopt an ecosystem-based approach, and consider not only Natura 2000 sites but also other connecting designated and non-designated areas, and environmental features which may fulfil important functions in the ecosystem, including providing corridors for migration and genetic exchange between populations (Figure 2.9).

Although there are no specifications on how to assess proposed alternatives in the SEA, EIA and Habitat Directives, expertise and knowledge on vulnerability of receptors as well as on changes to the environmental conditions resulting from the proposal are pre-requisites for an effective and precise assessment. Compiling appropriate baseline information and a set of well-selected biodiversity conservation objectives and indicators, such as those measured by the NBDC or Comhar¹¹, or the NBP's commitment to develop a set of headline indicators, can assist this process (Appendix C). The NBP adopts and applies a set of headline biodiversity indicators to inform the general public and decision-makers on the state and trends of biodiversity, pressures on biodiversity and the effectiveness of key policy measures; this set may also be applicable at SEA level. In the context of SEA and plan/programme AAs, the assessment may be made in broad terms. This entails the evaluation of proposed plan/programme objectives and policies against the existing biodiversity, sites and species, as well as supporting environmental parameters, and identifying any potential conflict between such objectives and/or policies and biodiversity conservation. In this case, the most common assessment technique is the application of matrix-based approaches based on expert judgment. In the context of EIA or project-level AA (as well as local-level SEA), impact assessment tends to rely on more quantitative approaches that anticipate the level of change on biodiversity indicators (e.g. quantifying the habitat area reclaimed for development, pollution or increase in the level of noise affecting particular species). In all cases, potential cumulative, secondary, synergistic, short, medium, and long-term effects should be highlighted, indicating whether they are positive or negative, their likely magnitude and extent, and whether they are likely to be temporary or permanent.

Impact assessment should take full consideration of all potential impacts on biodiversity (including designated and non-designated sites and species).

A cumulative effects assessment should be undertaken when addressing potential impacts on Natura 2000.

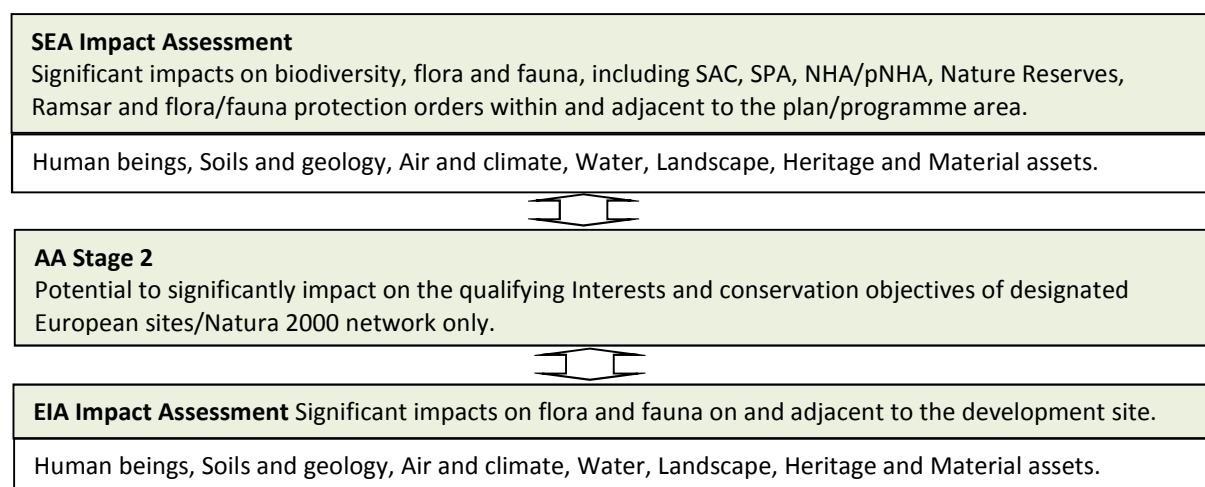


Figure 2.9. Existing linkages between various legislative instruments at the impact assessment stage.

¹¹ <http://www.comharsustainableindicators.ie/home.aspx>

A cumulative effects assessment approach, that takes into account the in-combination effects of plans/programmes or projects, should be used in determining the overall biodiversity effect a proposal may have, particularly in the context of Natura 2000 sites (for more detail, see Cumulative Effects Assessment Guidance published by EPA, 2012). This approach helps ensure that incremental effects on biodiversity resulting from the combined influence of various interventions (past, present and reasonably foreseeable future) are adequately assessed and managed. The starting point is determining the capacity of receptors (i.e. habitats or species) to absorb or assimilate change. Therefore, the quality of biodiversity receptors¹² (e.g. conservation status, population size, etc.) will give a good indication as to their ability to absorb anthropogenic pressure (e.g. if a receptor is already degraded or under stress, the significance of impacts arising from a new plan are likely to be greater). Based, for example, on the composite vulnerability of a given area (section 2.2.5), the assessment of co-occurring interventions or policies for that area can be assessed to determine their in-combination effect, and subsequently establish the magnitude of impact in relation to the relative vulnerability of the area.

2.4.2. Integration of Legislative Requirements

Both the SEA and EIA Directives require the assessment of potential impacts on environmental receptors (including human beings, flora, fauna, biodiversity, soil, geology, air, water, climate, landscape, heritage, material assets and inter-relationships between any components), while the Habitats Directive solely compels the assessment of impacts on Natura 2000 qualifying interests and conservation objectives.

IBIA should simultaneously consider the status of and threats on the wider environmental receptors, affecting designated and non-designated areas and species and their supporting conditions.

Provisions have, however, been made in Articles 4, 10, and 12 to 16 of the Birds and Habitats Regulations (DEHLG, 2011) to take into consideration the protection of birds and annexed species (e.g. flora protection orders) outside European sites from pollution and deterioration, as well as the protection of landscape features that are of major importance for wild flora and fauna. In addition, Annexes I and II of the Habitats Directive specifically refer to the cumulative nature of effects (i.e. in-combination with other plans and projects). Therefore, integrated SEA/EIA/AA processes must give due consideration to the status of, and threats on, the wider environmental receptors in order to address those requirements of the Birds and Habitats Directives that are not covered by the specific site-based AA processes and any in-combination effects. IBIA should simultaneously assess the potential for direct, indirect and cumulative impacts on both designated and non-designated areas and species.

2.4.3. Geographical Scope and Assessment Detail

Project-level impact assessment provides detailed site-specific data and issues.

Plan/programme-level assessments provide greater insight into habitat suitability, distribution patterns and potential cumulative impacts.

Impact assessment in SEA and EIA is commonly contained within administrative or site boundaries although, where applicable, relevant areas within the zone of influence of the plan/programme or project respectively are also included – these may include transboundary regions, sites and features (section 2.1.3). In current practice, an indicative 15 km zone of influence around the plan/programme boundary is generally adopted for assessing potential impacts on Natura 2000 sites; this area may, where scientifically appropriate, be scaled down for project-level assessments. In certain cases (e.g. projects

¹² These are increasingly being proposed. See, for example, evidence-based guidelines proposed by EIS Ltd. for the Grid25 Implementation Programme or capacity studies proposed by DETI for the Northern Ireland Onshore Renewable Energy Action Plan.

impacting on water quality or flow-volume in a river) the impact of plans or projects outside a 15 km zone may need to be considered, individually or for in combination impacts.

The strength of project-level impact assessment relies on capturing site-specific data and issues, thereby significantly contributing to and making use of local knowledge, inventories and ground-truthing. In contrast, plan/programme-level assessments provide a better framework for predicting impacts at a regional or national level for gaining a greater insight into habitat sensitivity and capacity, distribution patterns and potential cumulative impacts. Therefore, the lower the planning tier, the more specific the scope and the more defined the level of detail of impact assessments – as illustrated by the most common assessment approaches:

- **Ecosystem-based assessment.** It entails the prediction of generic loss of biological functions as a result of development policies and actions. It relies on expert knowledge regarding the interactions of different ecosystem components and is commonly applied at strategic level, using matrix-based approaches. The scale of assessment is dictated by the scale of the ecosystem processes under study in the wider landscape and, as a result, is mainly applicable in SEAs or regional/county-level AAs.
- **Habitat sensitivity/vulnerability assessment.** It examines the suitability of habitats with regards to quality, quantity and connectivity (commonly entailing habitat or green infrastructure mapping). This approach examines conservation status, suitability for species occupancy, persistence of communities, migration, dispersal and other biodiversity processes, enabling the use of predictive tools to anticipate potential impacts. This approach is often implemented using GIS. It is more commonly applied at county/local-level SEAs and AAs.
- **Site-specific assessment, also known as patchwork approach.** It mainly focuses on single sites, protected areas and protected species, more commonly associated with EIA and project-level AA. It relies on intensive site-specific data gathering, expert judgments and detailed quantification of impacts, sometimes supported by GIS. It often overlooks the wider scale of ecological processes and it is generally inadequate to ensure appropriate consideration of cumulative or in-combination effects.

2.4.4. Data Sources

Data gathered at the baseline stage may or may not be sufficient to assess the potential impact of the proposal on biodiversity. Additional data and/or ecological, hydrological or other relevant expertise may be required at this stage to fully assess the potential for significant impacts on biodiversity. A significant number of biodiversity-relevant datasets exist in Ireland (section 2.2.4 and Appendix A). However, the majority of existing national datasets have been created at small scale (i.e. low resolution). Detailed surveys (i.e. large scale) have been undertaken for numerous sites throughout the country, providing a scattered patchwork of highly detailed information for given taxonomic groups and habitats. Small scale datasets are generally suitable for predicting potential impacts at strategic level or higher planning tiers (which may or may not need further assessment at lower planning tiers or at project design stage); intensive surveys are likely to be needed to provide the necessary evidence to support detailed assessments at the local level. In all cases, the combination of multiple environmental data sources (including habitats, flora and fauna but also water, soils, air quality, etc.) is a pre-requisite for the assessment of in-combination or cumulative effects.

Combination of multiple data sources is a pre-requisite for the assessment of in-combination or cumulative effects.

Additional data may be gathered at this stage where the assessment detail may impose requirements for new data collation or creation. Although not commonly used in current practice, impact assessment processes can be enhanced through the application of modelling tools that simulate future changes resulting from anthropogenic changes (e.g. transformation of green area to

residential development) or exogenous factors (e.g. climate change) – see section 2.4.5. Therefore, modelling can also provide additional data for assessing the impact of different alternatives under varying scenarios, such as anticipated economic development or predicted climatic change.

2.4.5. GIS-supported Methodology: Approaches and Techniques

The most commonly applied impact assessment approaches include: matrix-based assessments (entailing the subjective assessment of impacts, often supported by expert judgment and GIS-based spatial analysis), GIS-based multi-criteria assessments (entailing more objective and spatially-specific approaches based on evidence-based datasets) and modelling (entailing objective and spatially-specific approaches but often based on assumptions due to the uncertainty associated with future scenarios). The adopted impact assessment approach may often be determined by the expertise within the assessment team, resource demands and timing. In all cases, it should be relevant to the assessment scale.

Matrix-based approaches are generally adopted where plan/programme objectives and/or policies are strategic and broadly defined (thus lacking specific details on actions and geographic locations), or when GIS or modelling expertise is lacking. The assessment method implies evaluating the proposed policies and/or objectives of the plan/programme against the previously established strategic environmental objectives (SEOs) which are commonly based on international legislation and treaties (Box 2). The assessment matrix can be improved by providing comments that support the assessment outcomes, particularly, when supported by expert judgment as well as basic spatial visualisation tools (biodiversity-relevant data can be visualised online, for example, at the EPA¹³, NPWS¹⁴ and NBDC¹⁵ websites). Additional relevant planning information can be found in Myplan.ie.

Box 2. Case Study: 2030 Vision – Transport Strategy for the Greater Dublin Area

The 2030 Vision SEA ER presents a good example of how to include the results of the AA into the impact assessment using the SEOs that have been prepared to address impacts on Natura 2000 sites. The SEA ER also pulls out the AA recommended policy-based mitigation measures so that the reader who has not digested the NIS is aware of the specific policies that have arisen out of the AA process.

Table 9.1 SEA results for the Preliminary Draft Transport Strategy

SEA Objective	Rating	Assessment
Biodiversity		
1. To avoid impacts on the integrity of European Conservation Sites (SACs and SPAs) and nationally designated sites (GNMAs).	0 to -2	<p>GIS analysis shows the location of Natura 2000 sites and the alignment of new or improved infrastructure included in the Strategy (Figure 7.1). A Habitats Directive Appropriate Assessment (Natura Impact Statement (HDA) Report has been prepared which identified 13 Natura 2000 sites for consideration in relation to the Strategy. The assessment has identified five prospective infrastructure projects that are included in the Strategy which could potentially result in significant direct impacts on Natura 2000 sites (see Section 3.1 of the HDA Report). No in-combination effects nor indirect effects have been identified that do not relate to Natura 2000 sites or types of impact that have already been identified. Mitigation in the form of amendments to the text of the Strategy has been proposed in regard to all of the identified potentially significant impacts (see Section 4 of the HDA Report). The five projects where mitigation in the form of amendments to the text is proposed are as follows:</p> <ul style="list-style-type: none"> • Development of the proposed Sutton to Sandycove Cycle Track: Measure WCY 13 of the Strategy (see Section 4.3 of the HDA Report); • Upgrades to the Northern Rail Line Upgrade: Measure RAIL 2 of the Strategy (see Section 4.4); • Upgrades to the Southern Rail Line Upgrade: Measure RAIL 2 of the Strategy (see Section 4.4); • Development of the proposed Navan Rail Line: Measure RAIL 4 of the Strategy (see Section 4.4); and • Development of the proposed Leinster Orbital Route road: Measure ROAD 3 of the Strategy (see Section 4.5). <p>In addition to these amendments to the text relating to specific projects, mitigation in the form of amendments to the text of the Strategy is also proposed in regard to the following:</p> <ul style="list-style-type: none"> • Additional Text describing the way in which the Strategy has been Appropriately Assessed throughout the period of its development has also been prepared (see Sections 5.1 and 5.2 of the HDA Report); and • Additional text discussing the retention of a route corridor for the sections of the Eastern Bypass that cross Dublin Bay. <p>Whilst the Strategy's recommendation is limited to the retention of a route corridor for this proposal, and it is not considered that retention of the route could in itself result in any negative impact on Natura 2000 sites, it is considered that this inclusion in the Strategy requires mitigation in the form of additional text highlighting significance of effects has been assessed. For all of the projects listed above except the Northern Rail Line Upgrade, the HDA Report concludes that provided the Final Strategy incorporates all of the mitigation measures that have been proposed in Section 4 of the Natura Impact Statement, it is considered that the Strategy's implementation will not result in any adverse effect on the Conservation Objectives of any of the Natura 2000 sites they affect, and hence there will be no adverse effects on the integrity of the Natura 2000 sites. The Northern Railway Line Upgrade has the potential for greater effects on the Natura 2000 sites of the Malahide, Rogerstown and Broadmeadows/Secords Estuaries. The detailed design at the project level is required to be able to determine whether there will be any adverse effects on the integrities of these sites. It would have to demonstrate that the requirements to the Habitats Directive could be met before the scheme could proceed. However there are a number of reasons to suggest at this stage that an upgrade which could meet the requirements of the Habitats Directive may be possible. Examples are listed below.</p>

Detail of SEA results for the draft Greater Dublin Transport Strategy (source: NTA).

¹³ <http://gis.epa.ie/>

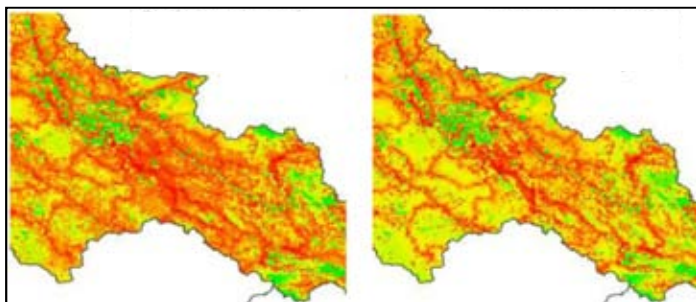
¹⁴ <http://www.npws.ie/mapsanddata/>

¹⁵ <http://maps.biodiversityireland.ie/#/Map>

Biodiversity impact assessment processes and outputs can be enhanced by **GIS-based spatial approaches** that examine the location and spatial distribution of sensitive habitats and species. This is of particular significance in spatial planning and project design, where the potential significance and magnitude of biodiversity impacts is largely dependent of the spatial location of proposed interventions and their proximity to affected designated and non-designated receptors (i.e. habitats and species). The application of GIS tools has the potential to provide significant insights for biodiversity conservation by providing quantitative and spatially-specific evidence base and predictions. GIS enable optimal use of scarce data while taking into account cumulative, widespread, off-site and long-term effects (sections 2.1.5 and 2.2.5). Evaluating co-occurring biodiversity and related environmental resources and/or sensitivities can help address cumulative effects, by determining the assimilative capacity of the receptors to change. This composite assessment of biodiversity vulnerability is particularly relevant in spatial planning, as overlaying the mapped outputs of such an assessment with the proposed intervention/s can help readily determine the potential for in-combination effects of the various actions. In addition, GIS weighted-overlay tools enable the incorporation of expert opinion in relation to the sensitivity of habitats and species and their vulnerability to a given development proposal, thus assigning a significance weight to each biodiversity dataset and emphasising their relative importance. In this context, an **ecosystem-services approach** may also be incorporated into the assessment. Ecosystem services are the benefits people obtain from ecosystems (such as food and water, regulation of floods, drought and land degradation, soil formation and nutrient cycling, ambience and recreation). Therefore, the ecosystem-services approach entails assigning service values to biodiversity components, in a similar way to that of significance weights in a GIS platform, and using these values to inform decision-making. Given that value judgments can be subjective, it relies on expert knowledge regarding the interactions of different ecosystem components, and values must be agreed with the proponent and

Box 3. Case Study Example: Globio-Clue Decision Support Tool

GLOBIO-CLUE decision support tool (developed by Aidenvironment based on the work of the Netherlands Environmental Assessment Agency and Alterra, Wageningen University) enables assessing the impacts of human-induced land use changes on terrestrial biodiversity, based on cause-effect relations between pressures and biodiversity impacts. The model uses a composite indicator that describes the “naturalness” of an area compared with its undisturbed situation, combining ecosystem extent and quality; also calculating specific indicators such as mean species abundance. It assesses the effect that land use change interventions/policies have in such naturalness. For more information see: www.aidenvironment.org.



Detail of the North West region in Vietnam, illustrating mean species abundance for the year 2020 according to business as usual (left) and forest conservation policy (right) options. Remaining biodiversity is 6% higher in the conservation option (source: Aidenvironment).

planning and consent authorities.

Impact assessment can be further enhanced by incorporating **GIS-based modelling** tools that enable simulation of future conditions (e.g. anticipating future changes in wildlife corridor connectivity resulting from the implementation of a proposed plan, or changes in climatic conditions, flood risk and air pollution affecting species distribution). Model simulations can be subsequently incorporated into the assessment and examined to more objectively predict likely impacts (Box 3). They enable linking habitat loss, fragmentation, degradation and/or disturbance impacts to the overall objectives

for biodiversity, and in this way provide a transparent and spatially-specific evaluation of plan/programme/project alternatives. Nevertheless, models are subject to uncertainty and the assumptions made need to be clearly reported. Moreover, long-term data are needed for model validation; the absence of such data limits the applicability of models in impact assessment.

2.4.6. Consultation and Communication

The SEA/EIA and AA teams should maintain regular communication to share and compare assessment outcomes in order to ensure that all potential impacts on biodiversity are identified, examined and appropriately considered (section 2.1.6).

SEA/EIA and AA teams should share and compare assessment outcomes in order to identify, examine and appropriately consider all potential biodiversity impacts.

Although there is no statutory requirement for consultation during this assessment stage, key stakeholders (including the scientific community) may be informally consulted to identify any updates on sensitive biodiversity issues, conservation objectives and/or threats and pressures on habitats and species that may influence the identification and significance of impacts.

2.4.7. Current Practice Issues and Actions

Biodiversity is addressed under different sections in SEA/EIA due to the inter-relationship and, in some cases, interdependence of habitats and flora and fauna communities with other environmental receptors such as water, soil or the landscape. As a result, there is often an **overlap between the different sections** and, for example, Natura 2000 designations may be referred to under surface waters, flood risk, fisheries or landscape amenity sections. Although this overlap is inevitable and often necessary, the 'biodiversity, flora and fauna' section (or 'flora and fauna' in the case of EISs) should provide a comprehensive and thorough overview of all relevant biodiversity considerations and significant impacts. This should include an understanding and assessment of the **'general' biodiversity** by embracing ecosystem based approaches that encompass designated and non-designated areas and species and give due consideration to ecological connectivity. Similarly, wherever relevant, it should give adequate consideration to other issues and threats such as those associated with invasive species and genetically modified organisms (GMOs) and to the potential of proposed plans, programmes, projects and activities to contribute positively or negatively to the exclusion, control or eradication of such species and organisms.



Current practice suggests a general **lack of quantification of impacts**, mainly due to data limitations as confirmed by a review of AAs undertaken in Ireland as part of this project. Impacts are quantified where the proposal has a strong technical element (e.g. water supply programmes) or at project level, where sufficient detail on the proposed development is provided and field surveys are undertaken to more accurately measure the significance and magnitude of impacts. This issue can rarely be solved at plan/programme level, where the quantification of impacts is constrained by the strategic nature of proposals that entail broad policies and objectives that are deficient in detail and by **data and resource limitations**. In such cases, the assessment

should be based on scientifically comprehensive (albeit qualitative) data and information; and recommendations should be made to remediate identified data/information gaps. The assessment

method for impact identification should fit the scope and scale of proposal. As a result, a wide range of assessment methods and resolutions (i.e. level of detail) can be encountered in practice, inhibiting comparability of results between assessments as well as effectiveness of biodiversity impact assessment across the different regulatory processes. The selection of the optimum assessment method can often be inhibited by the lack of or limitations with 'know-how' as well as by data quality and scale. For example, GIS-based approaches are considered to have the potential to spatially assess and quantify biodiversity impacts. However, evaluation of biodiversity data may prove problematic if sufficient skills are not available or if data quality, gaps, frequency or scale issues apply (e.g. some datasets available online are outdated, and the lack of standards for data collation generates spatial datasets at multiple scales that result in positioning inaccuracies when combining them in GIS). Best practice notes should be developed in this regard to promote the adoption of consistent and comparable biodiversity impact assessment methods, to establish standards for data collection and presentation, so as to facilitate data management and analysis, and to enhance the transparency of outputs by recognizing any data limitations.

Cumulative effects assessment in SEA/EIA and assessment of in-combination effects in AA are generally inadequate. It is widely acknowledged that EIA and project-level AA have limited capacity to address cumulative effects. However, it is also recognized that SEA provides the opportunity to evaluate the full range of cumulative or in-combination effects. Nevertheless, the incremental effects that the proposed plan/programme may have when combined with other relevant plans/programmes are often overlooked, and where they are addressed the investigation of cumulative impacts may be inappropriate or insufficient in reaching conclusions. Treatments of cumulative effects are generally determined judgmentally, rather than being a systematic approach supported by relevant scientific data. The assessment of cumulative effects should be an integral part of SEA and AA processes. Current shortcomings should be addressed by highlighting the requirements of the SEA Directive for the evaluation of cumulative and synergistic effects, as well as those of the Habitats Directive that compel the likely significant effects of a plan in the integrity of Natura 2000 sites to be assessed in combination with other plans.

Key recommendations to address current practice issues in impact assessment:

- **Assessment of potential impacts on designated and non-designated sites and species and 'general' biodiversity (reflection of AA findings in SEA/EIA).**
- **Provision of scientifically comprehensive and, as far as possible, quantitative results.**
- **Adoption of impact assessment techniques that fit the scale and scope of the proposal.**
- **Assessment of cumulative effects as an integral part of SEA and AA processes.**
- **Development of best practice notes to promote the adoption of consistent and comparable biodiversity impact assessment methods.**

2.5. SEA/EIA Mitigation and Monitoring & AA Mitigation

2.5.1. Procedural Considerations

In the context of IBIA, mitigation measures are put forward to prevent, reduce and, as fully as possible, offset any predicted significant adverse effects on biodiversity and biodiversity-supporting features of implementing the proposal. They are formulated based on impact assessment results and enable integrating SEA/EIA and AA findings into the proposal.

Mitigation measures can generally be hierarchically divided into those that:

- Avoid the identified potential effects – which generally entail removing plan/programme objectives and/or actions, or project specifications (including, where appropriate, location) that have an impact on biodiversity;

- Reduce the magnitude, extent, probability or severity of potential effects – which commonly entails re-wording of plan/programme objectives or actions, introducing new actions, amending certain project specifications or devising new specifications; and
- Offset effects after they have occurred – which entail devising positive measures to compensate for biodiversity impacts deriving from unavoidable actions (this is often the case in light of a statement of case for IROPI). This option is considered, to some extent, a remedial action.

Mitigation measures derived from SEA/EIA and AA should be compatible and simultaneously considered for their incorporation into the proposal.

Mitigation measures derived from the relevant assessments need to be compatible and simultaneously considered for their incorporation into the proposal. Mitigation measures from AA, in particular, need to be reflected in the proposal.

Monitoring arrangements are required under SEA (and advised with EIA) in order to identify at an early stage unforeseen adverse effects of plan implementation or project development and to undertake appropriate remedial action. Monitoring also enables addressing any identified data gaps (through additional data gathering to be subsequently used during the plan/programme reviews or at project level). The methods and frequency of monitoring and reporting are not prescribed. The nature (e.g. quantitative or qualitative) and level of detail for monitoring depend on the scope of the proposal and its predicted biodiversity (and environmental) effects. Indicators formulated or selected during the assessment process (Appendix C) are generally measured, and existing monitoring arrangements are commonly used if suitable and appropriate. Although AA processes do not formally require the definition of monitoring arrangements, indicators and targets for Natura 2000 sites should be specified as part of SEA/EIA monitoring (Figure 2.10). This may also include hydrological monitoring under the WFD river district basin plans for water dependant habitats. The monitoring programme should include provisions allowing for flexibility without impairing its scientific integrity. This could be achieved by making allowance for adjusting what and how to monitor based on what initial monitoring results reveal. Moreover, adopting a long-term view when devising monitoring measures could facilitate bringing monitoring efforts together, and thus undertaking joint monitoring of plans/programmes and projects in the same geographic area. Monitoring results should be collected in a centralised database to inform future proposals and impact assessments.

SEA Mitigation and Monitoring

Measures to avoid, reduce or remedy any impacts on biodiversity, flora and fauna on designated and non-designated areas and species within and adjacent to the plan/programme area.
Biodiversity, flora and fauna indicators and targets (including Natura 2000 sites, but also other national and international designations and non-designated areas and species).

Human beings, Soils and geology, Air and climate, Water, Landscape, Heritage and Material assets.



AA Mitigation

Measures to avoid, reduce or remedy any impacts on Natura 2000 sites.



EIA Mitigation and Monitoring

Measures to avoid, reduce or remedy any impacts on flora and fauna on designated and non-designated areas and species within and adjacent to the development site.
Flora and fauna indicators and targets (including designated and non-designated areas and species).

Human beings, Soils and geology, Air and climate, Water, Landscape, Heritage and Material assets

Figure 2.10. Existing linkages between various legislative instruments at the mitigation and monitoring procedural stage.

2.5.2. Integration of Legislative Requirements

Article 9 of the SEA Directive requires a description of how environmental considerations have been integrated into decision-making; mitigation measures constituting the common approach to such integration. In contrast, Article 5 of the EIA Directive specifically requires a description of the measures envisaged in order to avoid, reduce and, if possible, remedy significant adverse effects. These are commonly defined as conditions under planning permission, explicitly stating the location, quality, character, duration and timing of the measures to be implemented.

Mitigation measures should be based on the precautionary principle.

Monitoring reports are essential for assessing how the plan is meeting its biodiversity targets.

Article 6 of the Habitats Directive compels the avoidance of deterioration of designated habitats and disturbance of protected species. In the case of AA, mitigation measures may be implemented to reduce or offset negative significant effects in order to enable passing the AA tests. Moreover, where a statement of case for IROPI is invoked, mitigation measures take the form of compensatory measures to ensure that the overall coherence of Natura 2000 sites is protected. In all cases, mitigation measures aim to address any significant impacts on biodiversity and the environment, in accordance with the precautionary principle. Nevertheless, AA

mitigation is substantially more specific than SEA/EIA mitigation, as it is a statutory requirement, and it only arises where possible significant effects are identified and assessment proceeds to Stage 2 (i.e. only avoidance is permissible in AA screening, and compensation or measures that merely reduce the impact of a plan or project may only be considered where it is proposed to invoke the IROPI provisions of Article 6(4) of the Habitats Directive).

Article 10 of the SEA Directive requires that significant environmental effects of implementing the plan/programme are periodically monitored in order to identify at an early stage unforeseen adverse effects. While there are no explicit monitoring requirements in the EIA Directive, monitoring predicted effects is implicit in the identification of mitigation measures (Article 5) and site-specific monitoring conditions are often attached to planning consent. There are no official requirements for establishing monitoring arrangements as part of AA processes but the Minister for Arts, Heritage and the Gaeltacht has powers to carry out, or to cause to be carried out, surveillance and monitoring under Regulation 9 of the Birds and Habitats Regulations. However, monitoring of Natura 2000 sites is often incorporated into SEA monitoring and this represents best practice. Monitoring reports, although not commonly prepared in current practice, are essential for assessing how the plan is meeting its biodiversity targets. Monitoring results provide the empirical basis for early detection of anticipated or unforeseen negative changes and, therefore, can help improve plans/programmes and projects as well as ensure the IBIA objective of no adverse effects in designated and non-designated habitats and species.

2.5.3. Geographical Scope, Supporting Data and Consultation

The geographical scope of mitigation and monitoring measures is based on the geographical scope adopted for the assessment (i.e. it may be determined by administrative boundaries or by the zone of influence of the proposal). At SEA level, mitigation measures are formulated strategically to prevent, reduce and as fully as possible offset any significance adverse effects on biodiversity and the environment resulting from the implementation of the plan/programme. At EIA level, detailed mitigation measures at planning and design level are commonly provided to avoid, minimise or remedy adverse impacts, and ensure that residual adverse impacts are kept within acceptable levels. The planning hierarchy determines the level of detail of AA mitigation measures (as per SEA and EIA). These measures focus on preventing, and where there has been a statement of case for IROPI, reducing and as fully as possible offsetting or compensating for any significance adverse effects on the integrity of Natura 2000 sites only. Monitoring measures in relation to Natura 2000 sites are

often incorporated into SEA monitoring where SEOs overlap with protection of European sites and wildlife connectivity (Box 4).

Mitigation measures are commonly formulated using expert judgments based on baseline and impact assessment findings, ideally in consultation with the NPWS. Therefore, they may not necessarily require additional data collation or use. In all cases, any spatially-specific mitigation measures arising from SEA/EIA or AA should be mapped and referred to in future plans and projects, (e.g. bat houses on roads, underpasses, habitat creation, etc.). In contrast, monitoring arrangements require the collection and collation of new data, based on previously established indicators (section 2.4.1) and therefore, should be spatially-specific and mapped as far as feasible. These indicators may be linked to existing monitoring arrangements and, as such, monitoring results may be obtained from third party sources (Appendix A). It is important not only to have access to monitoring data, but to have the necessary ecological expertise (and, depending on the proposal, hydrological, geophysical and other relevant expertise) to engage in data interpretation, preparation and presentation.

Mitigation measures should be based on assessment results and fit the scale and scope of the proposal.

Consultation can help ascertain existence of relevant monitoring schemes.

Box 4. Case Study: Lee Catchment Flood Risk Assessment and Management Study (CFRAMS)

The CFRAMS included SEA and AA processes that run in parallel and allowed the overlap of data collection and description of the baseline environment to cover the requirements of both processes. When it came to the drafting of strategic objectives, these clearly used information collected during the AA on the Natura 2000 sites. The reference to the monitoring of conservation status of designated sites is an important linkage between the standardised use of indicators in SEA and the AA process, where monitoring is not a statutory requirement.

	Objective	Sub-objective	Indicator	Minimum requirement	Aspirational target
Env C	Avoid damage to, and where possible enhance, the flora and fauna of the catchment	Avoid damage to, and where possible enhance, internationally and nationally designated sites of nature conservation importance	Reported conservation status of designated sites relating to flood risk management	No deterioration in the conservation status of designated sites as a result of flood risk management measures	Improvement in the conservation status of designated sites as a result of flood risk management measures
		Avoid damage to or loss of habitat supporting legally protected species and other known species of conservation concern and where possible enhance	Population sizes and/or extent of suitable supporting legally protected species and other known species of conservation concern (target species)	No net decrease in population sizes of and/or loss of extent of suitable habitat supporting target species	Increase in population sizes of and/or loss of extent of suitable habitat supporting target species as a result of flood risk management measures
		Avoid damage to or loss of existing riverine, wetland and coastal habitat, to maintain a naturally functioning system	Area of riverine, wetland and coastal habitat protected or created/restored as a result of flood risk management measures	No net loss or permanent damage to existing riverine, wetland and coastal habitat as a result of flood risk management measures	Increase in extent of riverine, wetland and coastal habitat as a result of flood risk management measures

Detail of proposed monitoring indicators of the Lee CFRAMS (source: OPW, Cork City Co. and Cork Co. Co.)

There are no requirements for consultation at this procedural stage. However, planning and SEA/EIA and AA teams should maintain communication in order to validate mitigation measures deriving from the various processes, and ensure that they are consistent and compatible. In addition, informal consultation with other organisations (e.g. EPA, NPWS, etc.) may be necessary to ascertain the

existence and specifications (including location and frequency) of relevant monitoring schemes, as well as appropriateness of proposed monitoring.

2.5.4. Current Practice Issues and Actions

A review of AAs and SEAs undertaken as part of this project revealed that mitigation measures proposed in early high-level planning SEAs were commonly based on determining the need for further AA at lower planning tiers. Practice has improved and most recent SEAs avoid **passing down AA requirements** by setting provisions to deal with certain issues at project level and by providing specific mitigation measures to protect European sites. However, some confusion remains over the use of some types of policies to mitigate impacts. There is a general lack of appreciation of types of



compensatory measures that can be recommended if required, and the level of uncertainty in relation to project specifications still may lead to passing the AA requirement down to project stage. **Limitations with AA mitigation** have also been observed: although only required if Stage 2 identifies significant effects on qualifying interests, the review of AAs identified that mitigation is regularly proposed without proceeding to Stage 2 (such mitigation being incorporated into the proposal in the form of rezoning of lands or amendments to the project rather than standard building mitigation). This is contrary to EU guidance which sets that **screening should be carried out in the absence of any consideration of mitigation measures** (i.e. only avoidance is permissible in such cases).

If mitigation measures are considered at screening stage to avoid or reduce potential significant impacts on European sites, the assessment recognises the risk of a significant impact and, therefore, it should proceed to Stage 2.

Basic monitoring proposals, based on existing monitoring programmes, are generally included in SEA reflecting budget, resource and data availability constraints. SEA monitoring often includes protection of Natura 2000 sites (thus addressing AA aspects) but is only generically measured as conservation status or percentage of protected area. Although monitoring aims to address any identified data gaps, in some cases, it is generally management oriented and, in land-use planning, tends to be used to inform the review of the plan/programme. At EIA level, monitoring is generally vague and non-committal unless attached to planning or licence consent (such as IPPC). In the context of **AA**, **there is no explicit legal imperative to follow-through** and thus monitoring is not implemented unless linked to SEA or EIA conditions; however Articles 6(1) and 6(2) require ongoing monitoring if they are to be effectively implemented. This is addressed in Regulation 9 of the Birds and Habitats Regulations (DAHG, 2011), with the primary responsibility for monitoring or establishing monitoring requirements resting with the Minister for Arts, Heritage and the Gaeltacht. An approved proposal can become non-compliant by failure to adhere to the conditions attached to consent. Such conditions, if imposed for the purposes of avoiding or mitigating any potential damage to a Natura 2000 site or to the environment, need to be policed. It is not essential that every project be checked, but a sufficient proportion of projects should be inspected for compliance with conditions to act as a real deterrent/incentive for compliance. It is considered that planning authorities should vigorously pursue any breaches of conditions imposed in granting planning permission for the purpose of protecting Natura 2000 sites. In the context of IBIA, all biodiversity impact assessment processes should consider monitoring and, moreover, AA should embrace monitoring by availing from existing NPWS monitoring arrangements. In order to enhance monitoring schemes, collective monitoring approaches could be explored; SEA monitoring proposals could promote AA monitoring down to project level. In all cases, monitoring protocols should provide a good understanding of scale and

temporal variation to communicate monitoring results in an efficient manner and address any uncertainty aspects. Indeed, coordinated follow-up and enforcement is an essential sequel to an effective IBIA process.

Key recommendations to address current practice issues in mitigation and monitoring:

- **Provision of specific mitigation measures to protect designated sites, and specification of aspects to be dealt with at lower planning tiers or project level.**
- **Avoidance of impacts during AA screening, mitigation for AA Stage 2 only.**
- **Full incorporation of proposed mitigation measures and recommendations into the proposal.**
- **Monitoring arrangements to fit scale and scope of the proposal and avail, as far as possible, of existing monitoring arrangements (e.g. NPWS for Natura 2000 sites).**
- **Proactive biodiversity monitoring to ensure implementation of mitigation and early identification of any predicted/unforeseen adverse impacts (and immediate remedial action).**
- **Monitoring results to be made available to the consent authority and the general public.**
- **Creation of a mechanism to inspect the effective implementation of proposals and associated mitigation (i.e. consent conditions).**

2.6. Reporting

2.6.1. Integrated Biodiversity Impact Assessment Reporting

The legally-conforming outputs of IBIA process should be reported in an integrated albeit discrete manner:

- The outputs and findings of AA need to be reported in a stand-alone NIS (for projects) or NIR (for plans and programmes) to fulfil the legislative requirements of Article 6 of the Habitats Directive, and the Birds and Habitats Regulations.
- Where SEA/EIA is required, in addition to AA, the ‘flora and fauna’ requirements (and ‘biodiversity’ in the case of SEA) of the relevant SEA Environmental Report (ER) or Environmental Impact Statement (EIS) need to take into consideration and report on any relevant information, data and findings of the AA (Table 2.2). Where feasible, it is recommended that AA findings are documented in the main body of the SEA ER or EIS (or that AA findings are reflected in SEA/EIA) and that the NIS/NIR is provided as an Appendix.

The incorporation of mapped analysis and results into the final report (SEA ER, EIS or NIS/NIR) can contribute to a clearer and more transparent communication of assessment findings. In all cases, the legal consequences of the various SEA/EIA and AA findings need to be clearly stated, noting which proposed mitigation measures and recommendations derive from which process, and recognising the far greater statutory implications of AA. In this regard, the Birds and Natural Habitats Regulation 47 (DAHG, 2011a) requires a clear distinction to be made in terms of scope and conclusions between AA and SEA/EIA, while permitting these assessments to be carried out concurrently and drawing on common data and information. All proposed mitigation measures should be included in the plan/programme, and any residual effects following mitigation acknowledged. Where relevant, mitigation measures should also be attached as a condition for the approval of projects. Where a proposal is being turned down, the reason(s) for its rejection need to be clearly stated with reference to the relevant Directive(s) and transposing law.

SEA/EIA Section	Integration of Biodiversity Considerations
Non Technical Summary	Recognition of biodiversity as a component of SEA/EIA. Inclusion of a summary on baseline conditions, identified impacts on biodiversity and proposed mitigation (including designated and non-designated areas and species).
Description of plan, programme or project including alternatives	Coverage of biodiversity issues in the background of the proposal. Incorporation of ecological variables and biodiversity aspects in the formulation of alternatives.
Description of baseline conditions	Description and due consideration of protected areas and species, conservation status and qualifying interests of Natura 2000 sites, non-designated areas and species, significance (e.g. movement and dispersal, ecosystem services, population size and dynamics), supporting features (e.g. water, soil, air and climate), sensitivity/vulnerability, threats (e.g. urban pressure, habitat modification, fragmentation), and conservation priorities.
Evaluation of alternatives and significance of impacts	Recognition of drivers of change in biodiversity associated with each alternative. Assessment of cause-effect relationships between proposed interventions and biodiversity features/receptors. Due consideration to direct, indirect and cumulative impacts on designated and non-designated areas and species. Inclusion of AA findings.
Proposed mitigation measures	Identification of specific measures for biodiversity (e.g. conservation or restoration plan) specifying type of mitigation (e.g. avoidance, mitigation, compensation or enhancement) for designated and non-designated sites and species.
Proposed monitoring	Inclusion of specific biodiversity indicators (including Natura 2000 sites). Allocation of responsibilities for monitoring biodiversity indicators, frequency of monitoring (taking into account seasonal variability) and proposed remedial action/s.
Annex/es	Inclusion of NIS/NIR, where applicable.

Table 2.2. Reporting Checklist.

A centralised repository or record of SEAs, EIAs and AAs undertaken should be maintained indicating the nature of the proposal, its location, the assessment findings and the proposed mitigation. This would help with monitoring and reporting and, most importantly, assist in cumulative effects assessments.

Key recommendations for reporting:

- Reflect AA findings in the SEA/EIA, and report on ‘full-range’ of biodiversity impacts.
- State the process/es from which proposed mitigation measures derive to acknowledge their legal implications.
- Incorporation of mapped results into SEA ER, EIS or NIR/NIS.
- Incorporation of all mitigation measures (i.e. AA and SEA/EIA findings) into the plan/programme or project.

2.6.2. Data Creation and Dissemination

A good biodiversity baseline is crucial for effective IBIA. Biodiversity data in Ireland mainly derive from SEA, EIA and AA studies, conservation management research and inventories, and academic research. Varied, and often diverging, methods of data collation are applied in these areas, commonly leading to difficulties for comparing datasets among studies/projects and geographical areas. The application of standards for data creation (through site surveys, inventories, remote sensing, mapping, etc.) is critical to optimise data consistency, comparability, management and re-use. Several efforts have been made nationally and internationally to standardise data creation and classification.

The recently published guidance on habitat survey and mapping (HC, 2011) represents the first attempt to present a unified methodology for habitat survey and classification in Ireland. The

guidance provides detailed specifications for: determining the scope of the habitat survey in line with survey objectives; undertaking review of desktop information to assist field survey work; carrying out field-based habitat survey and mapping; compiling the final habitat survey GIS database, other data and project report; and interpreting the results. The guidance makes a series of recommendations with regards to habitat classification, parameters for determining the scope of the survey, and tools and methods for field surveys, among others. Similar efforts have been made by the NBDC to standardise biological records collected in Ireland by setting out the key aspects to be recorded in the field, including specifications on how to take a grid reference when surveying a site (see: <http://www.biodiversityireland.ie/wp-content/uploads/Taking-a-grid-reference.pdf>). For this purpose the use of GNSS, such as the widely applied Global Positioning Systems (GPS), is an essential navigation aid during field-work and in recording locations of features of ecological interest as survey points. These recordings, and all the associated information collected at that point (e.g. habitat type, species name, taxonomic group, abundance, and environmental variables such as temperature or humidity) can subsequently be transferred to GIS for mapping and spatial assessment. The early creation of a key biodiversity issues map (compiling all relevant field surveys and third party datasets) can significantly inform the assessment process and its outcomes.

Through the Global Biodiversity Information Facility (GBIF), international digital biodiversity data are being made freely and openly available via the Internet for practitioners, researchers, decision-makers and the general public. In order to seamlessly combine datasets, GBIF promotes a suite of standards that can be used to capture, publish and discover primary biodiversity data. The NBDC is a member of the GBIF; biodiversity data contained in the NBDC database is incorporated into the GBIF portal to ensure that future international and global maps include Irish data. The link between both organizations ensures compatibility between adopted biodiversity data standards. In this context, it is recommended that data collated during SEA/EIA and AA are compliant with such standards. Moreover, the establishment of measures to ensure that biodiversity data deriving from impact assessment processes is in the public domain should be prioritised. The incorporation of such data into the NBDC database would ensure their national and international distribution and, more importantly, facilitate data sharing and access among Irish practitioners.

Key recommendations for data creation and dissemination:

- **Adopt existing national standards for data gathering, creation and classification (e.g. HC, 2011).**
- **Make biodiversity data available to the NBDC for their national and international distribution.**
- **Establish a mandatory requirement for data sharing.**

2.6.3. Metadata

Metadata (defined as information describing spatial datasets, and commonly understood as ‘data-about-data’) allows the inventory of and access to datasets, as well as establishing their fitness for use (i.e. quality) and their fitness for purpose (i.e. usability).

Several metadata standards had been developed (e.g. Dublin Core and the International Standards Organisation’s (ISO) 19115:2003 Regulations) before the publication of the INSPIRE Directive (CEC, 2007b). Metadata standards are adopted by spatial data producers, and provide information about the identification, extent, quality, spatial and temporal schema, spatial reference, and distribution of digital datasets, among other aspects. The INSPIRE Directive and Regulations establish requirements for the creation and maintenance of metadata for the themes listed in the Directive’s Annexes (including protected sites, habitats and biotopes, and species distribution) to ensure that spatial datasets are compatible and usable in a community and transboundary context.

In the context of biodiversity, these standards have been adopted by the NPWS and the NBDC. The minimum set of parameters (or mandatory fields) to be provided when submitting data collections, and thereby comply with INSPIRE (and ISO 19115) Regulations, are presented in Table 2.3. Note that optional fields may vary between organisations, and that additional parameters may be requested in some cases.

Field Name	Description
Mandatory Fields	
Title of the dataset	Name of the dataset, generally associated with the taxonomic group, survey purpose/location or project name.
Dataset creator/surveyor	Name of organization/individual who has created/collected the data.
Contact details of data creator/surveyor	Commonly entailing address, telephone number, e-mail address.
Source	Including reference source of information of previous surveys/studies.
Format	Common categories: digital, paper copy, database/spreadsheet, etc
Description of the dataset	A brief description of the dataset contents and purpose, including sampling or data creation method, habitat type or species name and location.
Purpose of data capture	Acknowledge links to research or impact assessment study.
Relation	To other existing datasets, if any, or survey areas (e.g. sheet 1 of n of a given survey).
Geographic coverage	Referring to the spatial extent of the surveyed area or the area covered by the digitized dataset (or grid reference).
Survey/data creation date	Start and end date of surveys, or data creation date/year.
Status of dataset	Common categories: completed, partial coverage, under review, published, etc.
Data quality	Adopted quality standards during data creation/capture (commonly associated with survey methods, detail of data creation and quality control).
Data rights	Common categories: free distribution, property of, license agreement.
Relevant Optional Fields*	
Note that additional optional and conditional fields are identified in the ISO and INSPIRE Regulations	
Keywords	Headwords that describe the dataset (e.g. taxonomic group, habitat type, survey location, etc.)
Link	URL link to the data (for data download or access)
Language	Language in which data was created
Resolution	Scale of data creation (e.g. 1km ² versus 1m ² grids)
Metadata standard	Dublin Core, ISO 19115 or INSPIRE Regulations

Table 2.3. Minimum set of parameters to be provided when creating metadata.

Datasets should be accompanied by sufficient metadata information to enable their inventory and discovery which in turn facilitates the immediate identification of their fitness for use. Metadata can be provided in text, spreadsheet or XML format. Although an array of tools exists to assist in the production of metadata, an INSPIRE-compliant metadata tool is available online (see: www.inspire-geoportal.eu/InspireEditor/).

Key recommendations for metadata creation:

- Enforce the provisions of the INSPIRE Directive for metadata creation.
- Provide sufficient metadata information and comply with established national standards for metadata creation.

2.7. High Level Recommendations

In order for IBIA to be effectively implemented, proactive and ongoing communication should be maintained between the proponent and the AA and SEA/EIA teams, which must include competent ecological and other relevant expertise, to exchange relevant information in a timely manner. Communication should also be maintained with environmental authorities and key stakeholders, including the NPWS and any other local and transboundary organisations (e.g. OPW, RBD, EPA Northern Ireland). The NPWS should be informed and, ideally, involved early in the assessment process, particularly at higher planning tiers and for strategic projects, and stay proactively engaged to ensure that biodiversity conservation priorities are appropriate, the information utilised in the assessment is up-to-date and fit for purpose, the proposed mitigation measures are adequate, and no potential significant biodiversity impacts on Natura 2000 sites or protected species are overlooked. To further enhance the assessment process and ensure efficient and effective biodiversity impact assessment, biodiversity officers should be established in regional authorities, and ecological expertise in public organisations. Their expertise and advisory capacity could complement that of biodiversity/heritage officers and consultancy teams, supporting in-house screening and informing the proponent early in the plan-making or project-design processes on the potential for any significant biodiversity impacts (objectively interpreting data to accurately identify issues from the baseline data and anticipate impacts from the proposal). Pooling of expertise and promotion of best practice could be further enhanced by establishing an IBIA working group at the national level, which could in turn be associated with the existing SEA working group.

Proactive communication contributes to full consideration of all biodiversity-relevant aspects (including designated and non-designated sites and species, as well as their inter-relationship with other environmental factors and the potential for cumulative effects). It also facilitates the incorporation of IBIA findings into the plan/programme or project. The integration between IBIA and planning is achieved through the full incorporation of proposed mitigation measures resulting from AA and SEA/EIA which may entail: a) the removal of or amendments to plan/programme policies, objectives and/or actions or project specifications; and b) formulation of new policies, objectives and/or actions or devising new project specifications (for planning consent). Therefore, the 'impact' of IBIA on the proposal, of the integration of IBIA findings into the final plan/programme/project, could be easily inspected and monitored by an independent agency (e.g. EPA).

To enhance biodiversity knowledge, and assist in cumulative effects assessment, biodiversity-relevant datasets gathered during field surveys associated with AA/SEA/EIA or research projects, as well as assessment outputs should be spatially-specific and freely distributed (i.e. the creation of a centralised repository of SEAs, EIAs and AAs). There is a clear need to improve nationwide spatially-specific biodiversity data, and the preparation of a national habitat map or the provision of site-specific management plans and conservation objectives for Natura 2000 sites would significantly contribute to the improvement of biodiversity impact assessment practice, particularly in the context of AA. Similarly, development of a set of headline national biodiversity indicators would assist assessment processes and facilitate comparability. Moreover, to provide comparable assessment outcomes, best practice notes should be prepared with the aim to standardise assessment approaches for biodiversity impact assessment (including the adoption of consistent and comparable zones of influence, scales, data sources, and GIS-based assessment techniques for discrete/cumulative impacts)

High level recommendations:

- **Proactive and ongoing communication between the proponent, the assessment teams and key stakeholders (e.g. NPWS representatives and biodiversity/heritage officers).**
- **Establishment of biodiversity officers in regional authorities and ecological expertise in public organisations to support and provide advice on biodiversity impact assessment.**

High level recommendations (cont.):

- **Establish a national IBIA working group to promote best practice, which could join the existing national SEA working group.**
- **Setting up an inspection mechanism to monitor implementation of mitigation measures and early identification of any predicted and/or unforeseen biodiversity impacts.**
- **Mandatory requirement for spatial data collation and standardization, as far as possible, and establishment of transparent mechanisms for data sharing.**
- **Creation and provision of relevant biodiversity information at national level (e.g. habitat maps, management plans and conservation objectives as well as headline indicators).**
- **Creation and maintenance of a centralised record of SEA, EIA and AAs (with a summary of the nature of the proposal, its location, the assessment findings and the proposed mitigation).**

2.8. Next Steps

This guidance reflects current best practice to support integrated biodiversity impact assessment. It provides a valuable source of information on current issues and best practice recommendations, which will need to be operationalised through the preparation and piloting of a practitioners' manual. The effective implementation of the recommendations contained in this guidance may be constrained by the availability of resources or the variability in the legislative time-frames allocated to the drafting, consultation and approval of plans, programmes and projects. It is, therefore, recommended that the guidance be piloted (under strict terms of reference to ensure reporting of process integration) to ascertain its applicability, and fine-tune any relevant aspects if and where appropriate.

A requirement exists under the WFD to undertake AA and SEA for river basin water management plans and programmes of measures. Similar requirements are embedded in the FRD, for flood risk management plans (SEA) and flood defences (EIA), where there are implications for sensitive habitats (i.e. Natura 2000 sites). Strategic plans and programmes, such as those associated with renewable energy development, are also subject to both AA and SEA. In this context, the application of IBIA could provide significant advantages on coordinating efforts, optimising communication and information exchange, effectively integrating data, improving the effectiveness and comprehensiveness of the assessment, and fulfilling the statutory obligations. Opportunities also exist for transboundary application of IBIA, particularly for the preparation of catchment flood risk assessment and management studies under the WFD.

CHAPTER 3. STEP-BY-STEP IBIA GUIDANCE

3.1. Best Practice Step-by-Step IBIA Guidance

The following best practice step-by-step recommendations are intended to provide practical guidance on how to undertake IBIA and are not intended as statutory requirements. They offer advice on coordinating the biodiversity impact assessment requirements of SEA, EIA and AA Directives and thus integrating SEA with AA at plan/programme level and EIA with AA at project level. They also incorporate any other biodiversity-relevant considerations deriving from EU legislation such as the WFD and ELD.

Note that these recommendations refer to the integration of biodiversity impact assessment requirements, and that current planning, AA, SEA and EIA issues (e.g. limited communication and consultation, restricted time-frames, institutional arrangements for consent, scope and assessment detail, etc.) may affect the overall IBIA process and its outputs. In the light of this, it should be noted that good IBIA starts with good SEA/EIA and AA. In addition, the following general recommendations should be implemented:

- A. **Initiate IBIA early in the plan/programme-making or project design process.** The AA and SEA/EIA processes should commence with the announcement of the preparation or revision of the plan/programme or at the project design stage, respectively. IBIA and drafting of the proposal should run in parallel and continuous interaction and feedback should exist between processes in order to effectively integrate biodiversity considerations into the final proposal.
- B. **Establish and maintain communication channels** between the proponent (e.g. planning team or project promoter) and the AA and SEA/EIA teams, and consult with environmental authorities (i.e. EPA, DAFF, DAHG, DCENR and DECLG) and key stakeholders (including the NPWS) on a regular basis. The interplay between the proponent, consultants, stakeholders and the general public should be established early in the IBIA process and proactively maintained to ensure timely information exchange and data sharing. This can facilitate early identification of key biodiversity-relevant issues, data gathering, and comprehensive assessment and results.
- C. **Define and allocate clear responsibilities** among consultants and project partners, including information sharing mechanisms and time-frames. The role of each assessment team, and the scope of the biodiversity impact assessment, should be determined in order to subsequently coordinate data gathering efforts, the timely exchange of information and findings, and the preparation of the final report (e.g. NIR or SEA ER or both). This should address the role of ecological and other relevant experts and the scientific community in identifying potential impacts on biodiversity.
- D. **Provide IBIA training to increase understanding on biodiversity impacts, on impacts avoidance and mitigation, and on spatial approaches for biodiversity impact assessment.** Educating planners, practitioners, stakeholders and, most importantly, decision-makers can contribute to better formulation of plans that avoid/mitigate biodiversity impacts and a more effective incorporation of biodiversity considerations into the final decision. Moreover, training and capacity building can facilitate in-house AA screening, data collection, collation and analysis, implementation of GIS techniques for biodiversity assessment, and a more proactive approach to the early incorporation of IBIA findings in the proposal.
- E. **Develop best practice notes** to provide standardised approaches for biodiversity impact assessment at national level (including assessment detail, data sources, assessment techniques for discrete/cumulative impacts, etc.) and promote the adoption of consistent and comparable biodiversity impact assessment methods.

- F. **Ensure full assessment of all biodiversity-relevant considerations.** The impact assessment process should be undertaken at ecosystem level, include designated and non-designated areas and species, and address habitat suitability and integrity, and connectivity between designated and non-designated sites. Similarly, it should assess the inter-relationship with other environmental factors such as water, soil or climate, and provide an all-inclusive assessment of potential significant effects on biodiversity including the potential for cumulative effects.
- G. **Apply standardised approaches to spatial data management.** Promote spatial data generation during field surveys by applying existing national guidance on data collation (e.g. HC, 2011), creation of metadata following EU guidance (CEC, 2007b), and application of spatial analysis techniques for the assessment of biodiversity-relevant aspects where feasible. Spatial assessment approaches should fit the scale and scope of the proposal in order to provide spatially-specific and, as far as possible, quantitative outputs that facilitate understanding of potential issues. Report and acknowledge any data gaps and inconsistencies that may limit assessment results to ensure transparency in IBIA.
- H. **Create a biodiversity data sharing mechanism.** Biodiversity data gathered and created during AA, SEA or EIA processes should be verified through quality control and subsequently incorporated into a centralised database for distribution and widespread use (while giving due consideration to the protection of sensitive data). This would facilitate access to data and avoid duplication of data gathering and assessment efforts.
- I. **Coordinate multiple consent processes.** Where a proposal is subject to multiple consents, different competent authorities should assess a proposal in an integrated manner to ensure that all relevant information is taken into account in addressing the requirements under each of the Directives (i.e. AA and SEA for plans/programmes and AA and EIA for projects).
- J. **Incorporate IBIA findings into the proposal.** IBIA findings, in the form of proposed mitigation measures and recommendations, should be fully incorporated into the proposal (i.e. plan, programme or project). The successful incorporation of biodiversity-relevant aspects also entails, where feasible, the establishment of monitoring arrangements to inspect the effective implementation of the proposal and any associated mitigation.

The following specific step-by-step recommendations are grouped into the five correlating critical methodological stages, as described in Chapter 2 and presented in the overall flowchart diagram to IBIA provided in Figure 3.1. Although every effort has been made to provide a comprehensive set of recommendations, they are indicative, and some of them present just one possible approach. Chapter 2 should be consulted to obtain further detail and insight into each of the specific recommendations. Note that some of these step-by-step recommendations apply to several steps and, as a result, may appear in several occasions throughout the different stages.

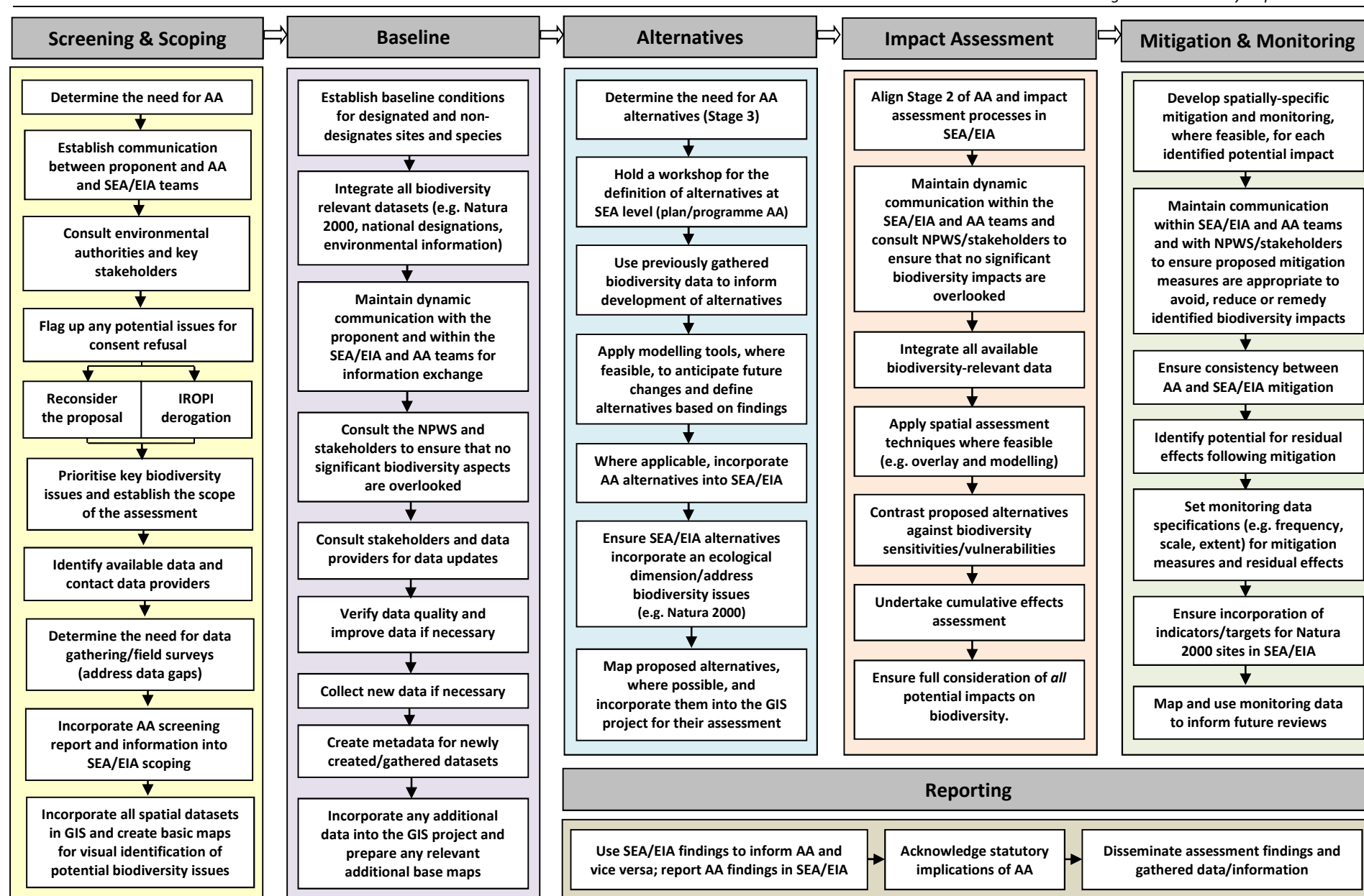


Figure 3.1. Flowchart diagram illustrating the overall recommendations for integrating the requirements of AA and SEA/EIA.

3.2. Screening and Scoping

3.2.1. Methodological steps (See section 2.1 for further detail)

The following steps refer to the general methodological aspects to be considered during AA screening and SEA/EIA screening and scoping (see also Figure 3.2).

- i. **Determine the need for AA** undertaking AA screening. Identify any Natura 2000 sites that could be affected by implementing the proposal and identify the potential for significant impacts on the qualifying interests of such sites. Where significant impacts are anticipated or cannot be ruled, the proposal *shall* undergo AA.
- ii. Where **AA screening flags up any potential issues** that it appears could lead to consent refusal (based on the precautionary principle) reconsider whether the assessment (SEA or EIA) of such plan, programme or project should move forward in its proposed form, whether it should not proceed further or whether an alternative needs to be developed. If appropriate, the potential for a statement of case for IROPI should be examined in this context (and compensatory measures immediately devised), but all reasonable and realistic alternatives must be first considered and examined. If appropriate or necessary, any proposed alternative should be developed with the aim of avoiding any significant impacts on Natura 2000 sites. Where AA screening does not identify any potential issues that may lead to consent refusal or where such issues have been satisfactorily addressed by a revised alternative or where it is proposed to seek an IROPI derogation, initiate the SEA/EIA scoping process (once SEA/EIA screening determines the need for undertaking SEA/EIA).
- iii. **Incorporate the information** gathered during AA screening into SEA/EIA scoping (and baseline). Any information in relation to qualifying interests, conservation status, location and extent of Natura 2000 sites should be used to inform the scoping of issues, including potential for cumulative effects, and establishment of the baseline for the biodiversity, flora and fauna section of the SEA/EIA.
- iv. Identify and, where relevant, **prioritise key biodiversity issues** that need further attention in the assessment process. This should be undertaken in collaboration between the SEA/EIA and AA teams, with ecological and, where relevant, hydrological, geophysical and other relevant experts' input (and in consultation with the environmental authorities, the NPWS and stakeholders where appropriate), in order to ensure that no relevant biodiversity issues are overlooked. This should include an assessment of the inter-relationship between biodiversity and other relevant environmental factors (e.g. water, soils, climate, etc.), as well as the potential for cumulative effects.

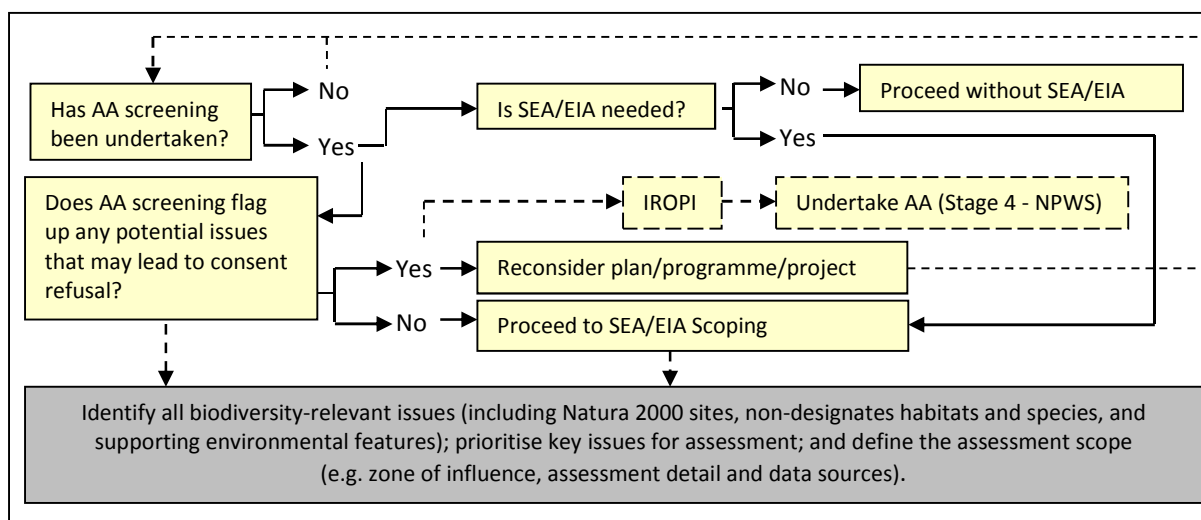


Figure 3.2. Flowchart guide for integrating AA screening and SEA/EIA screening and scoping.

- v. **Identify available data** sources (see Appendix A) and data needs. All relevant data should be gathered early in the assessment process to provide a comprehensive overview of biodiversity considerations (i.e. vulnerability of and potential to significantly impact on biodiversity) and support their assessment.
- vi. Ensure that the **scope of the assessment is suitable to address all potential significant effects on biodiversity** and fulfils the requirements of AA and SEA Directives for plans/programmes and of AA and EIA Directives for projects. In particular, the zone of influence of the proposal, the scale and level of detail of the assessment, the sources of information to be considered, and the relative importance/significance of each biodiversity parameter should be given due consideration.

3.2.2. Data Gathering, Creation and Manipulation (See sections 2.1.3 and 2.1.4 for further detail)

The following steps aim to promote best practice in biodiversity data gathering and creation during screening and scoping (see also Figure 3.3).

- i. **Identify the relevant biodiversity spatial and non-spatial datasets** required to address the key issues identified during screening/scoping. A checklist could be compiled at this stage to ensure that all relevant datasets are obtained. In order to do so, the biodiversity datasets currently available in Ireland provided in Appendix A can be used (note that although every effort has been made to provide a comprehensive list, it may not be exhaustive as it only contains datasets inventoried by October 2011).
- ii. **Identify data websites and portals** (websites that present information from diverse sources in a unified way) for immediate download of online spatial and non-spatial data. The most relevant national data download sources are provided in Appendix A (e.g. www.npws.ie, www.biodiversityireland.ie and www.epa.ie). Refer also to www.myplan.ie for relevant planning information. Additional data portals are also available at European level that may be of use (e.g. www.gbif.org).
- iii. **Identify data sources and contact data providers early in the assessment** process in order obtain all relevant offline datasets in a timely manner. The most relevant national data providers are listed in Appendix A. International and individual sources may be also relevant depending on the scope and geographical extent of the assessment (e.g. Northern Ireland).
- iv. **Identify data gaps, and data access and quality limitations** (e.g. level of detail or date of data capture) that may require additional gathering efforts at later stages or collation of additional information in the field. Make the necessary arrangement for field surveys or other data collation methods (e.g. remote sensing).

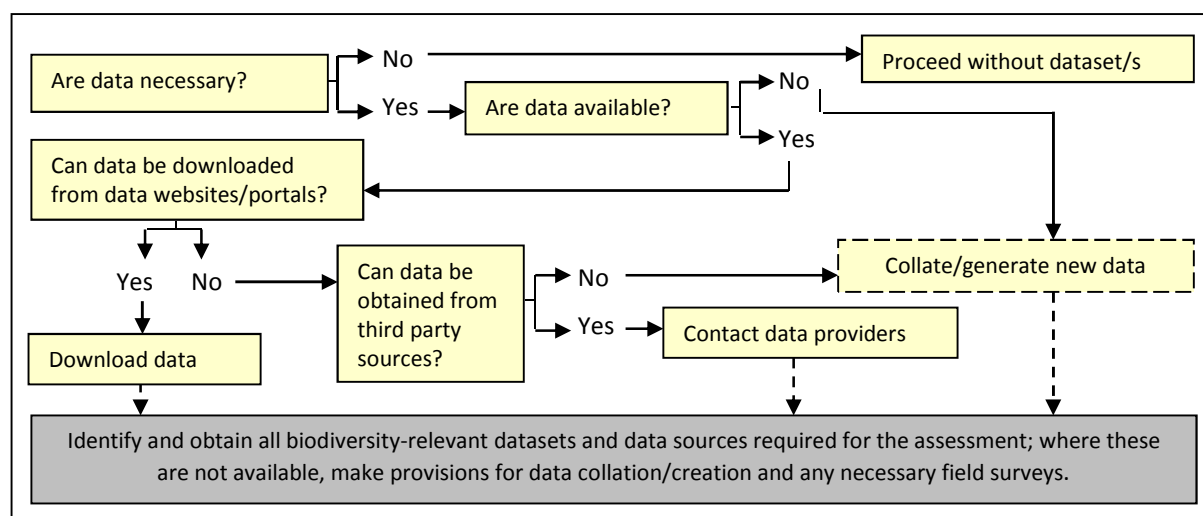


Figure 3.3. Flowchart guide for data gathering and creation during screening and scoping.

3.2.3. Application of GIS Methods and Techniques (See section 2.1.5 for further detail)

The following steps aim to provide guidance on spatial assessment during screening and scoping (see also Figure 3.4 and refer to GISEA Manual – EPA, 2009).

- i. **Incorporate all relevant spatial datasets** (including those obtained from data providers and any additional data gathered on-site or created in-house) and a detailed map of the proposal **into a GIS project**. An appropriate spatial reference system (e.g. Irish Transverse Mercator for national studies) should be adopted.
- ii. Adopt the **geographical extent and level of detail** (i.e. scale) defined during scoping, that fits the requirements of the assessment. The resolution of the analysis may be determined by the resolution of available datasets. However, the extent should be determined by the geographical scope or zone of influence of the plan/programme/project and appropriate background mapping should be used in this regard (e.g. 1:50,000 for regional and county plans/programmes; 1:2,500 for local plans/large scale projects).
- iii. **Create basic thematic maps** (also known as choropleth maps) to categorise, and thus colour-code, each relevant biodiversity dataset according to the most significant attribute (e.g. habitat type, species numbers, etc.). Apply the standard colour schemes adopted by data providers, where applicable, to ensure consistency and rapid readability.
- iv. Use these maps to **visually identify any biodiversity sensitivities** and support the preparation of the SEA/EIA scoping and AA screening reports. Also make use of these maps during team meetings and consultation workshops to facilitate the identification and spatial location of potential biodiversity threats from implementing the proposal, and promote debate.
- v. **Use alternative assessments techniques** (e.g. expert judgment, matrix-based assessments, statistical analysis, cost-benefit analysis, etc.) to address non-spatial considerations and ensure that all potential biodiversity impacts (including significant effects on qualifying interests, conservation objectives and integrity of Natura 2000 sites) are identified and appropriately examined.

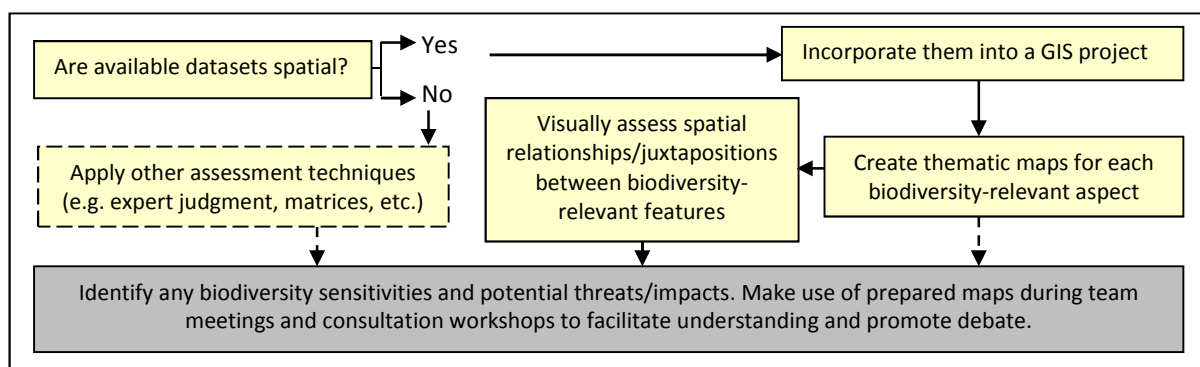


Figure 3.4. Flowchart on the application of assessment techniques during screening and scoping.

3.2.4. Communication, Consultation and Public Involvement (See section 2.1.6 for further detail)

The following steps aim to promote the establishment of proactive communication and consultation mechanisms during screening and scoping (see also Figure 3.5).

- i. Ensure early establishment of **clear communication channels** between the proponent and the AA and SEA/EIA teams, including type of communication (e.g. e-mail, meetings, workshops), periodicity (e.g. weekly updates, regular progress meetings), and role/responsibility of each partner in driving interactions and consultations.
- ii. **Consult environmental authorities at SEA scoping stage** to fulfill statutory requirements. Due consideration should also be given to engaging the NPWS and other relevant stakeholders (e.g. OPW and RBD representatives) to gather their views and promote best practice.

- iii. To facilitate communication at this point, clear consultation requests should be provided to statutory authorities and stakeholders. In addition, consideration should be given to organizing a **SEA scoping/AA screening workshop**, as well as to setting up a steering committee or technical working group for significant plans/programmes. Consideration should also be given to consulting the planning authority at EIA scoping stage.
- iv. **Identify key stakeholders** and affected parties and **initiate communication** with them early in the process.

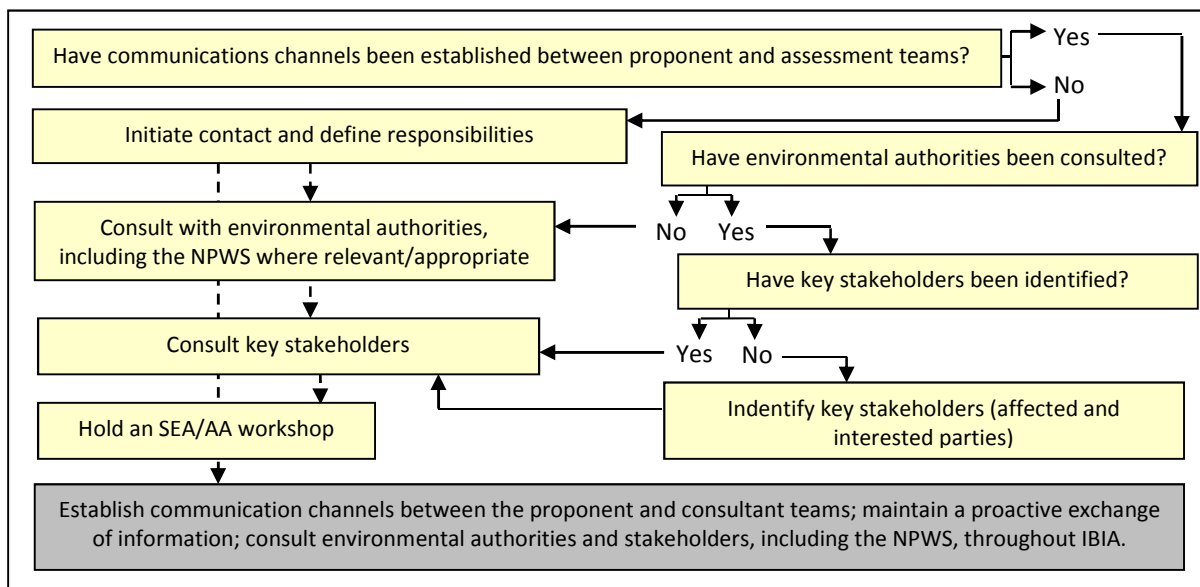


Figure 3.5. Flowchart guide for consultation during screening and scoping.

3.3. Baseline

3.3.1. Methodological steps (See section 2.2 for further detail)

The following steps refer to the general methodological aspects to be considered during AA screening and SEA/EIA baseline (see also Figure 3.6).

- i. Ensure that SEA/EIA baseline gives due consideration to all **designated sites and annexed habitats and species**. Determining the conservation status and identifying any vulnerability associated with the qualifying interests of potentially affected Natura 2000 sites should be a priority at this assessment stage. The inter-relationship between these European sites and other designated and non-designated areas and features, particularly with regard to connectivity and habitat suitability, should also be examined (e.g. the supporting role that pNHAs may play for SPAs and SACs). Similarly the inter-relationship with biodiversity-supporting environmental factors such as water, soils, air quality and climate, or the landscape, should be examined.
- ii. Similarly, ensure that AA screening and Stage 2 assessment, if required, take into consideration SEA/EIA baseline findings on **biodiversity-related aspects** such as water, soils or climate. As noted above, any existing relationship between Natura 2000 sites and supporting environmental factors (e.g. water dependant habitats) should be carefully examined to identify the potential for significant indirect effects on the integrity of the sites.
- iii. Ensure that all **biodiversity-relevant datasets are integrated**. All relevant information should be simultaneously considered to inform the establishment of biodiversity baseline. Where possible, such integration should seek to be spatially-specific (using GIS) to provide a graphic overview of geographical locations and facilitate the spatial assessment of inter-relationships and juxtapositions. In this context, it should be ensured that any key constraints posed by the Natura 2000 sites and other biodiversity conservation legislation are highlighted in the maps (e.g. annexed habitats and species, NHAs, buffer zones around rivers, bogs, etc.).

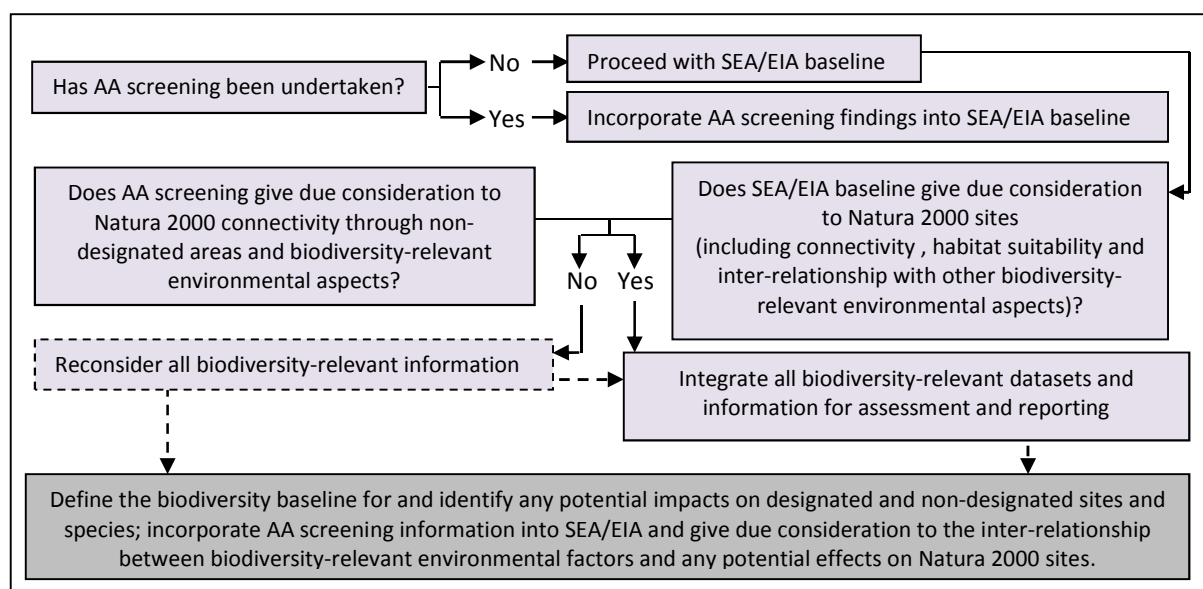


Figure 3.6. Flowchart guide for integrating AA screening and SEA/EIA baseline.

3.3.2. Data Gathering, Creation and Manipulation (See sections 2.2.3 and 2.2.4 for further detail)

The following steps aim to promote best practice in data gathering, creation and manipulation for setting up the biodiversity baseline (see also Figure 3.7).

- i. **Verify the scope of the assessment**, as defined during screening/scoping, to ensure that all the relevant biodiversity aspects are covered when establishing the baseline.
- ii. Ensure that appropriate ecological expertise exists within the team to **accurately and objectively interpret the data**, analyse trends and identify issues from the baseline data.
- iii. **Check periodically for data updates** throughout the assessment processes. Data providers and their websites (NPWS and NBDC in particular) may be consulted all through the IBIA process to confirm availability of updated information (as data currency is crucial for evidence-based assessment) or additional datasets. This may be critical in long-term projects where new/updated information can become available throughout the process.
- iv. Undertake **data consistency checks** to ensure that the quality and scale are appropriate for the assessment. Biodiversity data is likely to derive from multiple sources, and collated using different survey methods and scales. When amalgamating them for assessment purposes (e.g. combining them in GIS), their consistency (in terms of format, spatial reference system, spatial coverage, scale, attributes, etc.) should be verified, and any inaccuracies addressed through data improvement tasks, where appropriate. Any scale and quality limitations should be duly reported in the assessment outputs for clarity and transparency.
- v. Where relevant data are not available, consult relevant agencies and stakeholders to determine the **need for data collation**. Where relevant information cannot be sourced from third party sources, the NPWS and/or consent authority could be consulted to ascertain the need for such additional data. Where the assessment cannot be appropriately and effectively undertaken using existing datasets, provisions should be made for new data collation and/or generation (for EIA and/or project-level AA in particular).
- vi. Ensure that **data collation surveys fit the scale and scope of the assessment** requirements. Prepare a data checklist (including scale, geographical coverage, level of details and aspects/attributes to be recorded) before field-work for quality control. Promote spatially-specific data collation during field surveys (i.e. support data-gathering efforts by recording location coordinates and mapping). Group datasets according to established criteria (e.g. taxonomic group, site, etc.). Consider timing issues, e.g. seasonal requirements that may necessitate the collection of data at a particular time or times of year.

- vii. Create/record **metadata for each biodiversity dataset**. In particular, the following aspects should be recorded to comply with the requirements of the INSPIRE Directive (Table 3): description of the dataset, grouping criteria, method of data generation and/or collection, scale of data generation/collection, extent of the surveyed area, any identified limitations or uncertainties affecting the quality of the collected data, data generation/collection date, data format, contact person (surveyor), details of contact organisation (provider), and any limitations with regards to data access (e.g. copyright, license, etc.). Existing metadata templates such as that provided by the NBDC should be used where feasible.

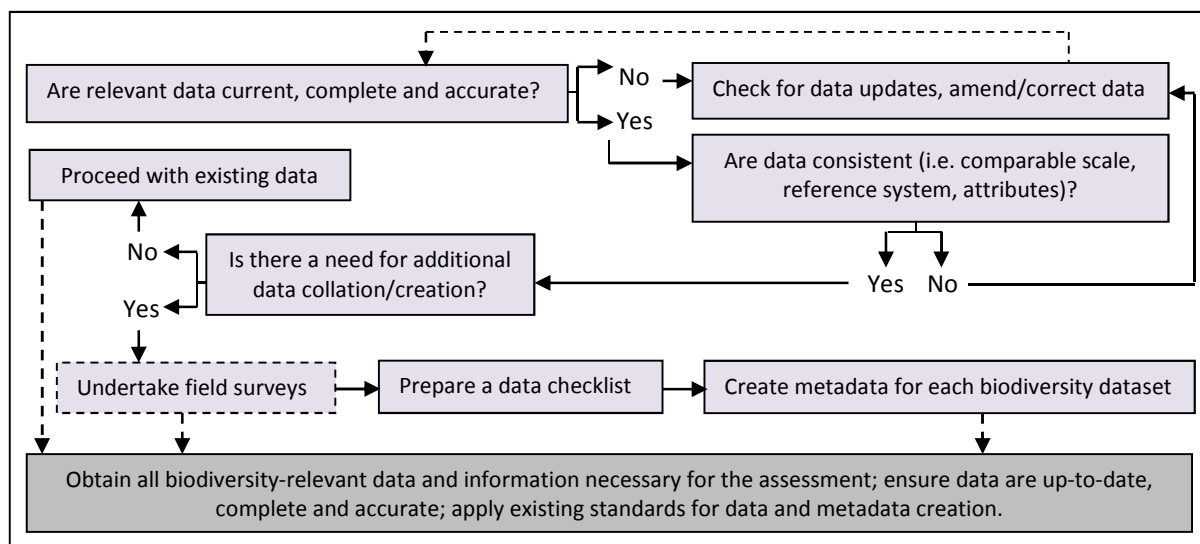


Figure 3.7. Flowchart guide for data gathering and creation during baseline.

3.3.3. Application of GIS Methods and Techniques (See section 2.2.5 for further detail)

The following steps aim to provide guidance on spatial assessment during baseline (see also Figure 3.8 and refer to GISEA Manual – EPA, 2009).

- Immediately **incorporate any additional data** collated throughout the processes into the GIS project. Datasets may be sourced and field surveys may be undertaken at different stages of the process and, as such, a systematic method for incorporating newly gathered datasets should be adopted. This systematic approach should take account of data and metadata considerations, and promptly feed this information into the assessment.
- Prepare any relevant additional maps** to support the description of the biodiversity and environmental baseline. Use these maps for the preparation of SEA ERs, EISs or NIS/NIRs, and incorporate them into the proposal where appropriate.

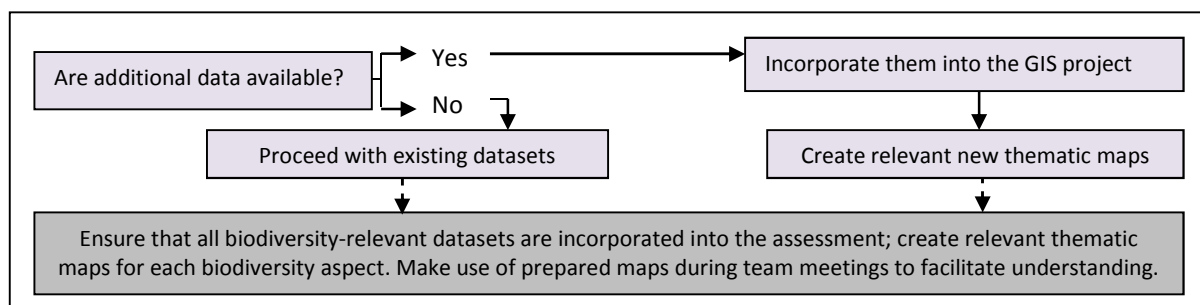


Figure 3.8. Flowchart on the application of spatial approaches during baseline.

3.3.4. Communication, Consultation and Public Involvement (See section 2.2.6 for further detail)

The following steps aim to promote the maintenance of proactive communication during baseline (see also Figure 3.9).

- i. Maintain **dynamic communication** between the proponent and the SEA/EIA and AA teams. Ongoing communication should be encouraged throughout the process, ensuring that information is exchanged at each procedural steps and, in particular, each key decision window (e.g. definition of alternatives, impact assessment and mitigation).
- ii. Check NPWS, NBDC and other relevant websites, and where appropriate, **consult informally with the NPWS, the NBDC and other relevant organizations** (e.g. BirdWatch Ireland) for any updates in biodiversity-relevant information. This is particularly relevant at the baseline and impact assessment stages. Note that the emphasis in this process is on communication rather than formal consultation. Communication is essential to identify all relevant issues and potential data sources for the assessment.
- iii. **Engage with** previously identified **stakeholders** to ensure that no biodiversity issues are overlooked when establishing the baseline. Their involvement may also be relevant at other procedural stages (e.g. definition of alternatives and impact assessment).

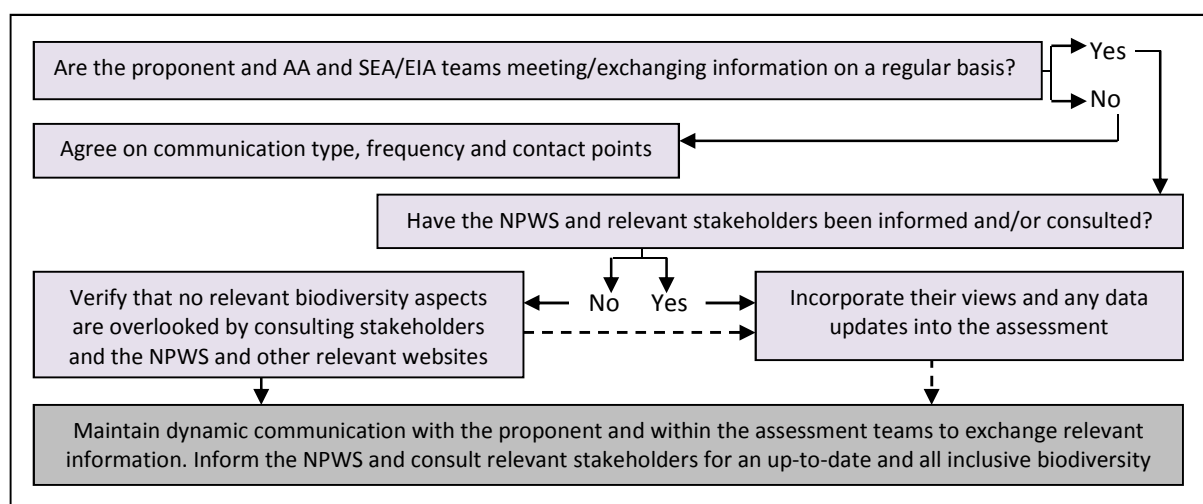


Figure 3.9. Flowchart guide for communication during baseline.

3.4. Alternatives

3.4.1. Methodological steps (See section 2.3 for further detail)

The following steps refer to the general methodological aspects to be considered during the definition of alternatives in AA Stage 3 and SEA/EIA (see also Figure 3.10).

- i. Ensure that SEA/EIA **alternatives give due consideration to ecological aspects** (including the full range of biodiversity-related topics, such as hydrology or climate). The definition of reasonable and realistic alternatives to implement the objectives/actions of a given proposal should incorporate an ecological dimension. At planning level, this can be achieved by ensuring the appropriate and suitable zoning of lands (e.g. that avoids development on or in proximity to Natura 2000 sites). At project level, biodiversity aspects could be incorporated by promoting planting of native species and creation of wetland areas for nature conservation.
- ii. Where appropriate (i.e. where alternatives have been defined in Stage 3), ensure that AA **ecological solutions** (to protect biodiversity) **are compatible with SEA/EIA alternatives**. Note that AA alternatives take priority over SEA/EIA alternatives. Nevertheless, a consistency and compatibility check should be undertaken to ensure that any biodiversity-relevant solutions

proposed at Stage 3 of the AA process do not contravene or undermine the alternatives proposed and assessed in SEA/EIA and, in case of conflict, appropriate adjustments are accordingly made.

- iii. Where applicable, **incorporate AA ecological solutions into SEA/EIA and correspondingly assess them**. Once the compatibility check has been undertaken, the proposed ecological solutions should also be assessed against the mapped environmental vulnerabilities or the strategic environmental objectives set in SEA/EIA.

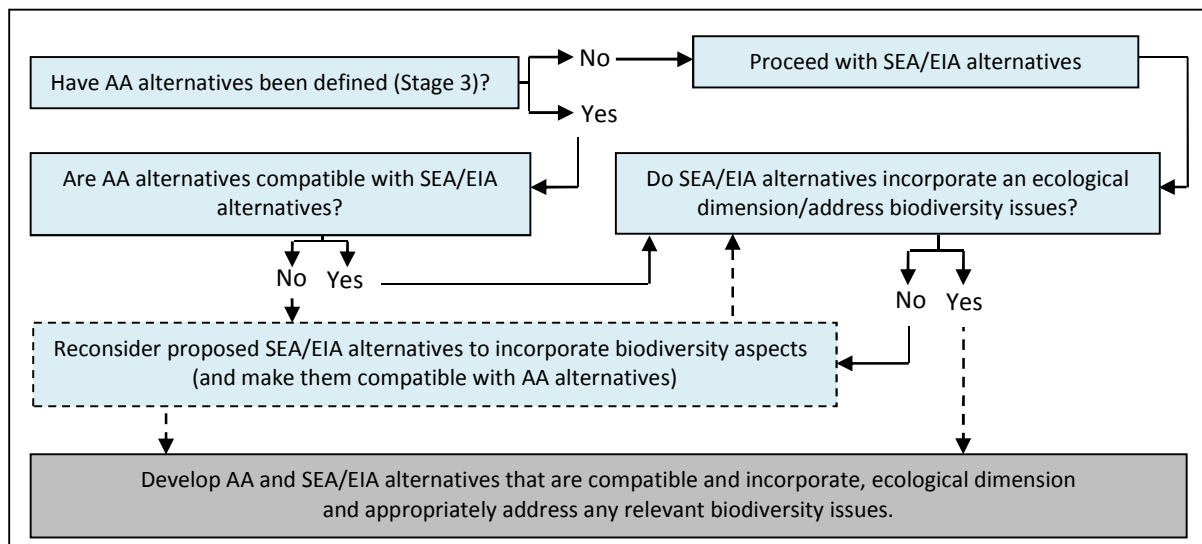


Figure 3.10. Flowchart guide for integrating AA Stage 3 and definition of alternatives in SEA/EIA.

3.4.2. Data Gathering, Creation and Manipulation (See section 2.3.3 for further detail)

The following steps aim to promote best practice in biodiversity data use and creation for the definition of alternatives (see also Figure 3.11).

- i. Use previously gathered **datasets to inform the development of SEA/EIA alternatives** and AA ecological solutions. Spatial datasets may prove valuable when formulating alternatives that avoid or take consideration of the proximity of land-use zonings or specific development/s to designated sites and non-designated important habitats. Similarly, information on the location and vulnerability of species or communities of flora/fauna should be used to inform the definition of biodiversity-compatible solutions.
- ii. Create **alternatives** separately in order **to form a new spatial dataset** or GIS layer included into the assessment. Alternatives should take into account spatial considerations, particularly their proximity to, and implications for, Natura 2000 sites and other sensitive biodiversity areas and features as noted above. Where feasible, they should be spatially-specific and incorporated into the GIS framework for their assessment. Where strategically defined (e.g. broad policies at higher planning tiers), they should also give consideration to their implications for Natura 2000 sites and other sensitive areas and habitats of species, and be accordingly assessed against biodiversity conservation objectives (e.g. SEOs).
- iii. Ensure that data **permit the assessment and ranking of the relative impact** of different alternatives. This may require the application of data overlay techniques to identify zones of particular biodiversity sensitivity and/or a development pressure, as well as the definition of a context-specific (i.e. area- and proposal-specific) valuation system for weighting biodiversity aspects and, therefore, subsequent ranking alternatives in terms of compliance with legal requirements and biodiversity conservation objectives.

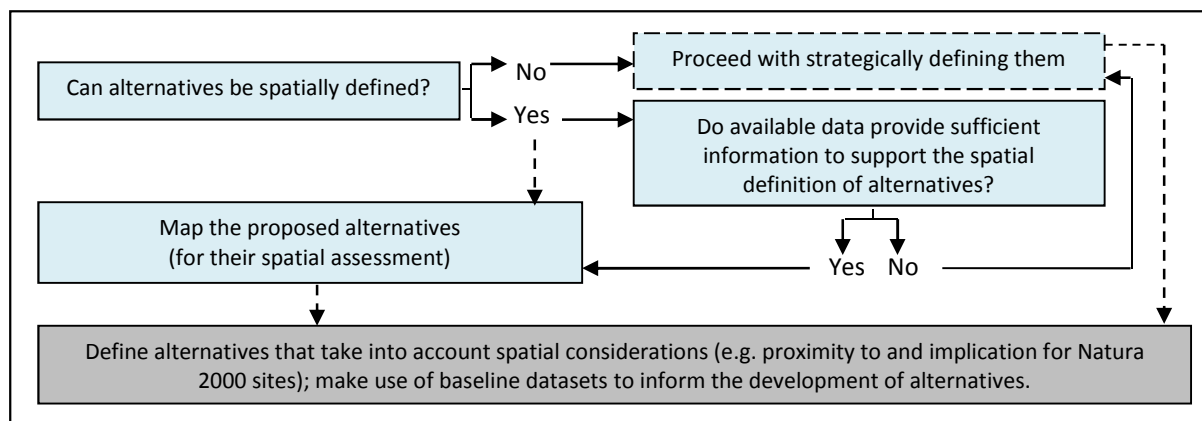


Figure 3.11. Flowchart guide for data use and creation during the definition of alternatives.

3.4.3. Application of GIS Methods and Techniques (See section 2.3 for further detail)

The following steps aim to promote guidance on spatial assessment and methods for the definition of alternatives (see also Figure 3.12 and refer to GISEA Manual – EPA, 2009).

- i. Where feasible **map the proposed alternatives** to facilitate their spatial assessment. Use previously collated baseline spatial data to identify highly sensitive biodiversity areas and inform the formulation and definition of alternatives, thereby taking account of any spatial considerations, particularly their proximity to and implications for Natura 2000 sites and other sensitive biodiversity areas and features.
- ii. **Apply modelling tools**, where feasible, to anticipate future land-use or environmental change scenarios and define alternatives based on findings. Incorporating knowledge and data on threats and pressures (e.g. climate change or land-use change scenarios) can help develop robust climate-proof alternatives for biodiversity conservation.

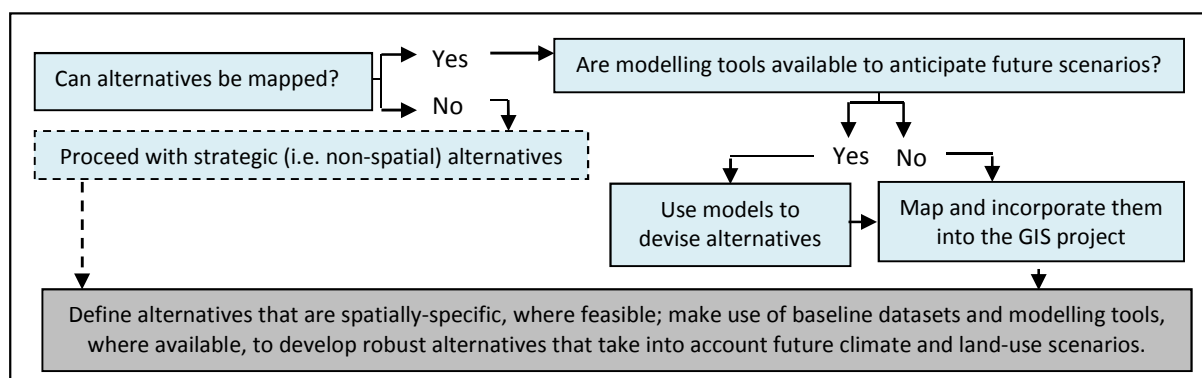


Figure 3.12. Flowchart on the application of spatial approaches during the definition of alternatives.

3.4.4. Communication, Consultation and Public Involvement (See section 2.3.3 for further detail)

The following steps aim to promote proactive communication for the definition of alternatives (see also Figure 3.13).

- i. SEA/EIA and AA teams should **collaborate in developing reasonable, realistic and compatible alternatives** for biodiversity conservation and enhancement. This is particularly relevant at EIA or project-level AA, where wider consultation for the development of alternatives is often constrained by time and resources.
- ii. Hold a **workshop for the definition of alternatives** at plan/programme level. This should include representatives from the planning and SEA and AA teams and, ideally, statutory environmental

authorities and the NPWS. In all cases, the workshop should ensure inclusion of ecological and, where relevant, hydrological experts. Where feasible, engage previously identified stakeholders.

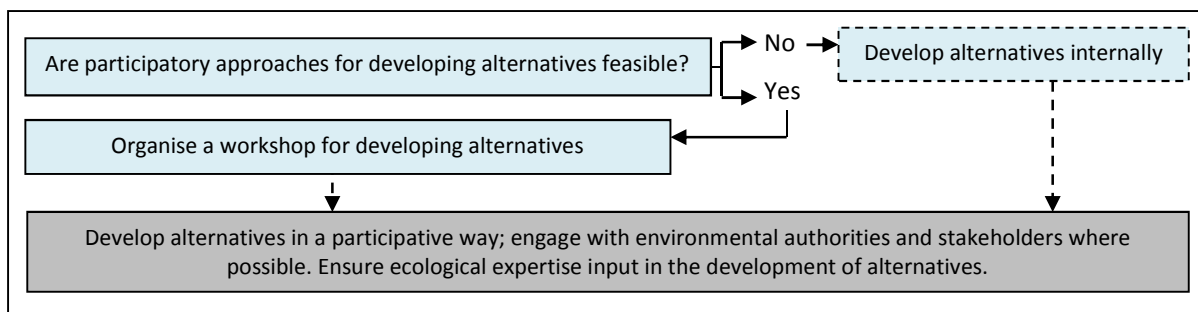


Figure 3.13. Flowchart guide for communication during the definition of alternatives.

3.5. Impact Assessment

3.5.1. Methodological steps (See section 2.4 for further detail)

The following steps refer to the general methodological aspects to be considered during AA Stage 2 and impact assessment in SEA/EIA (see also Figure 3.14).

- i. Align Stage 2 of AA and impact assessment processes in SEA/EIA to ensure **full consideration of all potential significant impacts on biodiversity**. The assessment of potential impacts should be based in the precautionary principle and simultaneously address designated and non-designated sites, as well as supporting environmental factors in order to identify any positive, negative, direct, indirect, short/long term, synergistic and/or cumulative effects on biodiversity (including habitats and species within and outside Natura 2000 sites). In this context, potential impacts on the integrity of European sites should not be overlooked.
- ii. Undertake a **cumulative effects assessment** and/or in-combination effects assessment as part of SEA when addressing potential impacts on Natura 2000 sites. The assessment should ensure that incremental effects on biodiversity resulting from different components within the proposal or from the combined influence of various plan/programme or project interventions (past, present and reasonably foreseeable future) are assessed and managed. In order to achieve this, the relative biodiversity sensitivity/vulnerability of the different areas should be contrasted against the individual or multiple interventions proposed within or adjacent to such areas

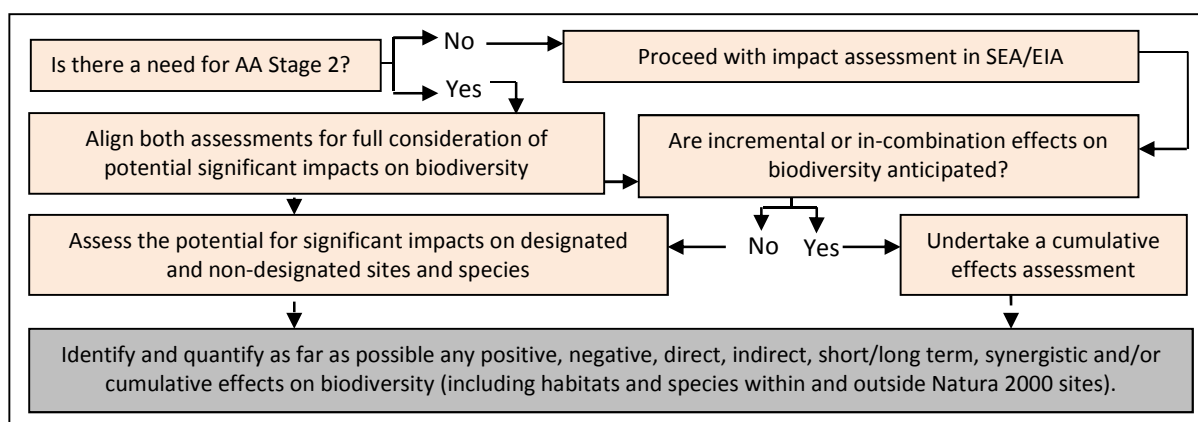


Figure 3.14. Flowchart guide for integrating AA Stage 2 and impact assessment in SEA/EIA.

3.5.2. Data Gathering, Creation and Manipulation (See sections 2.4.3 and 2.4.4 for further detail)

The following steps aim to promote best practice in biodiversity data use, creation and manipulation during the impact assessment stage (see also Figure 3.15).

- i. Verify that data gathered during the baseline stage are up-to-date and **integrate all available biodiversity-relevant data** (including previously defined alternatives) into a GIS to facilitate spatial and cumulative effects assessment (section 2.4.1). Where spatial datasets are not available, key considerations (e.g. status, qualifying interests and threats) should be compiled in a database for their systematic consideration.
- ii. **Identify main indicators** for assessing biodiversity impacts. If necessary, gather additional information on these indicators, including details on their vulnerabilities to environmental change and temporal dynamics.
- iii. Ensure that any **new datasets** generated in this stage (e.g. relative vulnerability of the different areas) **comply with previously established scale, detail and metadata** requirements. This is a prerequisite to ensure that datasets are comprehensive, compatible and comparable.

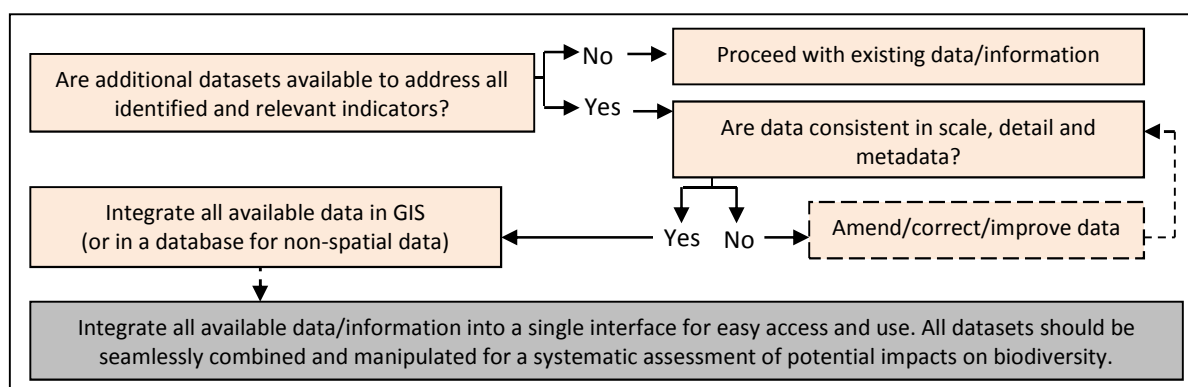


Figure 3.15. Flowchart guide for data use and manipulation during impact assessment.

3.5.3. Application of GIS Methods and Techniques (See section 2.4.5 for further detail)

The following steps aim to provide guidance on spatial approaches and techniques for impact assessment (see also Figure 3.16 and refer to GISEA Manual – EPA, 2009).

- i. **Overlay the most critical biodiversity-relevant datasets** to assess the composite vulnerability of the different areas (and thus inform alternative locations and zonings) as well as to identify the potential for in-combination effects. The higher the number of biodiversity sensitivities in an area, the higher the vulnerability of that area to change. Overlay techniques can take two forms: a) using transparency tools in GIS to visually identify areas where two or several datasets overlap (illustrating increasing vulnerability); or b) applying weighted overlay tools to assign a level of importance (i.e. weight) to each relevant datasets and, consequently, compute the vulnerability of a given area according to expert or public perceptions.
- ii. **Contrast proposed alternatives with the previously prepared biodiversity vulnerability maps** to identify and quantify affected areas and/or species. This would enable a rapid identification of any land-use conflicts and potential for significant effects, as well as quantification of affected areas. It will also facilitate the formulation of location- and effect-specific mitigation measures.
- iii. Apply **modelling tools** to examine potential effects of implementing proposed alternatives. They enable simulation of future conditions, and linkages between habitat loss, fragmentation, degradation and/or disturbance impacts and the overall objectives for biodiversity conservation.
- iv. **Map the affected areas and/or species** indicating their location, extent and vulnerability. A mapped illustration of the impact assessment outputs can help better communicating assessment findings and support the spatially-specific formulation of mitigation and monitoring measures.

- v. Where spatial datasets are not available, **apply alternative assessment techniques** (e.g. expert judgment, matrix-based assessments, statistical analysis, cost-benefit analysis, etc.).

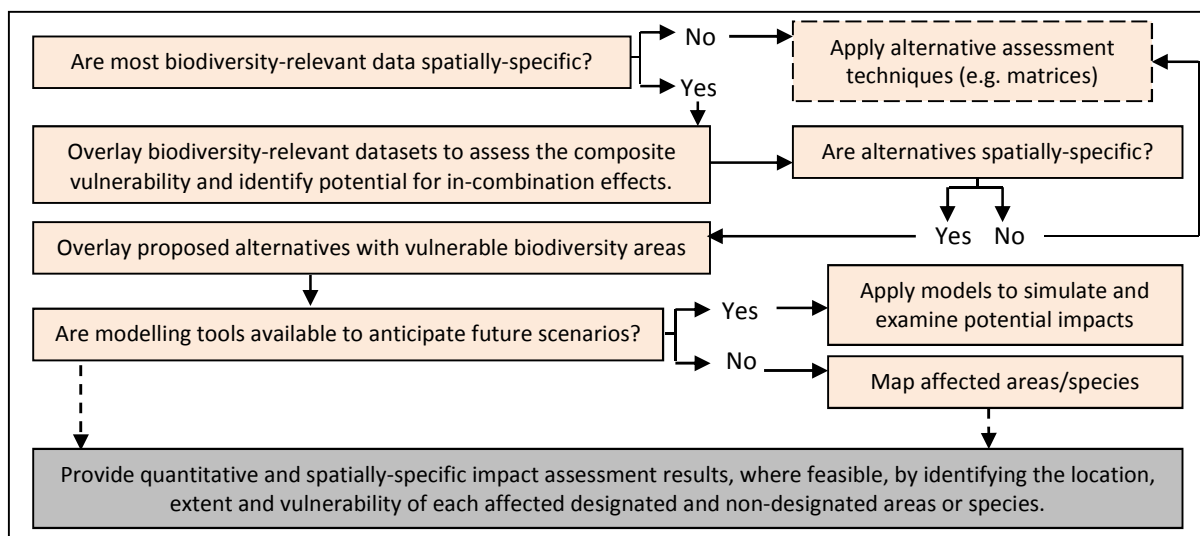


Figure 3.16. Flowchart on the application of spatial approaches for impact assessment.

3.5.4. Communication, Consultation and Public Involvement (See section 2.4.6 for further detail)

The following steps aim to promote the maintenance of proactive communication during impact assessment (see also Figure 3.17).

- i. **Exchange critical information** between the SEA/EIA and AA teams to ensure that any potential significant impacts have been identified and appropriately assessed. Similarly, the findings of the impact assessment should be communicated to the proponent as early as possible to ensure that potential significant impacts are readily addressed.
- ii. **Consult informally with the NPWS, the NBDC and other relevant organizations** (e.g. BirdWatch Ireland) and, where appropriate, the scientific community for any updates in biodiversity-relevant information, and to verify that no potential biodiversity impacts are overlooked in the assessment process.
- iii. **Engage with** previously identified **stakeholders** (and the local community at project level) to tap into their expertise and ensure that no potential biodiversity concerns are overlooked in the assessment process.

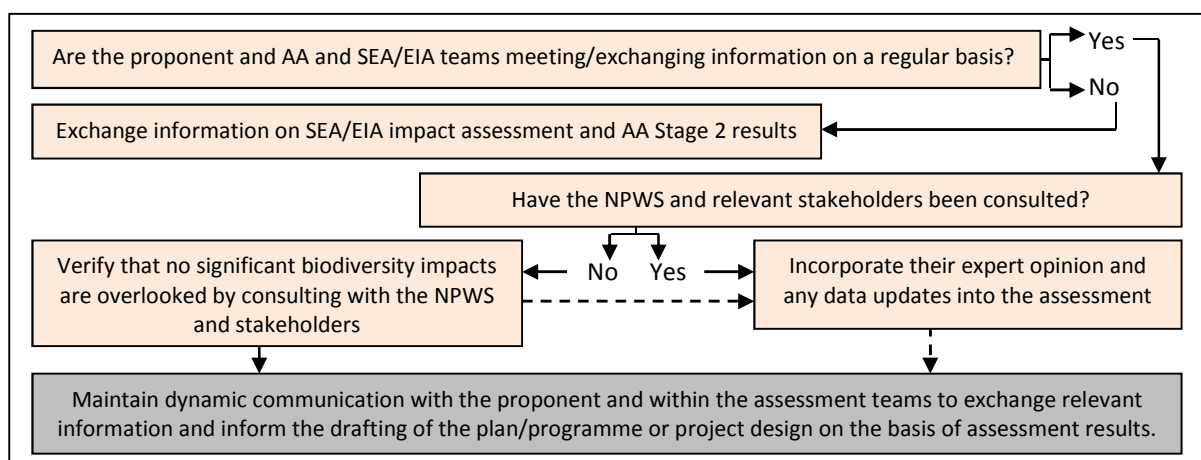


Figure 3.17. Flowchart guide for communication during impact assessment.

3.6. Mitigation and Monitoring

3.6.1. Methodological steps (See section 2.5 for further detail)

The following steps refer to the general methodological aspects to be considered during AA mitigation (Stage 3) and SEA/EIA mitigation and monitoring (see also Figure 3.18).

- i. **Mitigation and monitoring measures** should be developed for and linked to each of the likely significant effects identified. Where possible, proposed monitoring measures should be linked to existing monitoring schemes.
- ii. **Mitigation measures** resulting from both SEA/EIA and AA processes need to be validated for **compatibility and consistency**. A separate set of mitigation measures is likely to derive from each process. In the case of AA, mitigation measures should follow a clear hierarchy of avoidance, minimisation and (in an IROPI context) compensation. In SEA/EIA, mitigation measures are formulated to avoid, reduce and remedy as far as possible potential significant impacts, but are rather discretionary. Such compatibility and consistency check should ensure that mitigation measures are coherent (i.e. that they do not contravene or undermine each other, or cancel each other out). Once this has been verified, consider all proposed mitigation measures resulting from SEA and AA, or EIA and AA, simultaneously for their incorporation into the proposal.
- iii. Although AA processes do not formally require the definition of **monitoring arrangements, indicators and targets for Natura 2000 sites**, as well as protected species, should be specified as part of SEA/EIA monitoring, where relevant, and thus promote AA monitoring. To ensure the integration of AA considerations into SEA/EIA, specific indicators should be formulated to enable monitoring of any direct, indirect or cumulative effects on the integrity or any of the qualifying interests of Natura 2000 sites.
- iv. **Monitoring arrangements** should also be put in place to address any previously identified **data gaps** and, therefore, improve the accuracy of assessments at plan/programme review as well as at lower planning tiers (e.g. EIA).
- v. Assess and acknowledge the **potential for residual effects** following mitigation. Any potential adverse effects anticipated after mitigation should be accordingly evaluated and indication on their significance provided. Monitoring measures should also account for such residual effects.

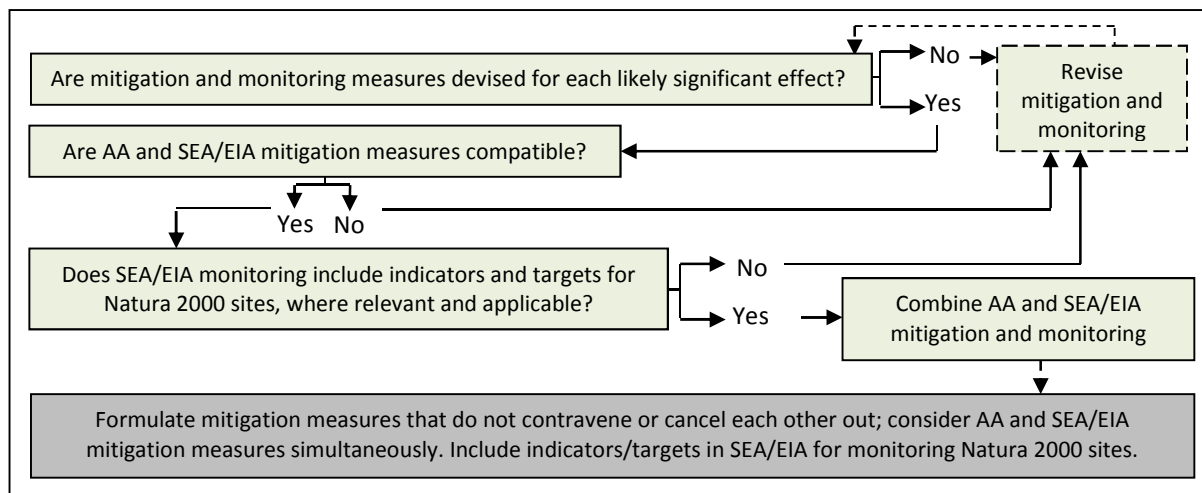


Figure 3.18. Flowchart guide for integrating AA mitigation and SEA/EIA mitigation and monitoring.

3.6.2. Data Gathering, Creation and Manipulation (See section 2.5.3 for further detail)

The following steps aim to promote best practice in biodiversity data use, creation and manipulation during mitigation and monitoring (see also Figure 3.19).

- i. Maintain all gathered datasets in an **internal database**. Quantitative and qualitative baseline data, impact assessment outputs and indicator values will inform future plan/programme reviews,

preparation of associated SEAs/EIAs and AAs, as well as support plan/programme/project monitoring.

- ii. Set **monitoring data specifications** to ensure data updates are undertaken at appropriate frequencies, and data collection campaigns cover the geographical scope of the study area (as well as the zone of influence, where applicable) at appropriate scales. Where appropriate, a clearly defined set of remedial actions should be proposed for non-achievement of biodiversity conservation targets (including implementation of proposed mitigation measures) or for exceeding previously established indicator thresholds/limits.
- iii. Use **monitoring data to inform future reviews** of plans/programmes and next steps (e.g. the need for remedial actions at project level). Positive and negative changes and trends on indicator values should be used to inform the formulation of future policies and objectives, as well as to make amendments in the implemented project in order to remediate any adverse effects on biodiversity and the environment.

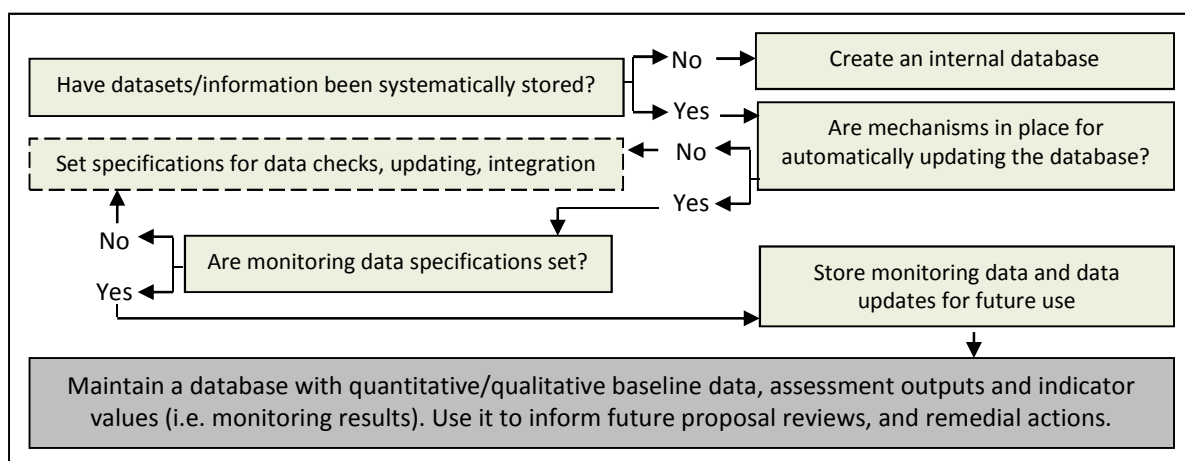


Figure 3.19. Flowchart guide for data use and manipulation during mitigation and monitoring.

3.6.3. Application of GIS Methods and Techniques (See section 2.5 for further detail)

The following steps aim to provide guidance on spatial approaches and techniques to support the formulation of mitigation measures and monitoring (see also Figure 3.20 and refer to GISEA Manual – EPA, 2009).

- i. Use the previously prepared baseline and assessment maps to formulate **spatially-specific mitigation measures** and identify these in a mitigation map, where feasible. Such measures can take the form of buffer areas for protecting important biodiversity sites and species, or as site-specific design solutions (e.g. location and type of planting) for biodiversity conservation.

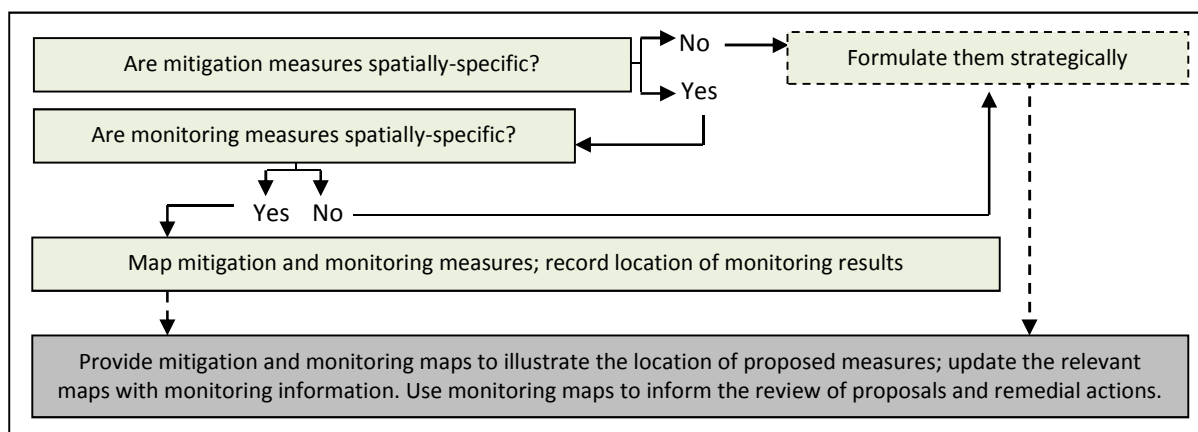


Figure 3.20. Flowchart on the application of spatial approaches for mitigation and monitoring.

- ii. **Incorporate any new datasets** and data updates obtained during **monitoring** into the GIS project. Incorporate monitoring values into existing spatial datasets as attribute values (e.g. biological river quality values). Where monitoring results reflect changes in geographical extents (of habitats or designated sites), create new spatial datasets.
- iii. Prepare a new set of **maps with monitoring data**, particularly in the context of plans and programmes. Compare monitoring maps with baseline maps to assess any increase/decrease in the quality, status or extent of biodiversity-relevant datasets. Use the monitoring maps to inform the review of the plan/programme (including the preparation of the Manager's report) or of the effectiveness of mitigation during project implementation.

3.6.4. Communication, Consultation and Public Involvement (See section 2.5.3 for further detail)

The following steps aim to promote the maintenance of proactive communication during the formulation of mitigation measures and monitoring (see also Figure 3.21).

- i. SEA/EIA and AA teams should communicate at this procedural stage and **share information on proposed mitigation measures** to ensure these are appropriate to avoid, reduce or remedy all identified biodiversity impacts, and evaluate the potential for residual impacts.
- ii. **Engage with** previously identified **stakeholders** to ensure that proposed mitigation measures are appropriate and to support monitoring arrangements.

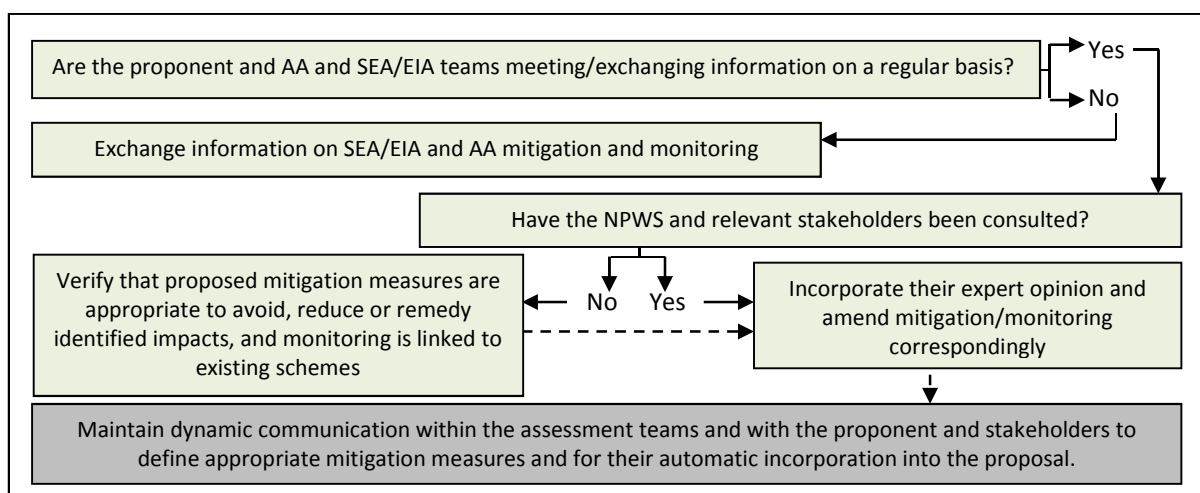


Figure 3.21. Flowchart guide for communication when defining mitigation and monitoring measures.

3.7. Reporting

3.7.1. Methodological steps (See section 2.6 for further detail)

The following steps refer to the general methodological aspects to be considered when preparing the NIR and SEA ER, or NIS and EIS (see also Figure 3.22).

- i. Use **SEA/EIA findings to inform and report on AA findings** and vice versa. Acknowledge the sensitivity of, threats to and interactions between Natura 2000 sites, national designations and all habitats and species of interest (with regard to habitat suitability, movement and dispersal, and population size and dynamics), as well as their supporting features (such as water, soil, climate and landscape).
- ii. The final report (i.e. NIS/NIR, SEA ER or EIS) should simultaneously consider and reflect **all significant biodiversity-relevant results**. As noted above, due consideration should be given to designated and non-designated areas and species, and all biodiversity-relevant aspects.

- iii. Note which proposed mitigation measures and recommendations derive from specific elements of SEA/EIA or AA processes. Furthermore, **acknowledge the statutory implications** of AA to withhold consent if it is determined that the proposal has potential to significantly impact on the integrity of Natura 2000 sites or if the potential for such impact cannot be ruled out (i.e. precautionary principle). Remember that SEA/EIA processes are undertaken to inform (rather than determine) decision-making.
- iv. Make **all relevant information and data available** to the consent authority/ies, stakeholders and the general public. In all cases, reporting should be clear and focused. The provision of all assessment outcomes (in the form of reports, figures, graphs and/or mapped outputs) promotes transparent, objective and informed decision-making.

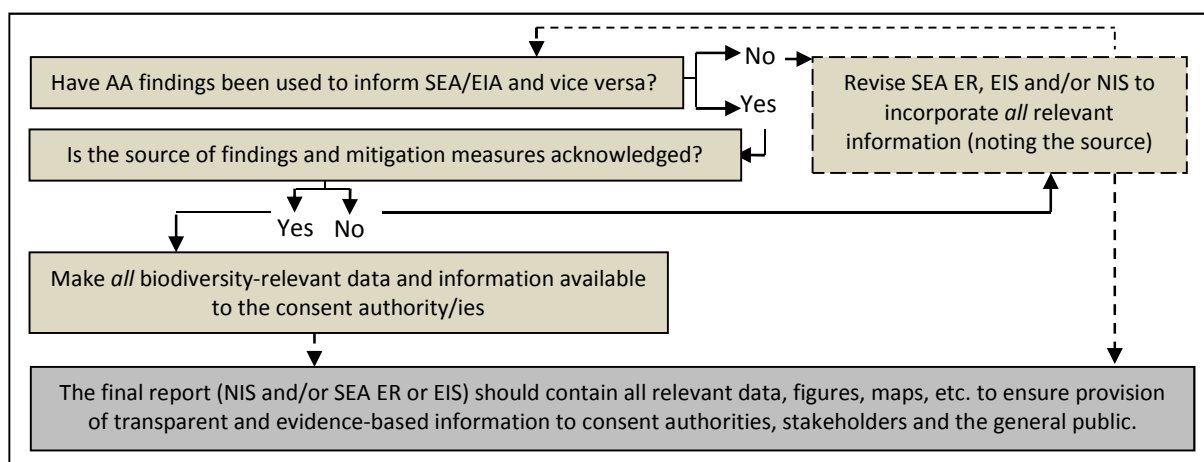


Figure 3.22. Flowchart guide for integrating AA and SEA/EIA results when reporting.

3.7.2. Data Gathering, Creation and Manipulation (See sections 2.6.2 and 2.6.3 for further detail)

The following steps aim to promote best practice in biodiversity-relevant data use when reporting (see also Figure 3.23).

- i. **Acknowledge datasets** used in SEA/EIA or AA processes, as well as their sources, in the relevant reports. Data copyright and licensing should always be noted. Any data **inconsistencies, gaps** and limitations should be documented in the NIS/NIR, SEA ER or EIS.
- ii. **Upload datasets and metadata** gathered and created during AA, SEA or EIA studies in the consultancy's (private) website for open or restricted (i.e. on request) distribution – with mechanism in place to control the dissemination of sensitive data. Ideally, forward newly created datasets to the NBDC for their distribution. Data sharing will facilitate the preparation and improve the effectiveness of SEA/EIA and AA, as well as contribute to avoiding duplication and unnecessary data collation efforts.

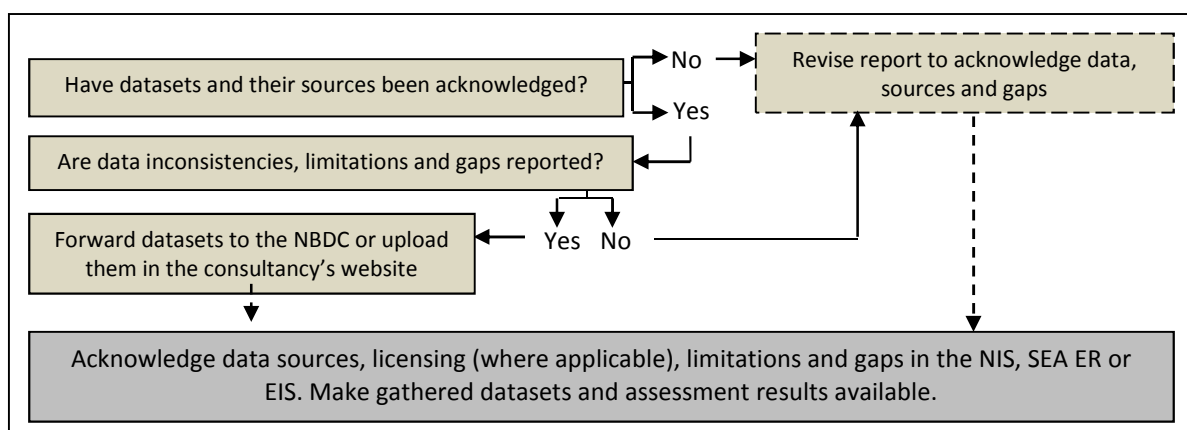


Figure 3.23. Flowchart guide for data use and manipulation during reporting.

3.7.3. Application of GIS Methods and Techniques (See section 2.6 for further detail)

The following steps aim to provide guidance on spatial approaches for reporting (see also Figure 3.24 and refer to GISEA Manual – EPA, 2009).

- i. **Incorporate** the previously prepared **baseline and assessment maps** into the NIS/NIR, SEA ER or EIS, as appropriate. Presenting baseline data and impact assessment results in graphic form improves the delivery of information, enhancing the understanding of the distribution, patterns and linkages between relevant biodiversity and environmental factors.
- ii. Take into account the **maps and updated information** that may be contained in the **monitoring report** (and any additional information in the Manager's report) during the review of the plan/programme.

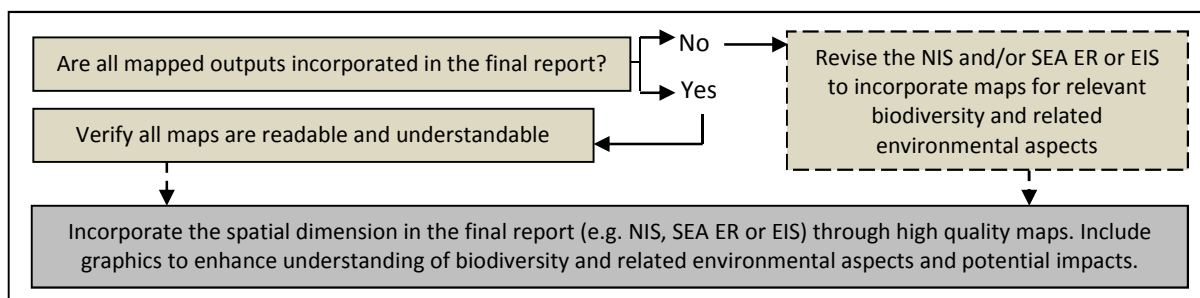


Figure 3.24. Flowchart on the application of spatial approaches for reporting.

3.7.4. Communication, Consultation and Public Involvement (See section 2.6 for further detail)

The following steps aim to maintain proactive communication during reporting (see also Figure 3.25).

- i. Maintain **proactive communication** throughout the preparation of the SEA ER and NIR, or the EIS and NIS, to ensure that all biodiversity aspects are appropriately addressed and integrated in the relevant documents, and that AA and SEA/EIA recommendations and proposed mitigation measures are incorporated into the final proposal.
- ii. Where ecological sensitivities have been identified, **the NPWS should be consulted at project pre-application stage** to verify that no biodiversity-relevant issues have been overlooked.
- iii. **Submit** the SEA ER and NIR to the EPA (register of ERs and AA screenings), to the consent authority (e.g. planning authority) and, where relevant, to the NPWS. Submit the EIS and NIS to the consent authority (e.g. planning authority).
- iv. **Disseminate assessment findings** (e.g. publish them online).

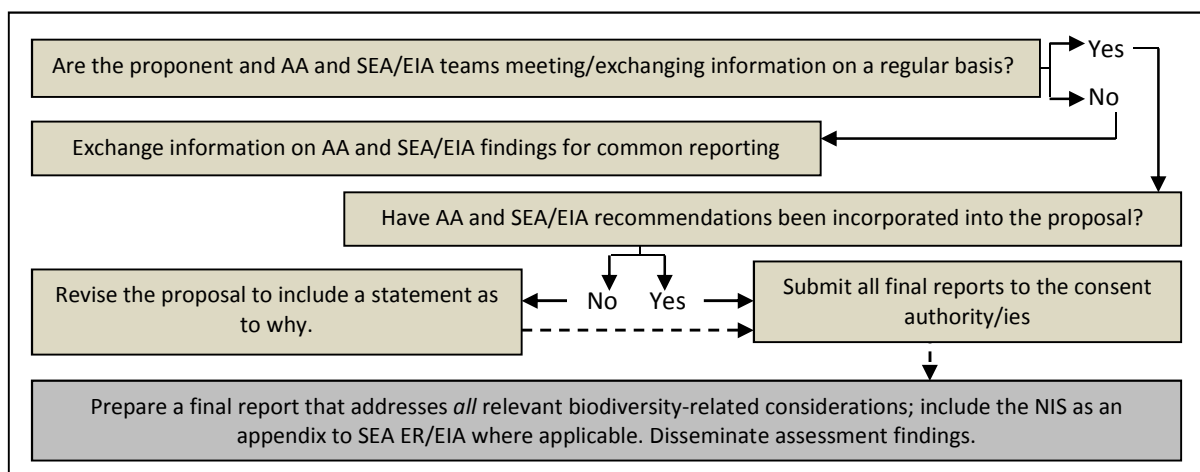


Figure 3.25. Flowchart guide for communication during reporting.

APPENDICES

- A. Part 1: Biodiversity Datasets Available in Ireland
Part 2: Biodiversity-related research projects in Ireland**
- B. Application of Spatial Data and GIS in the Context of the Methodological Framework**
- C. IBIA Indicators**
- D. IBIA Review Package**
- E. IBIA Project Input into the Birds and Natural Habitats Regulations 2011**

Data Creator	Dataset	Scale/Resolution	Coverage	Access
FRAMEWORK DATA (Geographic Setting)				
ERA Maptec www.era.ie	✓ Satellite imagery (i.e. Landsat, Spot, Ikonos, Quickbird).	Various	National	Purchase
	✓ Vector maps for infrastructure (roads, buildings, railways, etc.).	1:100,000 and 1:350,000	National	Purchase
Ordnance Survey Ireland (OSI) www.osi.ie	✓ Aerial photographs for the following years: 1995, 2000 and 2005.	1:40,000	National	Purchase
	✓ Digital Terrain Models (DTM) and Digital Elevation Models (DEM) derived from Light Detection and Ranging (LIDAR).	Various	National	Purchase
	✓ Historic maps.	6-inch (1:10,560) and 25-inch (1:2,500)	National	Purchase
	✓ Irish National Grid (ING) and Irish Transverse Mercator (ITM).	N/A	National	Purchase
	✓ Raster maps.	1:1,000; 1:2,500; 1:5,000; 1:10,000; 1:50,000; 1:250,000 and 1:450,000.	National	Purchase
	✓ Vector layer for the GeoDirectory (postal addresses).	Point data (X,Y coordinates)	National	Purchase
	✓ Vector layers (e.g. roads, buildings, railways, rivers, fields, etc.) for urban and rural areas.	1:50,000; and 1:150,000; and 1:5,000; 1:10,000; 1:25,000; 1:5,000; 1:2,500	National	Purchase
	✓ Vector layers of boundaries for the county, boroughs and urban districts, District Electoral Divisions (DEDs), wards and townlands.	1:50,000	National	Purchase
	✓ Vector layer of contours.	1:50,000	National	Purchase
SRTM/ASTER	✓ Digital Elevation Models (DEM).	90m - http://srtm.csi.cgiar.org 15m - http://www.gdem.aster.ersdac.or.jp	Global	Free Request
BASELINE DATA (Biodiversity, Flora and Fauna)				
Coillte Teoranta www.coillte.ie/	✓ Biodiversity database (habitat descriptions and codes for 20% of its estate designated for nature conservation and biodiversity enhancement).	1:5,000	National	Free Request
Dept. of Agriculture, Fisheries & Food www.agriculture.gov.ie	✓ Forest Inventory Database 2007.	1:10,560	National	Free Request
Marine Institute www.marine.ie	✓ Acoustic surveys of herring, blue whiting 2004-2009.	1:50,000	Irish Sea	Free Request
	✓ Biological sampling fish stocks at port 2009.	1:50,000	Irish Sea	Free Request
	✓ Biological sampling fish stocks at sea 2009.	1:50,000	Irish Sea	Free Request
	✓ Biologically sensitive areas 2005.	1:50,000	Irish Sea	Free Download

Appendix A – Part 1. Biodiversity-relevant datasets available in the Republic of Ireland. **This list contains datasets inventoried by October 2011 and, therefore, may not be exhaustive. Please consult with data providers to verify any data updates or identify newly generated data.**

Data Creator	Dataset	Scale/Resolution	Coverage	Access
BASELINE DATA (Biodiversity, Flora and Fauna)				
Marine Institute www.marine.ie	✓ Black belly angler monk nursery area 2009.	1:50,000	Irish Sea	Free Request
	✓ Blue whiting nursery and spawning areas 2009.	1:50,000	Irish Sea	Free Request
	✓ Cetaceans on the frontier: Atlantic front ecosystems and foraging niches survey 2009.	1:50,000	Irish Sea	Free Request
	✓ Cod nursery and spawning areas 2009.	1:50,000	Irish Sea	Free Request
	✓ Commercial fisheries atlas 2009.	1:50,000	Irish Sea	Free Request
	✓ Deepwater survey 2006-2009.	1:50,000	Irish Sea	Copyright Request
	✓ Fishing activity logs 2009.	1:50,000	Irish Sea	Free Request
	✓ Greencastle codling protected area 2004.	1:50,000	Irish Sea	Free Request
	✓ Haddock nursery and spawning areas 2009.	1:50,000	Irish Sea	Free Request
	✓ Hake nursery and spawning area 2009.	1:50,000	Irish Sea	Free Request
	✓ Herring nursery and spawning areas 2009.	1:50,000	Irish Sea	Free Request
	✓ Horse mackerel nursery area 2009.	1:50,000	Irish Sea	Free Request
	✓ Inshore fisheries atlas of Ireland 2006.	1:50,000	Irish Sea	Free Request
	✓ Irish groundfish survey 2004-2010.	1:50,000	Irish Sea	Copyright Request
	✓ Mackerel nursery and spawning areas 2009.	1:50,000	Irish Sea	Free Request
	✓ Megrim spawning area 2009.	1:50,000	Irish Sea	Free Request
	✓ National survey finfish farms 1991-2009.	1:50,000	Irish Sea	Free Request
	✓ Offshore shellfish samples 2010.	1:50,000	Irish Sea	Free Request

Appendix A – Part 1. Biodiversity-relevant datasets available in the Republic of Ireland.

Data Creator	Dataset	Scale/Resolution	Coverage	Access
BASELINE DATA (Biodiversity, Flora and Fauna)				
Marine Institute www.marine.ie	✓ Phytoplankton assessment survey 2007.	1:50,000	Irish Sea	Free Request
	✓ White belly angler monk nursery area 2009.	1:50,000	Irish Sea	Free Request
	✓ Whiting nursery and spawning areas 2009.	1:50,000	Irish Sea	Free Request
Marine Irish Digital Atlas (MIDA) mida.ucc.ie/contents.htm	✓ Areas of Special Scientific Interest (Environment and Heritage Service and Ordnance Survey Northern Ireland).	1:10,000	Northern Ireland and Irish Sea	Copyright Request
	✓ Biosphere reserves.	1:50,000	National (& N. Ireland)	Free Download
	✓ Cetacean Sightings 1999-2004.	1:50,000	Irish Sea	Free Request
	✓ Fishing areas (crab, crayfish. Cockle, lobster, scallop, shrimp, whelk)	Various	Irish Sea	Free Request
	✓ Harbour seal populations 2003.	1:50,000	National	Free Request
	✓ Important bird areas.	Various	National	Free Download
	✓ Nature reserves.	1:10,560	National	Free Download
	✓ Periwinkle distribution.	1:10,000	National (& N. Ireland)	Free Download
	✓ Ramsar sites.	1:10,560	National (& N. Ireland)	Free Download
	✓ Seaweed distribution.	1:10,000	National (& N. Ireland)	Free Request
	✓ Whitefish restriction area.	Various	Irish Sea	Free Download
National Biodiversity Data Centre (NBDC)	Plants			
	✓ Bryophytes of Ireland (British Bryological Society).	Various scales and resolutions (10Km ² to 100m ² ; 117,514 records)	National (& N. Ireland)	Free Request
	✓ Heritage Trees of Ireland (Tree Council of Ireland).	Various scales and resolutions (10Km ² to 100m ² ; 686 records)	National	Free Request

Appendix A – Part 1. Biodiversity-relevant datasets available in the Republic of Ireland.

Data Creator	Dataset	Scale/Resolution	Coverage	Access
BASELINE DATA (Biodiversity, Flora and Fauna)				
National Biodiversity Data Centre (NBDC) www.biodiversityireland.ie/	Plants			
	✓ Irish Fungal records (British Mycological Society).	Various scales and resolutions (10Km ² to 100m ² ; 14,319 records)	National (& N. Ireland)	Free Request
	✓ Phytoplankton of Irish lakes (EPA).	Various scales and resolutions (10Km ² to 100m ² ; 14,319 records)	National	Free Request
	✓ Tetrad map scheme data for Ireland (Botanical Society of the British Isles).	Various scales and resolutions (10Km ² to 100m ² ; 373,689 records)	National (& N. Ireland)	Free Request
	Mammals			
	✓ Atlas of Mammals in Ireland 2010-2015 (NBDC).	Various scales and resolutions (10Km ² to 100m ² ; 1,733 records)	National	Free Request
	✓ Badger and Habitat Survey of Ireland (NPWS).	Various scales and resolutions (10Km ² to 100m ² ; 4,176 records)	National	Free Request
	✓ ESAS cetacean sightings from 1980 to 2003 (Joint Nature Conservation Committee).	Various scales and resolutions (10Km ² to 100m ² ; 3,045 records)	North-east Atlantic	Free Request
	✓ Hare Survey of Ireland 2006/07 (NPWS)	Various scales and resolutions (10Km ² to 100m ² ; 1,605 records)	National	Free Request
	✓ Irish Deer Database (Ruth Carden; National Museum of Ireland).	Various scales and resolutions (10Km ² to 100m ² ; 794 records)	National	Free Request
	✓ Irish National Badger Settle Database (Department of Agriculture, Fisheries and Food).	Various scales and resolutions (10Km ² to 100m ² ; 25,727 records)	National	Free Request
	✓ Irish Squirrel Survey 2007 (COFORD).	Various scales and resolutions (10Km ² to 100m ² ; 1,627 records)	National	Free Request
	✓ National Bat Database (Bat Conservation Ireland).	Various scales and resolutions (10Km ² to 100m ² ; 3,552 records)	National	Free Request
	✓ Pine Marten Database (NPWS).	Various scales and resolutions (10Km ² to 100m ² ; 175 records)	National	Free Request
	✓ Otter Survey of Ireland 1982 (NPWS).	Various scales and resolutions (10Km ² to 100m ² ; 2,167 records)	National	Free Request

Appendix A – Part 1. Biodiversity-relevant datasets available in the Republic of Ireland.

Data Creator	Dataset	Scale/Resolution	Coverage	Access
BASELINE DATA (Biodiversity, Flora and Fauna)				
National Biodiversity Data Centre (NBDC) www.biodiversityireland.ie/	Mammals (cont.)			
	✓ Road Kill Survey (Biology.ie).	Various scales and resolutions (10Km ² to 100m ² ; 2,042 records)	National (& N. Ireland)	Free Request
	✓ Seal Database (NPWS).	Various scales and resolutions (10Km ² to 100m ² ; 1,210 records)	National	Free Request
	Birds			
	✓ Atlas of Wintering Birds in Britain & Ireland (BirdWatch Ireland).	Various scales and resolutions (10Km ² to 100m ² ; 55,690 records)	National (& N. Ireland)	Free Request
	✓ First Atlas of Breeding Birds in Britain & Ireland (BirdWatch Ireland).	Various scales and resolutions (10Km ² to 100m ² ; 63,985 records)	National (& N. Ireland)	Free Request
	✓ Irish Wetland Birds Survey 1994 to 2001 (BirdWatch Ireland).	Various scales and resolutions (10Km ² to 100m ² ; 10,908 records)	National	Free Request
	✓ Kingfisher Survey 2010 (NPWS).	Various scales and resolutions (10Km ² to 100m ² ; 6,883 records)	River systems: Barrow, Blackwater (Munster), Boyne, Clare, Moy & Nore.	Free Request
	✓ Second Atlas of Breeding Birds in Britain & Ireland (BirdWatch Ireland).	Various scales and resolutions (10Km ² to 100m ² ; 247,842 records)	National (& N. Ireland)	Free Request
	Insects			
	✓ Anisopodidae and Thaumaleidae of Ireland (Paddy Ashe).	Various scales and resolutions (10Km ² to 100m ² ; 84 records)	National (& N. Ireland)	Free Request
	✓ Bees of Ireland (Una Fitzpatrick and Tomas Murray).	Various scales and resolutions (10Km ² to 100m ² ; 10,436 records)	National (& N. Ireland)	Free Request
	✓ Centipedes of Ireland (Biological Records Centre, UK; Tony Barber).	Various scales and resolutions (10Km ² to 100m ² ; 476 records)	National (& N. Ireland)	Free Request
	✓ Craneflies of Ireland (Irish Biogeographical Society).	Various scales and resolutions (10Km ² to 100m ² ; 3,310 records)	National (& N. Ireland)	Free Request

Appendix A – Part 1. Biodiversity-relevant datasets available in the Republic of Ireland.

Data Creator	Dataset	Scale/Resolution	Coverage	Access
BASELINE DATA (Biodiversity, Flora and Fauna)				
National Biodiversity Data Centre (NBDC) www.biodiversityireland.ie/	Insects (cont.)			
	✓ Dixidae (Diptera) of Ireland (Irish Biogeographical Society; Paddy Ashe and J.P.O'Connor).	Various scales and resolutions (10Km ² to 100m ² ; 89 records)	National (& N. Ireland)	Free Request
	✓ Dragonfly Ireland (CEDaR, N. Ireland).	Various scales and resolutions (10Km ² to 100m ² ; 28,676 records)	National (& N. Ireland)	Free Request
	✓ Ephemeroptera of Ireland (University College Dublin; Mary Kelly Quinn).	Various scales and resolutions (10Km ² to 100m ² ; 6,000 records)	National (& N. Ireland)	Free Request
	✓ Fleas (Siphonaptera) of Ireland (University College Dublin; Paddy Sleeman).	Various scales and resolutions (10Km ² to 100m ² ; 2,123 records)	National (& N. Ireland)	Free Request
	✓ Harvestmen (Opiliones) of Ireland (Martin Cawley).	Various scales and resolutions (10Km ² to 100m ² ; 2,109 records)	National (& N. Ireland)	Free Request
	✓ Irish Butterfly Monitoring Scheme (NBDC).	Various scales and resolutions (10Km ² to 100m ² ; 20,072 records)	National	Free Request
	✓ Lice (Phthiraptera) of Ireland (NBDC).	Various scales and resolutions (10Km ² to 100m ² ; 306 records)	National	Free Request
	✓ Microlepidoptera of Ireland (National Museum of Ireland)	Various scales and resolutions (10Km ² to 100m ² ; 6,902 records)	National (& N. Ireland)	Free Request
	✓ Millipedes (Diplopoda) of Ireland (Biological Records Centre, UK; Paul Lee).	Various scales and resolutions (10Km ² to 100m ² ; 4,834 records)	National	Free Request
	✓ Mosquitoes (Diptera: Culicidae) of Ireland (Irish Biogeographical Society; Paddy Ashe, J.P., O'Connor and R.J. Casey).	Various scales and resolutions (10Km ² to 100m ² ; 253 records)	National (& N. Ireland)	Free Request
	✓ Neuroptera (Insecta) of Ireland (Irish Biogeographical Society; P.C. Barnard, J.P. O'Connor and M.A. O'Connor).	Various scales and resolutions (10Km ² to 100m ² ; 272 records)	National (& N. Ireland)	Free Request
	✓ Pseudoscorpions of Ireland (Irish Biogeographical Society).	Various scales and resolutions (10Km ² to 100m ² ; 234 records)	National (& N. Ireland)	Free Request
	✓ Water Beetles of Ireland (Balfour Brown Club; Garth Brown).	Various scales and resolutions (10Km ² to 100m ² ; 34,392 records)	National (& N. Ireland)	Free Request

Appendix A – Part 1. Biodiversity-relevant datasets available in the Republic of Ireland.

Data Creator	Dataset	Scale/Resolution	Coverage	Access
BASELINE DATA (Biodiversity, Flora and Fauna)				
National Biodiversity Data Centre (NBDC) www.biodiversityireland.ie/	Marine			
	✓ BioMar: marine dataset (NPWS).	Various scales and resolutions (10Km ² to 100m ²)	Irish Coast	Free Request
	✓ Marine Turtles in Irish Waters (Gabrial King and Simon Berrow).	Various scales and resolutions (10Km ² to 100m ²)	Irish Coast	Free Request
	✓ Rocky Shore Macroalgae (EPA).	Various scales and resolutions (10Km ² to 100m ² ; 2,791 records)	Irish Coast	Free Request
	✓ Seaweeds of Ireland (Michael Guiry and British Phycological Society).	Various scales and resolutions (10Km ² to 100m ² ; 48,927 records)	Irish Coast	Free Request
	✓ Sponges of Rathlin Island (Bernard Picton and Claire Goodwin; Ulster Museum).	Various scales and resolutions (10Km ² to 100m ² ; 17,855 records)	Rathlin Island, Co. Antrim	Free Request
	Invasive Species			
	✓ Irish Didemnum Species Database (NBDC).	Various scales and resolutions (10Km ² to 100m ² ; 10 records)	National (& N. Ireland)	Free Request
	✓ Irish New Zealand Flatworm Database (Archie Murchie, Agri-food and Bioscience Inst.).	Various scales and resolutions (10Km ² to 100m ² ; 1,141 records)	National (& N. Ireland)	Free Request
	✓ Irish Wire Weed Database (Irish Seaweed Centre; Stefan Kraan).	Various scales and resolutions (10Km ² to 100m ² ; 106 records)	National (& N. Ireland)	Free Request
	✓ National Invasive Species Database (NBDC).	Various scales and resolutions (10Km ² to 100m ² ; 5,603 records)	National (& N. Ireland)	Free Request
	Other National Datasets			
	✓ All Ireland Non-Marine Molluscan Database (Conchological Society of Great Britain and Ireland).	Various scales and resolutions (10Km ² to 100m ² ; 78,200 records)	National (& N. Ireland)	Free Request
	✓ Biodiversity Records from Ireland (NBDC)	Various scales and resolutions (10Km ² to 100m ² ; 7,047 records)	National (& N. Ireland)	Free Request
	✓ CréBeo Earthworm Database (University College Dublin; Aidan Keith & Olaf Schmidt).	Various scales and resolutions (10Km ² to 100m ² ; 340 records)	National (& N. Ireland)	Free Request

Appendix A – Part 1. Biodiversity-relevant datasets available in the Republic of Ireland.

Data Creator	Dataset	Scale/Resolution	Coverage	Access
BASELINE DATA (Biodiversity, Flora and Fauna)				
National Biodiversity Data Centre (NBDC) www.biodiversityireland.ie/	Other National Datasets (cont.)			
	✓ EPA River Biologists Data (EPA).	Various scales and resolutions (10Km ² to 100m ² ; 29,291 records)	National (& N. Ireland)	Free Request
	✓ Freshwater fish in Irish lakes (Inland Fisheries Ireland).	Various scales and resolutions (10Km ² to 100m ² ; 6,035 records)	National (& N. Ireland)	Free Request
	✓ Irish National Crayfish Database (NPWS).	Various scales and resolutions (10Km ² to 100m ² ; 2,253 records)	National	Free Request
	✓ Irish National Frog Database (Irish Peatland Conservation Council).	Various scales and resolutions (10Km ² to 100m ² ; 3,483 records)	National	Free Request
	✓ Reptiles and Amphibians Atlas 1978 (An Foras Forbartha).	Various scales and resolutions (10Km ² to 100m ² ; 766 records)	National (& N. Ireland)	Free Request
National Parks and Wildlife Service (NPWS) www.npws.ie <i>* Subject to NPWS data policy</i>	Designated Areas			
	✓ Special Protection Areas (SPA).	1:5,000	National	Free* Download
	✓ Special Areas of Conservation (SAC).	1:5,000	National	Free* Download
	✓ Proposed offshore marine SACs.	1:5,000	National	Free* Download
	✓ Natural Heritage Areas (NHA).	1:5,000	National	Free* Download
	✓ Proposed Natural Heritage Areas (pNHA).	1:5,000	National	Free* Download
	Other National Datasets			
	✓ Ancient woodland survey 2010.	Various; up to 1:40,000	National	Free* Request
	✓ Blanket bog NHA Project 2004.	Various; up to 1:40,000	National	Free* Request
	✓ Coastal monitoring project of Irish sand dune and machair sites 2004-2006.	1:40,000	National	Free* Request
	✓ Commonage datasets and habitat mosaics.	1:100,000	National	Free* Request

Appendix A – Part 1. Biodiversity-relevant datasets available in the Republic of Ireland.

Data Creator	Dataset	Scale/Resolution	Coverage	Access
BASELINE DATA (Biodiversity, Flora and Fauna)				
National Parks and Wildlife Service (NPWS) www.npws.ie <i>* Subject to NPWS data policy</i>	Other National Datasets (cont.)			
	✓ Conservation planning habitat maps for SACs/SPAs 1995-ongoing.	Various; up to 1:40,000	National SAC/SPA	Free* Request
	✓ Consolidated turlough dataset 2008.	Various; up to 1:40,000	National	Free* Request**
	✓ Grassland monitoring project (Annex I in Natura 2000 sites) 2006.	Various; up to 1:40,000	National	Free* Request
	✓ Irish lagoon database 1996-2006.	Various; up to 1:40,000	National	Free* Request
	✓ Irish semi-natural grassland survey and marsh communities 2007-ongoing.	Various; up to 1:40,000	Cavan, Cork, Leitrim, Longford, Monaghan, Offaly, Roscommon, Waterford	Free* Request
	✓ Juniper formations in Ireland survey 2011.	Various; up to 1:40,000	National	Free* Request
	✓ Metalliferous mine waste survey (which hold areas of Annex 1 grasslands) 2008.	1:40,000	National	Free* Request
	✓ National fen database (Irish springs, fens and flushes).	Various; up to 1:40,000	National	Free* Request
	✓ National limestone pavement survey 2008-ongoing.	Various; up to 1:40,000	National	Free* Request
	✓ National petrifying springs survey 2010-2013.	1:80,000	National	Free Unavailable until 2013
	✓ National seacliff survey 2009-ongoing.	Various; up to 1:40,000	National	Free* Request
	✓ National shingle beach survey and conservation value 1999.	1:40,000	National	Free* Request
	✓ National survey of native woodlands 2003-2007.	Various; up to 1:40,000	National	Free* Request

Appendix A – Part 1. Biodiversity-relevant datasets available in the Republic of Ireland.

Data Creator	Dataset	Scale/Resolution	Coverage	Access
BASELINE DATA (Biodiversity, Flora and Fauna)				
National Parks and Wildlife Service (NPWS) www.npws.ie <i>* Subject to NPWS data policy</i>	Other National Datasets (cont.)			
	✓ National shingle beach survey and conservation value 1999.	1:40,000	National	Free* Request
	✓ National survey of native woodlands 2003-2007.	Various; up to 1:40,000	National	Free* Request
	✓ National survey of upland habitats 2008-ongoing.	1:10,000	National	Free* Request
	✓ National vegetation database (Turboveg) – ongoing.	Various	National	Free* Request
	✓ NPWS rare and threatened species database – ongoing.	Various	National	Free* Request
	✓ Raised bog monitoring project 2004-2005.	1:10,000	National	Free* Request
	✓ Saltmarsh monitoring project.	1:40,000	National	Free* Request
	✓ Survey of intertidal mudflats & sandflats 2006-2007.	1:50,000	National SAC	Free* Request
	✓ Turf cutting assessment projects on designated raised bogs 1994-2006.	1:40,000	National SAC bogs	Free* Request
Teagasc www.teagasc.ie	✓ National hedgerow map.	1m minimum width	National	Free Request
	✓ Teagasc habitat indicator map (THIM95).	Minimum unit: 1ha	National	Free Request
	✓ Forest Inventory and Planning Database (FIPS).	1:40,000	National	Free Request
BASELINE DATA (Biodiversity Supporting Features and Potential Pressures/Impacts)				
Environmental Protection Agency (EPA) www.epa.ie maps.epa.ie <i>**Related rivers are restricted by OSI license</i>	Water			
	✓ Bathing water quality.	1:50,000	National	Free** Download
	✓ Historic and current river water quality (Q values).	1:50,000	National	Free** Download
	✓ Historic and current ground water quality in relation to nitrate, ammonium and phosphate concentrations.	1:50,000	National	Free** Download

Appendix A – Part 1. Biodiversity-relevant datasets available in the Republic of Ireland.

Data Creator	Dataset	Scale/Resolution	Coverage	Access
BASELINE DATA (Biodiversity Supporting Features and Potential Pressures/Impacts)				
Environmental Protection Agency (EPA) www.epa.ie maps.epa.ie <i>**Related rivers are restricted by OSI license</i>	Water (cont.)			
	✓ Record of Protected Areas – WFD RPA: beaches, habitat rivers (e.g. salmonid waters, freshwater pearl mussel), nutrient sensitivity lakes/estuaries and shellfish areas.	1:50,000	National	Free** Download
	✓ River catchments and River Basin Districts (RBDs).	1:50,000	National	Free** Download
	✓ Water status (2007-2009 under the WFD) for rivers, lakes, estuaries, coastal and ground waters.	1:50,000	National	Free** Download
	✓ Water quality for lakes, estuarine/coastal waters and groundwater.	1:50,000	National	Free** Download
	Land-use and Land Cover			
	✓ CORINE land-use for 1990, 2000 and 2006 (2009 to be released).	1:100,000 (25 hectare minimum mapping unit)	National	Free Download
	✓ CORINE land cover changes 1990-2000 and 2000-2006.	1:100,000 (25 hectare minimum mapping unit)	National	Free Download
	✓ Forest cover (Dept. of Agriculture, Fisheries and Food).	1:40,000	National	Free Request
	Soils			
	✓ National soils database (percentages of different elements/minerals in the soil)	2000m grid squares resolution	National	Free Download
	✓ Soil classification.	1:100,000 to 1:150,000	National	Free Download
	✓ Soil sealing (Global Monitoring for Environment and Security).	1:100,000 (25 hectare minimum mapping unit)	National	Free Download
	Others			
	✓ Mines project data (closed mine sites).	1:20,000 to 1:50,000	National	Free Download
	✓ Noise maps.	1m noise contours	National (Dublin&national routes exceeding traffic threshold)	Free Request

Appendix A – Part 1. Biodiversity-relevant datasets available in the Republic of Ireland.

Data Creator	Dataset	Scale/Resolution	Coverage	Access
BASELINE DATA (Biodiversity Supporting Features and Potential Pressures/Impacts)				
Geological Survey of Ireland (GSI) www.gsi.ie	✓ Bathymetry (seabed) contours.	1:250,000	Irish waters	Free Request
	✓ Bedrock geology.	1:100,000 and 1:500,000	National	Free Download
	✓ Bedrock aquifers.	1:100,000	National	Free Download
	✓ Groundwater vulnerability (Eastern, Neagh Bann, North Western, South Eastern, Shannon, South Western and Western Interims).	1:100,000	National	Free Download
	✓ Groundwater protection schemes (for some counties only).	1:100,000	County	Free Download
	✓ Irish designated sea area.	1:100,000	Irish waters	Free Download
	✓ Karst features, outcrops and faults.	1:100,000 and 1:500,000	National	Free Download
	✓ Seabed surveys – topography (LIDAR) at 20/50/200/500m depths.	1:250,000	Irish waters	Free Request
Irish Meteorological Service (Met Eireann) www.met.ie	✓ Hourly/daily ambient temperature (max./min.).	Point data	National	Free Last 12 months Purchase: Historical data
	✓ Hourly/daily solar radiation and sunlight intensity.	Point data	National	Free Last 12 months Purchase: Historical data
	✓ Hourly/daily mean relative humidity and pressure.	Point data	National	Free Last 12 months Purchase: Historical data
	✓ Hourly/daily mean wind speed and direction.	Point data	National	Free Last 12 months Purchase: Historical data
	✓ Precipitation – Hourly/daily rainfall.	Point data	National	Free Last 12 months Purchase: Historical data
	✓ Weather stations.	Point data (location)	National	Free Request

Appendix A – Part 1. Biodiversity-relevant datasets available in the Republic of Ireland.

Data Creator	Dataset	Scale/Resolution	Coverage	Access
BASELINE DATA (Biodiversity Supporting Features and Potential Pressures/Impacts)				
Marine Institute www.marine.ie	✓ Contaminants in the marine environment 2010.	1: 2,484,040	Irish Sea	Free Request
	✓ National coastal infrastructure service (ports, harbours, piers, quays, slipways, marinas, fishing ports) 2005.	1: 50,000	Irish Sea	Free Request
	✓ Seabed and bathymetric surveys 2004-2010.	1: 50,000	Irish Sea	Free Request
Marine Irish Digital Atlas (MIDA) mida.ucc.ie/	✓ Blue flag beaches.	1:50,000	National (& N. Ireland)	Free Download
	✓ Coastal geology and geomorphology.	1:100,000	National (& N. Ireland)	Free Download
	✓ Coastal land-cover change.	1:100,000	National (& N. Ireland)	Free Request
	✓ Deep sea restriction enclosures	1: 2,500,000	Irish Sea	Free Download
	✓ Green Coast Award beaches.	1:50,000	National (& N. Ireland)	Free Download
	✓ High and low water marks.	1:10,000	Irish Sea	Free Request
	✓ Mean tidal amplitude and wave height average.	1:100,000	Irish Sea	Free Download
	✓ Sea surface temperature (monthly average) 2002-2010.	1:100,000	Irish Sea	Free Download
	✓ Sea level rise.	1:100,000	Irish Sea	Free Download
	✓ Sea waves.	1:100,000	Irish Sea	Free Download
	✓ Territorial and fisheries limits.	1:50,000	Irish Sea	Free Download
	✓ Visitor moorings.	1:100,000	National	Free Download
	✓ World Heritage Sites.	1:100,000	National (& N. Ireland)	Free Download
Office of Public Works (OPW) www.opw.ie www.floodmaps.ie	✓ Benefiting lands.	1:10,560	National	Free Download
	✓ Catchment areas.	1:10,560	National	Free Download

Appendix A – Part 1. Biodiversity-relevant datasets available in the Republic of Ireland.

Data Creator	Dataset	Scale/Resolution	Coverage	Access
BASELINE DATA (Biodiversity Supporting Features and Potential Pressures/Impacts)				
Office of Public Works (OPW) www.opw.ie www.floodmaps.ie	✓ Historic flood events and recurring events.	1:1,000 to 1:10,560	National	Free Download
	✓ Historic flood extents and floodplains.	1:1,000 to 1:10,560	National	Free Download
	✓ Land commission and drainage districts.	1:10,560	National	Free Download
	✓ Predictive flood risk areas for some counties/towns (under review).	1:1,000 to 1:10,560	National	Free Download
Teagasc www.teagasc.ie	✓ Agricultural landuse map.	Field scale	National	Restricted Request
	✓ Forest planting potential map.	Minimum unit: 1ha	National	Restricted Request
	✓ National exposure map (TOPEX).	100m pixel	National	Free Request
	✓ National indicative soil map (under review).	1:100,000-1:150,000	National	Free Request
	✓ National subsoil map.	1:100,000	National	Free Request
	✓ National topographic map and derivatives (slope, stream lines, etc.).	Various	National	Restricted Request
	✓ Teagasc landcover map (TLC95).	Minimum unit: 1ha	National	Free Request
BASELINE DATA (Biodiversity Supporting Features and Potential Pressures/Impacts) – OTHER SOURCES				
Local Authorities Various	✓ Areas of high amenity.	Various	County	Free Request
	✓ Development plan boundaries and zoning.	Various	County/Town	Free Request
	✓ Habitat mapping.	Various	County/Town	Free Request
	✓ Landscape character areas and protected landscapes.	Various	County	Free Request
	✓ Proposed infrastructure development and transport corridors.	Various	County/Town	Free Request
	✓ Species and habitat surveys as part of EIA (Planning Dept.)	Various	County/Town	Free Request

Appendix A – Part 1. Biodiversity-relevant datasets available in the Republic of Ireland.

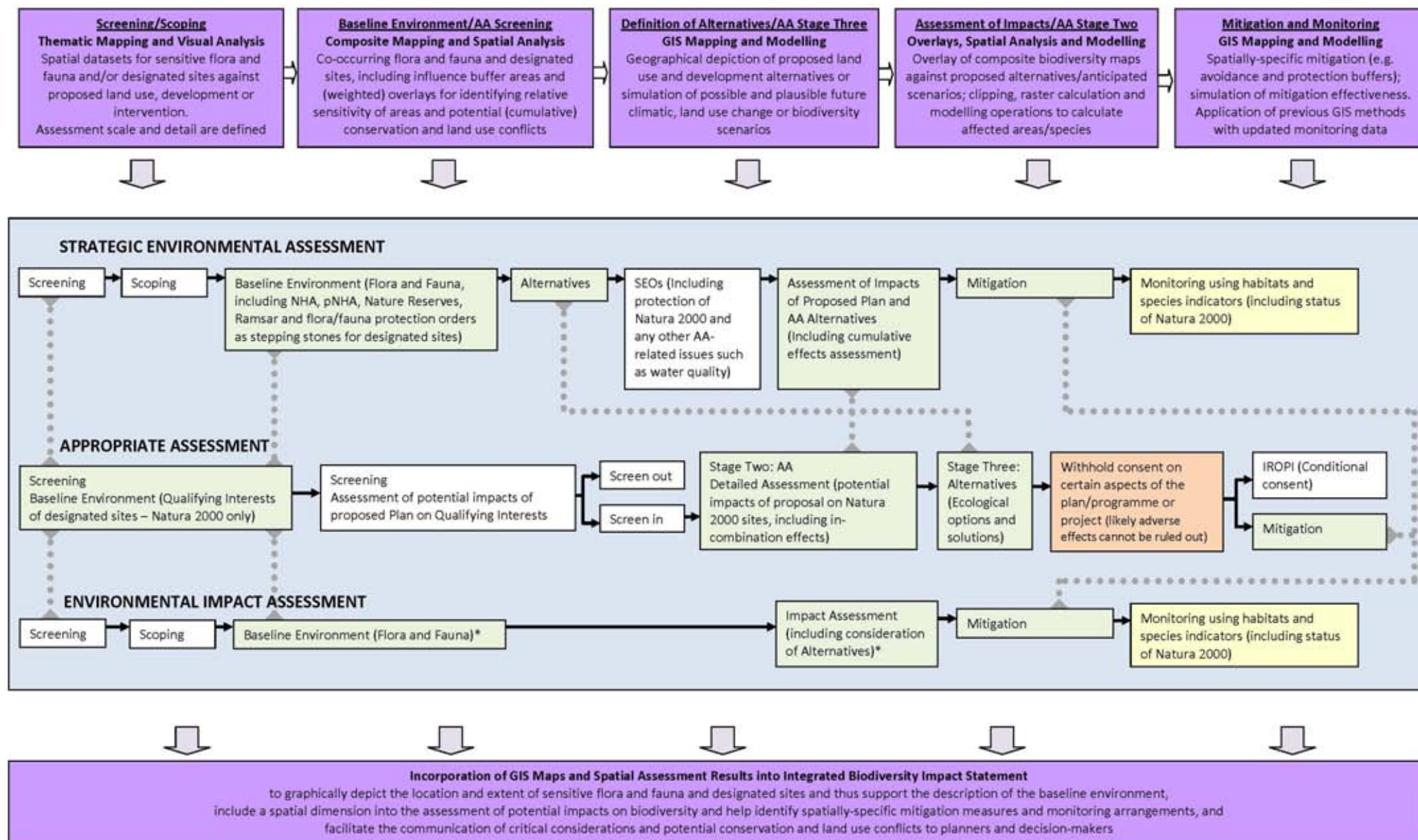
Data Creator	Dataset	Scale/Resolution	Coverage	Access
BASELINE DATA (Biodiversity Supporting Features and Potential Pressures/Impacts) – OTHER SOURCES				
Local Authorities Various	✓ Tree Protection Orders (TPOs).	Various	County/Town	Free Request
	✓ Urban pressure areas.	Various	County/Town	Free Request
Consultancies Various	✓ Climate change modelling.	Various	County/Town	Copyright
	✓ Detailed flora and fauna data (field surveys).	Various	County/Town	Copyright
	✓ Flood risk modelling and studies.	Various	County/Town	Copyright
	✓ Habitat mapping.	Various	County/Town	Copyright
	✓ Trees of local significance.	Various	County/Town	Copyright
	✓ Water quality measurements, modelling and studies.	Various	County/Town	Copyright

Appendix A – Part 1. Biodiversity-relevant datasets available in the Republic of Ireland.

Project Name	Description	Species Type	Coverage	Access
OTHER SOURCES OF INFORMATION				
AGBIOTA	Monitoring functional significance and management for the maintenance and economic utilisation of biodiversity in the intensively farmed landscape.	Birds, aquatic invertebrates, arthropods, earthworms and flora.	Carlow, Kildare, Meath, Tipperary, Wexford Selected Sites	EPA
BIOCHANGE	Biodiversity and environmental change - an integrated study encompassing a range of scales, taxa and habitats. Assessment of pressures that might lead to environmental change (e.g. fragmentation and loss of habitats; impacts of non-native species; climate change; pollution and changes in the exploitation of natural resources).	Pollinators (bees, butterflies, hoverflies), molluscs, freshwater invertebrates, invasive species (zebra mussels, japanese knotweed, bracken), marine invertebrates and seaweed.	National; special focus on Clare and Galway Bay area (including the Aran Islands)	TCD/EPA
BIOFOREST	Detailed study of the biodiversity that is found in Irish (first rotation) plantation forests.	Spiders, beetles, plants and birds.	National Selected Sites	EPA
BOGLAND	Review and analysis of peatland biodiversity (vegetation, methanogenic microbes, invertebrates, birds and macro-invertebrates).	Birds, aquatic and terrestrial invertebrates, vegetation and soil microbial communities.	National Selected Sites	UCD
Derived Peatlands Map of Ireland	Creation of a national map outlining spatial extents of predicted peat of four types of peat habitat: high level montaine, low level Atlantic, raised bog, and industrial peatlands.	Peatland habitat types.	National	UCD
Ecosystem Services	Creation of a national pollinator database, a pest and disease vectors information portal and a national crop wild relatives database.	Pollinators, pests and crops.	National	NBDC
Invasive Species	Creation of a consolidated all-Ireland database and information management system for the dissemination of information on invasive species including an early warning system to alert for, and track the spread of new arrivals.	Invasive species.	National	NBDC
Landsat Peatmap of Ireland	Creation of a national outlining the spatial extents of vegetated and exposed peat soils as identified by a supervised classification of multi-spectral Landsat TM (30m) imagery collected between 2003 and 2006.	Peat soils.	National	Friends of the Irish Environment /UCC
PLANFORBIO	Planning and Management Tools for Biodiversity in a Range of Irish Forests. Detailed study of the biodiversity that is found in Irish (second rotation) plantation and native forests.	Birds, ground-dwelling and canopy invertebrate animals, lepidoptera, ground-dwelling plants and epiphytes.	National Selected Sites	COFORD
Phenology	A national butterfly and moth monitoring scheme and a national phenology network and recording system.	Butterflies and moths.	National	NBDC
SIMBIOSYS	Quantifying impacts of key sectoral activities (e.g. cultivation of bioenergy crops, road landscaping and aquaculture) on genetic, species and landscape biodiversity and ecosystem services, including pollination, biological pest control, carbon sequestration and resistance to alien species invasion.	Pollinators (bees, butterflies and hoverflies), insects, marine invertebrates and higher plants.	National Selected Sites	TCD/EPA
Vegetation	Creation of a national vegetation standard and database.	Vegetation.	National	NBDC

Appendix A – Part 2. Biodiversity-related research projects in Ireland.

Appendix B. Sequential stages in the methodological framework where spatial data and GIS methods can be applied



Appendix C. Core Biodiversity Indicators

Note that this list is not exhaustive. Note also that indicators should be selected (or formulated) in order to fit the assessment purpose and reflect the biodiversity conservation objectives of the study area.

Indicator	Description
Biological Diversity Components – Habitats	
SEA and Plan/Programme AA	
Extent of affected Natura 2000 site	Percentage of total or area (m ²) of reclaimed/polluted/fragmented/protected/restored land in Natura 2000 sites.
Conservation status of habitats and species in Natura 2000 sites	Changes on the conservation status (as per NPWS definition) of Natura 2000 sites.
Number of affected qualifying interests	Percentage of total number of qualifying interests affected within a given Natura 2000 sites and magnitude of effect (e.g. removal or fragmentation of habitat, reduction in quality of supporting feature due to pollution, reduction in species population, restored habitat)
Extent of affected NHA/pNHA	Percentage of total or area (m ²) of reclaimed/polluted/fragmented/restored land in NHA/pNHA sites.
Extent of other affected national and/or international designations	Percentage of total or area (m ²) of Ramsar sites, biosphere reserves and nature reserves directly or indirectly affected by the proposed plan/programme (including removal or fragmentation of habitats, pollution, disturbance of species or habitat restoration).
Extent of affected native woodland	Percentage of total or area (m ²) of affected (removed/reclaimed/polluted/restored) native woodland.
Extent of affected natural grassland	Percentage of total or area (in m ²) of affected (removed/reclaimed/polluted/fragmented/restored) natural grassland.
Extent of affected (raised and blanket) bog	Percentage of total or area (m ²) of affected (removed/reclaimed/fragmented/polluted/restored) bog.
Extent of affected wetlands (including marshes and fens)	Percentage of total or area (m ²) of affected (reclaimed/restored/polluted) wetland.
Habitat connectivity	Area of habitat patches, their proximity and ease of species to move between them. It can also be measured as fragmentation index.
Extent of affected nursery and spawning areas	Percentage of total or area (m ²) of affected (reclaimed/polluted) nursery and spawning areas for black belly angler, blue whiting, cod, haddock, hake, horse mackerel, mackerel, megrim and whiting.
EIA and Project AA*	
<i>*Many of the SEA and plan/programme AA indicators above may also be applicable to EIA & AA of large infrastructural projects</i>	
Extent of affected hedgerow	Percentage of total within the study area or length (in m) of removed/planted/managed hedgerow.
Biological Diversity Components – Habitats (Listed in the Habitats Directive)	
Sandbanks	Affected area and changes in condition (structure/function).
Estuaries	Affected area and changes in condition (structure/function).
Tidal Mudflats and Sandflats	Affected area and changes in condition (structure/function).
Coastal Lagoons	Affected area and changes in condition (structure/function).
Large Shallow Inlets and Bays	Affected area and changes in condition (structure/function).

Reefs	Affected area and changes in condition (structure/function).
Annual Vegetation of Drift Lines	Affected area and changes in condition (structure/function).
Perennial Vegetation of Stony Banks	Affected area and changes in condition (structure/function).
Vegetated Sea Cliffs	Affected area and changes in condition (structure/function).
Salicornia Mud	Affected area and changes in condition (structure/function).
Spartina Swards	Affected area and changes in condition (structure/function).
Atlantic Salt Meadows	Affected area and changes in condition (structure/function).
Mediterranean Salt Meadows	Affected area and changes in condition (structure/function).
Halophilous Scrub	Affected area and changes in condition (structure/function).
Embryonic Shifting Dunes	Affected area and changes in condition (structure/function).
Marram Dunes (White Dunes)	Affected area and changes in condition (structure/function).
Fixed Dunes (Grey Dunes)*	Affected area and changes in condition (structure/function).
Decalcified Empetrum Dunes*	Affected area and changes in condition (structure/function).
Decalcified Dune Heath*	Affected area and changes in condition (structure/function).
Dunes with Creeping Willow	Affected area and changes in condition (structure/function).
Humid Dune Slacks	Affected area and changes in condition (structure/function).
Machair*	Affected area and changes in condition (structure/function).
Lowland Oligotrophic Lakes	Affected area and changes in condition (structure/function).
Upland Oligotrophic Lakes	Affected area and changes in condition (structure/function).
Hard Water Lakes	Affected area and changes in condition (structure/function).
Natural Eutrophic Lakes	Affected area and changes in condition (structure/function).
Dystrophic Lakes	Affected area and changes in condition (structure/function).
Turloughs*	Affected area and changes in condition (structure/function).
Floating River Vegetation	Affected area and changes in condition (structure/function).
<i>Chenopodium rubri</i>	Affected area and changes in condition (structure/function).
Wet Heath	Affected area and changes in condition (structure/function).
Dry Heath	Affected area and changes in condition (structure/function).
Alpine and Subalpine Heath	Affected area and changes in condition (structure/function).
Juniper Scrub	Affected area and changes in condition (structure/function).
Calaminarian Grassland	Affected area and changes in condition (structure/function).
Orchid-Rich Grassland/Calcareous Grassland*	Affected area and changes in condition (structure/function).
Species-Rich Nardus Upland Grassland*	Affected area and changes in condition (structure/function).
Molinia Meadows	Affected area and changes in condition (structure/function).
Hydrophilous Tall Herb	Affected area and changes in condition (structure/function).
Lowland Hay Meadows	Affected area and changes in condition (structure/function).
Raised Bog (Active)*	Affected area and changes in condition (structure/function).
Degraded Raised Bogs	Affected area and changes in condition (structure/function).
Blanket Bog (Active)*	Affected area and changes in condition (structure/function).
Transition Mires	Affected area and changes in condition (structure/function).
Rhynchosporion Depressions	Affected area and changes in condition (structure/function).
Cladium Fens*	Affected area and changes in condition (structure/function).
Petrifying Springs*	Affected area and changes in condition (structure/function).
Alkaline Fens	Affected area and changes in condition (structure/function).
Siliceous Scree	Affected area and changes in condition (structure/function).
Calcareous Scree	Affected area and changes in condition (structure/function).
Calcareous Rocky Slopes	Affected area and changes in condition (structure/function).
Siliceous Rocky Slopes	Affected area and changes in condition (structure/function).
Limestone Pavement*	Affected area and changes in condition (structure/function).
Caves Good	Affected area and changes in condition (structure/function).
Sea Caves	Affected area and changes in condition (structure/function).

Old Oak Woodlands	Affected area and changes in condition (structure/function).
Bog Woodland*	Affected area and changes in condition (structure/function).
Residual Alluvial Forests*	Affected area and changes in condition (structure/function).
Yew Woodlands*	Affected area and changes in condition (structure/function).
Biological Diversity Components – Species	
SEA and Plan/Programme AA	
Species richness	Changes in the type, number or proportion of a given species or set of species within the study area.
Fishing stocks	Changes in the population size of fishing species.
Wintering Birds	Conservation status and habitat suitability.
Bats	Conservation status and habitat suitability.
EIA and Project AA	
Biological Diversity Components – Plant Species (Listed in the Habitats Directive)	
Killarney Fern (<i>Trichomanes speciosum</i>)	Conservation status and habitat suitability.
Marsh Saxifrage (<i>Saxifraga hirculus</i>)	Conservation status and habitat suitability.
Slender Naiad (<i>Najas flexilis</i>)	Conservation status and habitat suitability.
Slender Green Feather-Moss (<i>Hamatocaulis vernicosus</i>)	Conservation status and habitat suitability.
Petalwort (<i>Petalophyllum ralfsii</i>)	Conservation status and habitat suitability.
Maerl (<i>Lithothamnion corralloides</i>)	Conservation status and habitat suitability.
Maerl (<i>Phymatolithon calcareum</i>)	Conservation status and habitat suitability.
White Cushion Moss (<i>Leucobryum glaucum</i>)	Conservation status and habitat suitability.
Sphagnum genus	Conservation status and habitat suitability.
Lycopodium species	Conservation status and habitat suitability.
Cladonia subgenus Cladina	Conservation status and habitat suitability.
Biological Diversity Components – Mollusc Species (Listed in the Habitats Directive)	
Geyer's Whorl Snail (<i>Vertigo geyeri</i>)	Conservation status and habitat suitability.
Narrow-mouthed Whorl Snail (<i>Vertigo angustior</i>)	Conservation status and habitat suitability.
Desmoulin's Whorl Snail (<i>Vertigo moulinsiana</i>)	Conservation status and habitat suitability.
Kerry Slug (<i>Geomalacus maculosus</i>)	Conservation status and habitat suitability.
Freshwater Pearl Mussel (<i>Margaritifera margaritifera</i>)	Conservation status and habitat suitability.
Nore Freshwater Pearl Mussel (<i>Margaritifera durrovensis</i>)	Conservation status and habitat suitability.
White-Clawed Crayfish (<i>Austropotamobius pallipes</i>)	Conservation status and habitat suitability.
Biological Diversity Components – Insect Species (Listed in the Habitats Directive)	
Marsh Fritillary (<i>Euphydryas aurinia</i>)	Conservation status and habitat suitability.
Biological Diversity Components – Lamprey Species (Listed in the Habitats Directive)	
Sea Lamprey (<i>Petromyzon marinus</i>)	Conservation status and habitat suitability.
River Lamprey (<i>Lampetra fluviatilis</i>)	Conservation status and habitat suitability.
Brook Lamprey (<i>Lampetra planeri</i>)	Conservation status and habitat suitability.
Biological Diversity Components – Freshwater Fish Species (Listed in the Habitats Directive)	
Allis Shad (<i>Alosa alosa</i>)	Conservation status and habitat suitability.
Killarney Shad (<i>Alosa fallax killarnensis</i>)	Conservation status and habitat suitability.
Twaite Shad (<i>Alosa fallax fallax</i>)	Conservation status and habitat suitability.
Pollan (<i>Coregonus autumnalis</i>)	Conservation status and habitat suitability.

Atlantic Salmon (<i>Salmo salar</i>)	Conservation status and habitat suitability.
Natterjack Toad (<i>Bufo calamita</i>)	Conservation status and habitat suitability.
Biological Diversity Components – Amphibian and Reptile Species (Listed in the Habitats Directive)	
Common Frog (<i>Rana temporaria</i>)	Conservation status and habitat suitability.
Leatherback Turtle (<i>Dermochelys coriacea</i>)	Conservation status and habitat suitability.
Biological Diversity Components – Bat Species (Listed in the Habitats Directive)	
Lesser Horseshoe Bat (<i>Rhinolophus hipposideros</i>)	Conservation status and habitat suitability.
Common Pipistrelle (<i>Pipistrellus pipistrellus</i>)	Conservation status and habitat suitability.
Soprano Pipistrelle (<i>Pipistrellus pygmaeus</i>)	Conservation status and habitat suitability.
Nathusius' Pipistrelle (<i>Pipistrellus nathusii</i>)	Conservation status and habitat suitability.
Natterer's Bat (<i>Myotis nattereri</i>)	Conservation status and habitat suitability.
Daubenton's Bat (<i>Myotis daubentoni</i>)	Conservation status and habitat suitability.
Whiskered Bat (<i>Myotis mystacinus</i>)	Conservation status and habitat suitability.
Brandt's Bat (<i>Myotis brandtii</i>)	Conservation status and habitat suitability.
Brown Long-Eared Bat (<i>Plecotus auritus</i>)	Conservation status and habitat suitability.
Leisler's Bat (<i>Nyctalus leisleri</i>)	Conservation status and habitat suitability.
Biological Diversity Components – Mammal Species (Listed in the Habitats Directive)	
Irish Hare (<i>Lepus timidus hibernicus</i>)	Conservation status and habitat suitability.
Otter (<i>Lutra lutra</i>)	Conservation status and habitat suitability.
Pine Marten (<i>Martes martes</i>)	Conservation status and habitat suitability.
Grey Seal (<i>Halichoerus grypus</i>)	Conservation status and habitat suitability.
Harbour seal (<i>Phoca vitulina</i>)	Conservation status and habitat suitability.
Humpback Whale (<i>Megaptera novaeangliae</i>)	Conservation status and habitat suitability.
Bottle-Nosed Dolphin (<i>Tursiops truncatus</i>)	Conservation status and habitat suitability.
Common Dolphin (<i>Delphinus delphis</i>)	Conservation status and habitat suitability.
Harbour Porpoise (<i>Phocoena phocoena</i>)	Conservation status and habitat suitability.
Killer Whale (<i>Orcinus orca</i>)	Conservation status and habitat suitability.
Long-Finned Pilot Whale (<i>Globicephala melas</i>)	Conservation status and habitat suitability.
Risso's Dolphin (<i>Grampus griseus</i>)	Conservation status and habitat suitability.
White-Sided Dolphin (<i>Lagenorhynchus acutus</i>)	Conservation status and habitat suitability.
Striped Dolphin (<i>Stenella coeruleoalba</i>)	Conservation status and habitat suitability.
Cuvier's Beaked Whale (<i>Ziphius cavirostris</i>)	Conservation status and habitat suitability.
Sowerby's Beaked Whale (<i>Mesoplodon bidens</i>)	Conservation status and habitat suitability.
Minke Whale (<i>Balaenoptera acutorostrata</i>)	Conservation status and habitat suitability.
Fin Whale (<i>Balaenoptera physalus</i>)	Conservation status and habitat suitability.
Blue Whale (<i>Balaenoptera musculus</i>)	Conservation status and habitat suitability.
Sperm Whale (<i>Physeter catodon</i>)	Conservation status and habitat suitability.
Northern Bottlenose Whale (<i>Hyperoodon ampullatus</i>)	Conservation status and habitat suitability.
Sei Whale (<i>Balaenoptera borealis</i>)	Conservation status and habitat suitability.
Northern Right Whale (<i>Eubalaena glacialis</i>)	Conservation status and habitat suitability.
False Killer Whale (<i>Delphinapterus lucas</i>)	Conservation status and habitat suitability.
True's Beaked Whale (<i>Mesoplodon mirus</i>)	Conservation status and habitat suitability.
Pygmy Sperm Whale (<i>Kogia breviceps</i>)	Conservation status and habitat suitability.
Beluga/White Whale (<i>Delphinapterus</i>)	Conservation status and habitat suitability.

<i>leucas</i>)	
Gervais' Beaked Whale (<i>Mesoplodon europaeus</i>)	Conservation status and habitat suitability.
Ecosystem Integrity – Supporting Features and Threats	
Biological river quality	Biological status of freshwaters (Q values) as reported by the EPA.
Status of water bodies	Status of rivers, lakes, estuaries and transitional waters as defined by the WFD.
Climate	Temperature, humidity, rainfall shifts as a result of changes in macro- and micro-climate.
Water level	Changes in the sea and/or lake level (rise or decrease as a result of climate change, including floods)
Soil quality	Changes in the chemistry (e.g. nutrient levels) and structure of soils (e.g. stability, compaction, sealing).
Number of invasive terrestrial plant species (e.g. Japanese Knotweed, Giant hogweed, Giant rhubarb)	Number of (introduced/eradicated/controlled/contained) invasive species.
Number of invasive terrestrial animal species (e.g. Grey squirrel, Sika deer, New Zealand flatworm)	Number of (introduced/eradicated/controlled/contained) invasive species.
Biodiversity Conservation Policies and Initiatives	
SEA and Plan/Programme AA	
Biodiversity Action Plans	Number and extent of implementation of BAP within the local or regional authority or governmental jurisdiction/s.
Biodiversity conservation incentives	Number and effectiveness of positive incentives developed, and adverse incentives removed.
Biodiversity conservation objectives	Number and effectiveness of policies and objectives within a plan/programme promoting the conservation of non-designated habitats, flora and fauna.
Management plans and conservation objectives (and compliance with)	Number of management plans and conservation objectives prepared (and achieved) within the local or regional authority or governmental jurisdiction/s.
Habitat mapping	Number of habitat maps prepared within the local or regional authority or governmental jurisdiction/s or percentage coverage of the total plan area.
Status of key protected species	Number of species in green, amber or red status within the local or regional authority or governmental jurisdiction/s (applicable for birds under the Birds of Conservation Concern in Ireland).

Adapted from: Comhar, EPA, NBP 2011-2016 and Habitats Directive.

Note that data to support assessment of many indicators listed above is provided in Annex B.

*Priority habitats – those that the EU considers require particular protection because their global distribution largely falls within the EU and they are in danger of disappearance.

Appendix D. IBIA Review Checklist. Note: the items highlighted in red relate to integration of SEA- AA and EIA-AA.

A	Generally well performed, no important tasks left incomplete or elements of significant uncertainty or doubt.
B	Generally satisfactory and complete, only minor omissions and inadequacies.
C	Can be considered just satisfactory despite elements of uncertainty or doubt but not deemed to be unreasonable.
D	Parts are well attempted but must, as a whole, be considered just unsatisfactory because of omissions, inadequacies, unsupported assumptions, unresolved uncertainties or unreasonable doubts.
E	Not satisfactory, significant omissions, inadequacies, uncertainties or doubts.
F	Very unsatisfactory, important task(s) poorly done or not attempted.
NA	Not applicable. The Review Topic is not applicable or irrelevant in the context of this Assessment

AA (BIODIVERSITY IMPACT ASSESSMENT) REVIEW FRAMEWORK		Applicable to Screening?	Applicable to Stage 2 AA?	A	B	C	D	E	F	NA	Comment
The required information may not be presented in the following order and may be scattered throughout different sections or even different documents.											
1. Introduction to the document in terms of the basis for the assessment is clearly explained.											
1.1	The competent authority responsible for the AA, the applicant for the proposed activity and the title of the NIS/NIR author are clearly stated.										
1.2	The consent processes for which the Report has been prepared are clearly stated.										
1.3	Any relationships with other documents connected with the activity are clearly stated. ¹⁶										
1.4	A description of how the biodiversity assessment process has been integrated into other assessment frameworks (e.g. Environmental Impact Assessment, Strategic Environmental Assessment, Flood Risk Assessment) is provided, noting stages where there have been overlaps.										
1.5	Guidelines referred to are clearly stated.										
2. Consultation during Screening is carried out appropriately.											
2.1	The bodies that were consulted are listed and the information that they provided is described, including stating where and how their information has been taken into										

¹⁶ Where plans, drawings or other reports are provided to support the Screening or other reports then these should be referenced. It is not necessary for the Screening Report or the NIS to be entirely self-contained providing it is not intending to be submitted as such, to the competent authority.

account in the screening process.										
3. Description of the proposed activity										
3.1 The background, purpose and objectives of action are fully explained.										
3.2 Relationships to 'parent' plans and programmes or other activities 'horizontally' are clearly stated, including stating whether other Appropriate Assessment judgments have been taken into account.										
3.3 Plans, maps and diagrams are included to clearly identify location and extent of the zone of influence of the proposed activity. A variety of scales are provided as required so that no doubt is left as to the extent of the zone of influence.										
3.4 Detail of the proposed activity in terms of timescale for each phase (preparatory/construction, operation and decommissioning and restoration- as appropriate) is stated.										
3.5 Where any aspects of the proposed activity cannot be described at the required level of detail at this stage of the design process ¹⁷ , this is clearly stated, including statements identifying the implications of these uncertainties for the Screening Stage and subsequent stages.										
4. Description of the footprint and zone of influence.										
4.1 An ecological description of the zone of influence of the proposed activity is provided using the necessary level of information and taking into account the different stages of the proposed activity.										
4.2 Methodologies and organisations used to gather information on the baseline conditions of the site are appropriate to the task.										
4.3 If a field survey was not carried out then a justification for this is provided and a comment made on any uncertainties that may result from the reliance on secondary sources of info.										
4.4 The nature of habitats, species or necessary ecological features present within the footprint of the proposed activity (especially those listed under the EC Habitats and Birds Directives) are fully and clearly described. Distinction is made between those recorded and those expected to occur.										
4.5 The level of importance placed on these ecological features is described using standardized descriptions (see IEEM, 2006).										
4.6 The key ecological sensitive receptors are clearly described.										
4.7 The locations of the sensitive receptors and relevant ecological features are described using maps where appropriate.										
4.8 The extent of habitat or species loss is described as a result of the proposed activity.										
4.9 The detail of the value of the site to the Natura 2000 network is described using quantitative terms. ¹⁸										

¹⁷ Certain detailed aspects (e.g. locations of site compounds, locations of waste disposal sites, commencement date) may be decided at a later stage – often post-consent. Where the lack of certainty over aspects means that likely significant effects cannot be ruled out objectively, this must be clearly acknowledged.

¹⁸ E.g. % of population in the Member State. The level of detail of information presented relates to the subject of the plan.

5. Description of Natura 2000 sites within the zone of influence of the proposed activity.										
5.1	A 'long-list' of Natura 2000 sites that were considered and criteria used to identify them are clearly explained. ¹⁹									
5.2	Natura 2000 site boundaries and their orientation to the proposed activity are shown on a map at an appropriate scale using several maps if required.									
5.3	Each Natura 2000 site is described in terms of qualifying habitats and species and other features of importance. Then reasons for designation are clearly stated.									
5.4	If appropriate, key physico-chemical factors that support the existence of the qualifying interests should be stated. These may include:									
	• Water balance									
	• Water chemistry									
	• Altitude									
	• Aspect									
	• Climate									
	• Air quality									
	• Soil chemistry									
	• Geology									
	• Tides									
	• Grazing regime									
	• Light.									
5.5	Key sources of baseline information are referenced with metadata to demonstrate the usefulness of the data.									
5.6	Relevant environmental data is portrayed spatially using GIS where appropriate and at scales that are useful to describe the potential for ecological impacts.									
5.7	The current conservation statuses of the qualifying interests are listed.									
5.8	The current conditions of the qualifying interest features are described.									
5.9	The current threats to the conservation status of the quantifying interests are listed using maps to show where these threats occur if this is necessary.									
5.10	Areas outside of Natura 2000 sites which may indirectly support the site through providing ecological corridors/green infrastructure or similar services have been taken into account (i.e. described).									
5.11	If required the specific location of certain habitats or species (which are qualifying interests) within the Natura 2000 site is provided (e.g. location of otter holt along a river cSAC).									
6. Identification and evaluation of likely significant effects.										
6.1	There are clear descriptions of any source-pathway-receptor linkages between the proposed activity in all its phases and the Natura 2000 sites. Such linkages are									

¹⁹ Criteria should include those based on distances from the proposed activity as well as linkages between sites and proposed activities.

	made with references to the qualifying interests and also to the underpinning physico-chemical factors.										
6.2	There is a clear distinction as to which Natura 2000 sites can be ignored in the rest of the assessment process if there are no source-pathway receptors. This will result in a short-list of sites that may be scrutinized further.										
6.3	There is a discussion as to the 'chance' or 'probability' of an impact occurring on the qualifying interests.										
6.4	There is a discussion as to the likely magnitude of the impact using objective, preferably quantitative terms.										
6.5	Impacts that are not deemed to be significant may be referred clearly screened out from further assessment.										
6.6	Impact Significance described with reference to defined criteria (using clear definitions of site integrity).										
6.7	Provides details of operations that may damage the special interest of the European site.										
6.8	Timescales over which effects have been considered are clearly defined.										
6.9	Any planned or contemplated nature conservation initiatives likely to affect the site in the future explained.										
6.10	Impacts are gauged against their potential to affect conservation objectives using the following criteria:										
	<ul style="list-style-type: none"> cause delays in progress towards achieving the conservation objectives of the site? 										
	<ul style="list-style-type: none"> interrupt progress towards achieving the conservation objectives of the site? 										
	<ul style="list-style-type: none"> disrupt those factors that help to maintain the favourable conditions of the site? 										
	<ul style="list-style-type: none"> interfere with the balance, distribution and density of key species that are the indicators of the favourable condition of the site? 										
	<ul style="list-style-type: none"> cause changes to the vital defining aspects (e.g. nutrient balance) that determine how the site functions as a habitat or ecosystem? 										
	<ul style="list-style-type: none"> change the dynamics of the relationships (between, for example, soil and water or plants and animals) that define the structure and/or function of the site? 										
	<ul style="list-style-type: none"> interfere with predicted or expected natural changes to the site (such as water dynamics or chemical composition)? 										
	<ul style="list-style-type: none"> reduce the area of key habitats? 										
	<ul style="list-style-type: none"> reduce the population of key species? 										
	<ul style="list-style-type: none"> change the balance between key species? 										
	<ul style="list-style-type: none"> reduce diversity of the site? 										
	<ul style="list-style-type: none"> result in disturbance that could affect population size or density or the balance between key species? 										
	<ul style="list-style-type: none"> result in physical fragmentation of habitats or ecological corridors? 										
	<ul style="list-style-type: none"> result in loss or reduction of key features (e.g. tree cover, tidal exposure, annual flooding, etc.)? 										
6.11	Impact during both the planned and unplanned/abnormal/accident scenarios are										

addressed (e.g. spillages, landslides, flooding).										
7. Identification and evaluation of likely significant in-combination or cumulative impacts										
7.1 Cumulative impacts are discussed with reference to other activities that may cause similar effects <u>on the same Natura 2000 site</u> . Other activities include nature conservation measures.										
7.2 Similar activities taking place in that could affect the same qualifying interests in other Natura sites are discussed.										
7.3 Existing conditions and background trends in environmental quality have been taken into account e.g. air quality, water quality.										
7.4 Where data has been taken from other assessment regimes (e.g. SEA, EIA) running in parallel to the biodiversity assessment, this is made clear.										
7.5 Boundaries for identification of in- combination effects are defined and justified (E.g. catchment-based).										
7.6 Timescales over which in-combination effects have been considered are defined.										
8. Mitigation measures										
8.1 It is clear that the hierarchy of mitigation (i.e. avoid, reduce, remedy) has been followed.										
8.2 Avoidance of likely significant effect by changes in designs, revisions of policy wording, inclusions of precautionary caveats and criteria has been fully described.[This is acceptable in Screening]										
8.3 Alternative designs (e.g. different scales, locations and forms of development) have been identified and fully assessed in terms of their likely impacts on the Natura 2000 site.										
8.4 Where no suitable avoidance /alternative solutions have been found the reasons are fully explained and fully justified, further assessment required is clearly identified.										
8.5 Mitigation measures involving means to reduce, minimise or remediate likely significant effects are proportionate to the magnitude and likely significance level.										
8.6 Contracts and funding are in place or other means of ensuring that mitigation will take place, are made clear.										
8.7 Mitigation must be capable of being monitored and a schedule of monitoring (including targets) is included where appropriate. If not capable of being monitored then a description of how the success of the measure will be determined, should be discussed.										
8.8 Contingency measures to address failure in mitigation are described.										
8.9 All steps have been taken to mitigate impacts that are possible at the level of the proposed activity and where recommendations have been made to carry out AA at lower levels (e.g. project-AA) then the risk that Natura 2000 sites may be threatened has been addressed.										

8.10 Where the biodiversity assessment is integrated into other assessment regimes (e.g. SEA, EIA) then there are clear references to the mitigation measures being part of a larger suite of other measures for protecting the environment.										
8.11 If required, other mitigation measures that have been proposed as part of SEA or EIA processes running in parallel to the biodiversity assessment, that have implications for biodiversity are also referenced.										
9 Residual impact										
9.1 The magnitude of the impact assuming successful mitigation is discussed in as much detail as required to convince that there are no likely significant effects.										
9.2 There are no likely effects as listed under Criteria 6.10										
9.3 There are no caveats, elements of reasonable doubt or reliance on other assessments placed on the conclusions made in the assessment.										

Appendix E. Input of the IBIA project into the Drafting of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011).

During the preparation of the IBIA Guidance, important legislative measures were being put in place, notably the Planning and Development (Amendment) Act 2010 and the European Communities (Birds and Natural Habitats) Regulations 2011. The driver of these revisions to legislation was a series of judgments of the Court of Justice of the European Union against Ireland for inadequate transposition of the Birds and Habitats Directives and failure to implement those Directives adequately.

In the preparation of the Birds and Natural Habitats Regulations, account was taken of the work being carried out on the IBIA project, and specific provisions were inserted in regulations 42 and 47 to facilitate integrated biodiversity impact assessment by promoting a joined-up approach.

Paragraph (21) of Regulation 42 provides for different consent authorities to collaborate on screening and appropriate assessment by stating:

(21) (a) Where a public authority, referred to in this paragraph as “the first authority”, has carried out a screening for Appropriate Assessment or an Appropriate Assessment in relation to a plan or project, any other public authority, referred to in this Regulation as “the second authority”, that is required to carry out a screening for Appropriate Assessment or an Appropriate Assessment of the same plan or project shall take account of the screening for Appropriate Assessment or Appropriate Assessment of the first authority in relation to that plan or project, and of any information, including a Natura Impact Statement that was prepared for consideration by the first authority or another second authority in relation to the plan or project.

(b) In taking account of a screening for Appropriate Assessment or Appropriate Assessment in relation to a plan or project and of a Natura Impact Statement, the second authority shall consider the extent to which the scope of that screening for Appropriate Assessment or Appropriate Assessment or Natura Impact Statement covers the issues that would be required to be addressed by the second authority in a screening for Appropriate Assessment or Appropriate Assessment of the plan or project in view of the scope of the consent to be given by it, and shall identify any issues that have not, in that regard, been adequately addressed.

(c) Subject to subparagraph (b) and without prejudice to its right to request all such information as it considers necessary to carry out a screening for Appropriate Assessment or Appropriate Assessment, the second authority may limit its requirement for information, including a Natura Impact Statement, to those issues that it determines have not been adequately addressed for the purposes of the second authority in the process of screening for Appropriate Assessment and Appropriate Assessment by the first authority or by another second authority.

(d) Where a plan or project requires two or more consents, each of which would require screening for Appropriate Assessment or Appropriate Assessment, the public authorities may carry out, following joint consultation, a joint screening for Appropriate Assessment or a joint Appropriate Assessment.

(e) Where two or more public authorities propose to carry out a joint screening for Appropriate Assessment or a joint Appropriate Assessment pursuant to subparagraph (d), the public authorities concerned shall so inform the proponent of the plan or project and provide him or her with a single contact address for correspondence, and they may agree that one public authority shall, in consultation with the others, lead the process and or co-ordinate correspondence with the proponent.

(f) For the avoidance of doubt, this paragraph applies to consents under the Planning and Development Acts 2000 to 2011 and to screening for Appropriate Assessments and Appropriate Assessments carried out thereunder.

Regulation 47 provides for the necessary legal distinction between AA and EIA/SEA but states that these assessments may be carried out concurrently and draws on common data and information.

Both the Planning and Development (Amendment) Act 2010 and the European Communities (Birds and Natural Habitats) Regulations 2011 provide for data submitted in support of a plan or project, including Natura impact statements, to be made publicly available.

Regulation 61 provides for the retention of all records for not less than 12 years, or such longer period as the Minister may direct. It also empowers the Minister to specify the content and format of information to be provided by a public authority on its website or in a national, regional or local database, in relation to plans and projects that it has approved to facilitate in combination assessments.

The Planning and Development (Amendment) Act 2010 makes the appropriate assessment of regional development guidelines, county development plans, local area plans, strategic development zones, planning permission applications, local authority own development etc. an integral part of the planning code. Previously the relevant provisions (applicable to the planning process) were contained in the European Communities (Habitats) Regulations 1997 to 2005, which were not seen as forming part of the planning code and were not well applied. The integration of AA into the planning code aligns it more closely with SEA and EIA, as provided for in the Planning and Development Acts and related Regulations, thereby facilitating a more integrated approach.

References and Bibliography

- CBD (2006). Biodiversity in Impact Assessment, Background Document to CBD Decision VIII/28: Voluntary Guidelines on Biodiversity-Inclusive Impact Assessment, Montreal, Canada. Secretariat of the Convention on Biological Diversity and Netherlands Commission for Environmental Assessment.
- CEC (1985). Directive 1985/337/EEC, of 27th June, on the Assessment of the Effects of Certain Public and Private Projects on the Environment. *Official Journal of the European Union*, L0337, L175, 5.7.1985.
- CEC (1992). Directive 92/43/EEC, of 21st May, on the Conservation of Natural Habitats and of Wild Fauna and Flora. Commission of the European Communities. *Official Journal of the European Union*, L 206, 22.7.1992.
- CEC (1997). Directive 97/11/EC, of 3rd March, amending Directive 85/337/EEC on the Assessment of the Effects of Certain Public and Private Projects on the Environment. Commission of the European Communities. *Official Journal of the European Union*, L0011, 3.3.1997.
- CEC (2000). Directive 2000/60/EC, of 23rd October, Establishing a Framework for Community Action in the Field of Water Policy. Commission of the European Communities. *Official Journal of the European Union*, L 327, 22.12.2000.
- CEC (2001). Directive 2001/42/EC, of 27th June, on the Assessment of the Effects of Certain Plans and Programmes on the Environment. Commission of the European Communities. *Official Journal of the European Union*, L 197/30, 21.7.2001.
- CEC (2004). Directive 2004/35/EC, of 21st April, on Environmental Liability with regard to the Prevention and Remedying of Environmental Damage. Commission of the European Communities. *Official Journal of the European Union*, L 143, 30.4.2004.
- CEC (2007a). Directive 2007/60/EC, of 23rd October, on the Assessment and Management of Flood Risks. Commission of the European Communities. *Official Journal of the European Union*, L288/27, 6.11.2007.
- CEC (2007b). Directive 2007/2/EC, of 14th March, Establishing an Infrastructure for Spatial Information in the European Community (INSPIRE). Commission of the European Communities. *Official Journal of the European Union*, L108/1, 24.5.2007.
- CEC (2009). Council Directive 2009/147/EC, of 30th November, on the Conservation of Wild Birds (codified version). Commission of the European Communities. *Official Journal of the European Union*, L 20/7, 26.1.2010.
- DAHG (2011a). European Communities (Birds and Natural Habitats) Regulations, Statutory Instrument No. 477/2011. Department of Arts, Heritage and the Gaeltacht, Government of Ireland. Accessible at: <http://www.irishstatutebook.ie/2011/en/si/0477.html>
- DAHG (2011b). Actions for Biodiversity 2011 – 2016, Ireland's 2nd National Biodiversity Plan. Department of Arts, Heritage and the Gaeltacht, Government of Ireland. Accessible at <http://www.pobail.ie/en/Publications/HeritagePublications/NatureConservationPublications/Actions%20for%20Biodiversity%202011%20-%202016.pdf>
- DEFRA (2011). UK Biodiversity Indicators in Your Pocket. United Kingdom: Department for Environment, Food and Rural Affairs. Accessible at http://jncc.defra.gov.uk/pdf/BIYP_2011.pdf
- DEHLG (2004). Implementation of SEA Directive (2001/42/EC): Assessment of the Effects of Certain Plans and Programmes on the Environment Guidelines for Regional Authorities and Planning Authorities. Ireland: Department of Environment, Heritage and Local Government, Government of Ireland. Accessible at <http://www.environ.ie/en/Publications/DevelopmentandHousing/Planning/FileDownload,1616,en.pdf>
- DEHLG (2009a). Appropriate Assessment of Plans and Projects in Ireland Guidance for Planning Authorities. Ireland: Department of Environment, Heritage and Local Government, Government of Ireland. Accessible at

<http://www.birdwatchireland.ie/LinkClick.aspx?fileticket=aeLSNXL11hU=&tabid=250consultation/name,25835,en.html>

- DEHLG (2009b). The Planning System and Flood Risk Management – Guidelines for Planning Authorities Ireland: Department of Environment, Heritage and Local Government, Government of Ireland. Accessible at <http://www.environ.ie/en/Publications/DevelopmentandHousing/Planning/FileDownload,21709,en.pdf>
- EC (2002). Assessment of plans and projects significantly affecting Natura 2000 sites Methodological Guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC. Office for Official Publications of the European Communities. European Commission, DG Environment. Accessible at: http://ec.europa.eu/environment/nature/natura2000/management/docs/art6/natura_2000_assess_en.pdf
- EPA (2002). Guidelines on the Information to be Contained in EIS. Prepared by CAAS Environmental Services Ltd. Ireland: Environmental Protection Agency. Accessible at http://www.epa.ie/downloads/advice/ea/guidelines/EPA_Guidelines_EIS_2002.pdf
- EPA (2003). Advice Notes on Current Practice in the Preparation of EIS. Prepared by CAAS Environmental Services Ltd. Ireland: Environmental Protection Agency. Accessible at http://www.epa.ie/downloads/advice/ea/guidelines/EPA_advice_on_EIS_2003.pdf
- EPA (2003). Synthesis Report on the Development of Strategic Environmental Assessment Methodologies for Plans and Programmes in Ireland. Prepared by ERM Ireland Ltd.. Ireland: Environmental Protection Agency. Accessible at <http://www.epa.ie/downloads/advice/ea/name,13547,en.html>
- EPA (2008). SEA Process Checklist. Prepared by Prendergast, T, Donnelly, A, d’Auria, L, and Desmond, M. Ireland: Environmental Protection Agency. Accessible at <http://www.epa.ie/downloads/advice/ea/SEA%20Process%20Checklist.pdf>
- EPA (2009). GISEA Manual: Current Practice and Potential on the Application of Geographic Information Systems as a Support Tool in Strategic Environmental Assessment of Irish Land Use Plans. Prepared by González, A. Ireland: Environmental Protection Agency. Accessible at <http://www.epa.ie/downloads/>
- EPA (2012). Good Practice Guidance: Cumulative Effects Assessment in SEA and AA. Prepared by Enfusion. Ireland: Environmental Protection Agency. Accessible at <http://www.epa.ie/downloads/>
- GBIF (2011). Promoting Biodiversity Data Inclusive EIA: Best Practice Guide for Publishing Primary Biodiversity Data. Prepared by Cadman, M, Chavan, V, King, N, Willoughby, S, Rajvanshi, A, Mathur, VB, Roberts, R, Copenhagen: Global Biodiversity Information Facility, 51 pp. ISBN: 87-92020-35-6. Accessible at http://links.gbif.org/eia_biodiversity_data_publishing_guide_en_v1
- HC (2011). Best Practice Guidance for Habitat Survey and Mapping. Prepared by Smith, GF, O’Donoghue, P, O’Hora, K and Delaney, E. Ireland: The Heritage Council. Accessible at http://www.heritagecouncil.ie/fileadmin/user_upload/Publications/Wildlife/Habitat_Survey_Guidance/Habitat_Survey_Guidance_Heritage_Council_2011_2.pdf
- IEEM (2006). Guidelines for Ecological Impact Assessment in the UK. Institute of Ecology and Environmental Management. Accessible at <http://www.ieem.net/ecia/Ecia%20Approved%207%20July%2006.pdf>

Science, Technology, Research and Innovation for the Environment (STRIVE) 2007-2013

The Science, Technology, Research and Innovation for the Environment (STRIVE) programme covers the period 2007 to 2013.

The programme comprises three key measures: Sustainable Development, Cleaner Production and Environmental Technologies, and A Healthy Environment; together with two supporting measures: EPA Environmental Research Centre (ERC) and Capacity & Capability Building. The seven principal thematic areas for the programme are Climate Change; Waste, Resource Management and Chemicals; Water Quality and the Aquatic Environment; Air Quality, Atmospheric Deposition and Noise; Impacts on Biodiversity; Soils and Land-use; and Socio-economic Considerations. In addition, other emerging issues will be addressed as the need arises.

The funding for the programme (approximately €100 million) comes from the Environmental Research Sub-Programme of the National Development Plan (NDP), the Inter-Departmental Committee for the Strategy for Science, Technology and Innovation (IDC-SSTI); and EPA core funding and co-funding by economic sectors.

The EPA has a statutory role to co-ordinate environmental research in Ireland and is organising and administering the STRIVE programme on behalf of the Department of the Environment, Heritage and Local Government.



ENVIRONMENTAL PROTECTION AGENCY
PO Box 3000, Johnstown Castle Estate, Co. Wexford, Ireland
t 053 916 0600 f 053 916 0699
LoCall 1890 33 55 99
e info@epa.ie w <http://www.epa.ie>



Comhshaoil, Pobal agus Rialtas Áitiúil
Environment, Community and Local Government