STRIVE
Report Series No. 106

Integrated Biodiversity Impact Assessment – Streamlining AA, SEA and EIA Processes: Practitioner's Manual

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

Environmental Protection Agency
An Ghníomhaireacht um Chaomhnú Comhshaoil

Environmental Protection Agency

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EPA STRIVE Programme 2007–2013

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Prepared for the Environmental Protection Agency

by

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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.

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Executive Summary

1 Introduction

Biodiversity is one of the environmental topics of Strategic Environmental Assessment (SEA), is captured by the topics of flora and fauna in Environmental Impact Assessment (EIA), and is pivotal to Appropriate Assessment (AA) but in the focused context of an assessment of the likely significant effects on European sites in view of their conservation objectives. Acknowledging the overlaps and the increasing burden for authorities and individuals, this practitioner's manual provides step-by-step guidance on integrating processes for biodiversity impact assessment. The Integrated Biodiversity Impact Assessment (IBIA) methodology presented seeks to ensure that legal requirements are fulfilled while, at the same time, effectively and efficiently connecting relevant procedures, allowing the sharing and reuse of biodiversity data and scientific knowledge supported by a Geographic Information Systems (GIS) framework, and integrating biodiversity considerations with a variety of other concerns during planning and design processes. It does not replace any of the existing requirements but rather promotes a framework for maximising the co-ordination and integration of processes and outcomes. Its objective is to inform the scope and outcomes of the different processes in a timely manner and promote best practice. Where appropriate, a distinction is made between integrating SEA with AA at plan level, and EIA with AA at project level. This guidance is complementary to other guidance on approaches and specific requirements associated with SEA, EIA and AA.

2 IBIA Framework

The legal and procedural requirements of the SEA, EIA and Habitats Directives are commonly fulfilled through a series of methodological steps undertaken during plan/programme-making or project design and consent processes. The IBIA methodological framework 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 and timely communication. The IBIA framework is supported, where possible, by spatially specific data and GIS techniques.

The IBIA process is initiated by AA as, under the Habitats Directive, it has statutory power to withhold consent if it is determined that the proposal (i.e. plan, programme or project) has the potential to significantly impact on the integrity of European sites or if such potential for significant impacts cannot be ruled out (i.e. precautionary principle). The AA screening stage can flag any potential issues that could lead to consent refusal and inform the SEA/EIA scoping stage to consider whether the proposal should move forward in its current form or whether alternative proposals need to be developed (failure to identify viable alternatives may establish the need to seek an Imperative Reasons of Overriding Public Interest (IROPI) derogation for essential public projects). Where AA does not identify any significant reasons to withhold consent or when such reasons have been addressed by adopting an alternative or modifying and redrafting the proposal to avoid impacting the integrity of a European site, the SEA/EIA process can be commenced.

Information gathered and analysed during AA screening should be incorporated into the SEA/EIA baseline to contribute to a comprehensive reference base for biodiversity impact assessment. Exchanging information between the AA process and the assessment of impacts as part of SEA or EIA can be clearly aligned to provide a well-informed and quantitative evidence base for the assessment. AA information on qualifying interests, conservation objectives and site integrity of European sites is to inform impact assessment in SEA/EIA. In the same way, SEA/EIA findings with regards, for example, to connectivity (via water features or vegetation, as well as national designations as stepping stones) should be taken into consideration at AA level. Although AA should precede SEA/EIA in the IBIA framework, the

definition of alternative solutions in AA, where needed, may occur on a par with or at a later stage than the definition of alternatives required in SEA/EIA, which tends to occur prior to the assessment stage. In all cases, the processes must be co-ordinated through ongoing communication to ensure that the ecological alternatives developed at this AA stage are incorporated into the SEA/EIA alternatives, and correspondingly assessed.

Mitigation measures derived from the relevant appraisals (to avoid, reduce and, in the context of IROPI, offset any predicted significant adverse effects on biodiversity and biodiversity-supporting features) need to be compatible and simultaneously considered for their incorporation into the plan/programme/project. Although AA procedures do not formally require the definition of monitoring arrangements, indicators and targets for European sites should be specified as part of SEA/EIA monitoring. Any monitoring scheme should aim at improving the evidence base and address any identified biodiversity data gaps in order to feed into and improve future assessments.

3 Key Best Practice Recommendations

The core aim of this guidance is to promote best practice when integrating EU and national legislative and procedural requirements for biodiversity impact assessment. The following general recommendations derive from international and national best practice and have been formulated to address the most common issues affecting biodiversity impact assessment as part of SEA/EIA and AA, as well as to more effectively integrate their requirements. Additional step-by-step recommendations are provided in the main document.

- ***Initiate IBIA early in the plan/programme-making or project planning/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 through the planning and design stages up to the emergence of the final proposal.

- ***Define and allocate clear responsibilities*** among consultants and project partners, including information sharing mechanisms and time frames. The role of each member of the assessment team, and the scope of the biodiversity impact assessment, should be determined in order to subsequently co-ordinate data gathering efforts, the timely exchange of information and findings, and the preparation of the final report (e.g. NIS, 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 (e.g. ecologists having an overseeing role in IBIA).

- ***Establish a data sharing mechanism*** between assessment teams to ensure full consideration of all relevant information and to avoid duplication of efforts, ensuring that data collected to meet statutory obligations are also made available in the public domain.

- ***Establish and maintain ongoing and proactive 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, DAFM, DAHG (which includes NPWS), DCENR and DECLG) and key stakeholders. The interplay between the proponent, consultants, public authorities, stakeholders and the general public should be established early in the IBIA process and be proactively maintained to ensure timely information exchange and data sharing. Ongoing consultation and information exchange (in addition to statutory consultation) can facilitate early identification of key biodiversity-relevant issues, conflicts and opportunities, data gathering, and comprehensive assessment and results.

- ***Undertake focused pre-planning consultation*** (i.e. at screening/scoping stage) with key stakeholders, including environmental authorities and (where appropriate) the NPWS, for full and early identification of potential significant biodiversity impacts.

- ***Ensure full assessment of all biodiversity-relevant considerations***. The description of the baseline and the impact assessment process should be undertaken at the ecosystem level, should include designated sites, annexed species and other habitats and species of ecological value, and address habitat suitability and integrity, as well as connectivity between designated sites and the wider biodiversity. Similarly, the baseline should assess the interrelationship with other environmental factors, such as water, soil, landscape, climate, etc., and provide an all-inclusive assessment of potential significant effects on biodiversity, including the potential for in-combination, cumulative and indirect effects. Where appropriate, ecosystem services associated with specific biodiversity features (e.g. wetlands and flood alleviation) should be recognised.

- ***Apply standardised methods for ecological surveys and data collation, creation and classification***, as well as metadata creation, by applying existing international and national guidance.

- ***Undertake ecological surveys that, where appropriate, address seasonal change*** where evidence 'beyond reasonable doubt' is not already available in AA screening (particularly at local planning and project level). In the absence of conservation plans, use existing site synopsis, threatened species list, detailed conservation objectives where available and national conservation objectives (to be published at the time of writing) to establish qualifying interests of European sites.

- ***Apply standardised approaches to spatial data management.*** Promote spatial data generation during field surveys by applying existing national guidance on data collation, creation of metadata following EU guidance, and application of spatial analysis techniques for the assessment of biodiversity-relevant aspects where feasible.

- ***Assessment approaches should fit the scale and scope of the proposal*** in order to provide scientifically robust and, as far as possible, spatially specific and quantitative outputs that facilitate understanding of potential issues.

- ***Report and acknowledge data gaps and inconsistencies*** that may limit assessment results to ensure transparency in IBIA.

- ***Develop alternatives as realistic and achievable strategic ecological solutions***. This can be achieved by identifying land-use zonings or development specifications that ensure protection of sensitive biodiversity areas by taking into consideration intrinsic biodiversity (and environmental) vulnerabilities.

- ***Develop and fully integrate specific measures to protect European sites*** (ensuring avoidance of impacts during AA screening through appropriate site location or land-use zoning, and best practice design measures, and providing mitigation for AA), with specification of aspects to be dealt with at lower planning tiers or project level.

- ***Fully incorporate SEA/EIA and AA findings*** in the form of mitigation measures and recommendations into the plan/programme/ project. The source of the mitigation measures (i.e. AA versus SEA/EIA) should be recognised to take account of their statutory implications.

- ***Formulate a monitoring scheme to fit the scale and scope of the proposal in the context of the biodiversity characteristics and potential vulnerabilities***, including indicators for European sites. Avail, as far as possible, of existing monitoring arrangements (e.g. EPA water quality monitoring or NPWS habitat monitoring projects). Monitoring should follow up on the effective implementation of mitigation measures, identify any predicted/unforeseen adverse impacts and, where possible, address any identified data gaps.

- ***Reflect AA findings in the SEA ER/EIS*** (e.g. providing the main findings of the NIS/NIR into the flora and fauna sections, or as an appendix), and report on ‘full-range’ of biodiversity impacts,

incorporating all mapped results and stating the process/es from which such findings (and proposed mitigation) derive to acknowledge their legal implications.

1 Introduction

1.1 Introduction

Environmental assessment obligations, including screening requirements, derive from three key European directives:

1. The Habitats Directive (CEC, 1992);
2. The Strategic Environmental Assessment (SEA) Directive (CEC, 2001); and
3. The Environmental Impact Assessment (EIA) Directive, as codified (CEC, 2011).

These present separate but often overlapping obligations in relation to biodiversity (including sites, ecosystems, habitats and species) when considering plans, programmes or projects. Added to this, there are overlaps in relation to biodiversity associated with other directives, notably the Birds Directive (CEC, 2009), the Water Framework Directive (WFD) (CEC, 2000), the Floods Directive (FD) (CEC, 2007a) and the Environmental Liability Directive (ELD) (CEC, 2004).

The three statutory forms of environmental assessment – Appropriate Assessment (AA), SEA and EIA – are summarised in Fig. 1.1; each has separate legislative provisions and procedural requirements. Having to screen for or undertake more than one of these assessments has implications for proponents in terms of resources, timing and approval processes, and may also mean duplication of work and, potentially, of costs when, in many cases, the same datasets are applied and similar steps are involved. In addition, assessments often have to be updated or repeated when, for example, proposals are altered or subject to periodic review. With each revision or new approval comes a requirement to (re)screen and consider potential cumulative and/or in-combination effects of other plans and projects.

Biodiversity is one of the environmental topics of SEA. It is captured by the topics of flora and fauna in EIA, and is pivotal to AA but in the focused context of an assessment of the likely significant effects on European sites in view of their conservation objectives. The term 'biodiversity impact assessment' not only encapsulates the biodiversity element of these three assessments, but also covers any other scenarios where impacts on biodiversity are taken into consideration, for example in ensuring proper planning and sustainable development, in complying with wider legal and other obligations of nature conservation legislation, and in promoting best practice. The term is used interchangeably with 'ecological impact assessment'.

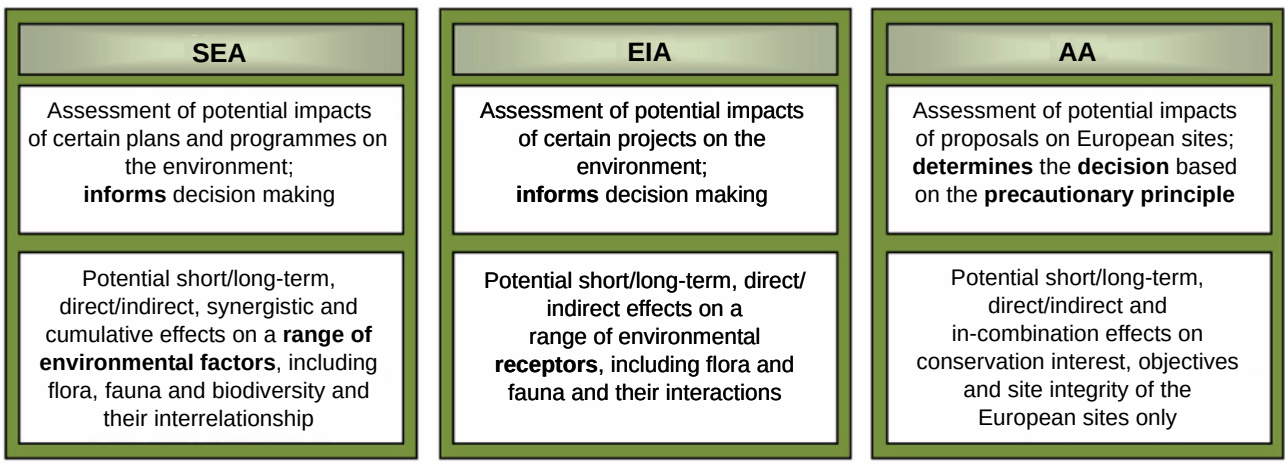

Figure 1.1. Comparison of main legal and procedural differences between SEA, EIA and AA.

Acknowledging the overlaps and the increasing burden for authorities and individuals, a study by a multidisciplinary team was commissioned and a methodological approach to integration of the processes was developed and published in the form of Integrated Biodiversity Impact Assessment (IBIA) Guidance (González et al., 2012). The integrated approach seeks to ensure that legal requirements are fulfilled while, at the same time, effectively and efficiently connecting relevant procedures, allowing the sharing and reuse of biodiversity data and scientific knowledge supported by a Geographic Information Systems (GIS) framework, and integrating biodiversity considerations with a variety of other concerns during planning and design processes. In addition, wider benefits will accrue for authorities and others by applying this framework to many of their day-to-day operations.

This user's manual is intended for the practical application of the IBIA methodology. It presents step-by-step guidance on integrating processes where more than one assessment is required, but can also be used to assist in screening. It does not replace any of the existing requirements but rather promotes a framework for maximising the co-ordination and integration of processes and outcomes. Its objective is to inform the scope and outcomes of the different processes in a timely manner and promote best practice. Where appropriate, a distinction is made between integrating SEA with AA at plan level, and EIA with AA at project level. Particular reference is made to spatial planning, but IBIA is equally applicable to other onshore and offshore plans, programmes and projects. It is not a rigid methodology but should be seen as one that will allow further development of flexible and context-relevant approaches.

The overall aims of the IBIA methodology presented in this manual are to:

- Integrate assessment processes and co-ordinate 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;
- Achieve best results for the protection and conservation of biodiversity; and
- Encourage greater sustainability in planning and realising development.

1.2 Legislative Framework for IBIA

Obligations in relation to biodiversity arise not only through direct legislative requirements, but also through wider application of good practice in relation to planning, sustainable development, informed decision making and maintaining environmental quality and ecosystem services. Biodiversity means the variety of all life forms and, in Ireland, encompasses the elements listed in Table 1.1, as well as other common habitats and species.

The Habitats and Birds Directives impose wide-ranging obligations in relation to habitats and species of conservation concern (mostly listed in the annexes) and ecological networks, within the EU, with an overarching aim of maintaining biodiversity. This includes obligations to designate and conserve Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) that, together, form part of the EU-wide Natura 2000 network, and to maintain or restore favourable conservation status of the target habitats and species of the directives (adjudged at the national resource level). In addition, Article 4 of the Birds Directive requires that efforts are made to protect bird habitats from pollution or deterioration outside SPAs. Articles 12–16 of the Habitats Directive address the wider protection of certain species, including strict protection of Annex IV species, while Article 10 addresses the protection of landscape features that are of major importance for wild flora and fauna and to the coherence of the Natura 2000 network. There are direct linkages with the ELD in relation to determining whether ‘environmental damage’ to ‘natural habitat

Table 1.1. Biodiversity elements and their relevant legislative and planning framework.

Nature Conservation Sites, as per the Planning and Development (Amendment) Act, 2010 – namely European sites (i.e. SACs designated under the Habitats Directive (CEC, 1992) and SPAs designated under the Birds Directive (CEC, 2009)); and NHAs, Nature Reserves, and Refuges for Flora or Fauna under the Wildlife Acts of 1976 and 2000.
Ramsar sites, Biosphere Reserves, Red Data Book species.
Other sites with nature conservation designations – National Parks, proposed NHAs[1] (other than those actively going through the designation process), Wildfowl Sanctuaries.
Annex IV (Habitats Directive) species of flora and fauna, and their key habitats (i.e. breeding sites and resting places), which are strictly protected wherever they occur, whether inside or outside the above sites.
Other species of flora and fauna and their key habitats, which are protected under the Wildlife Acts, 1976–2000 wherever they occur.
'Protected species and natural habitats' as defined in the Environmental Liability Directive and European Communities (Environmental Liability) Regulations, 2008, including: • Birds Directive – Annex I species and other regularly occurring migratory species, and their habitats (wherever they occur); and • Habitats Directive – Annex I habitats, Annex II species and their habitats, and Annex IV species and their breeding sites and resting places (wherever they occur).
Stepping stones and ecological corridors covered by Article 10 of the Habitats Directive.
Local biodiversity sites or areas of biodiversity importance identified in spatial plans.
Other natural or semi-natural habitats, and important species locations.

[1]Undesignated sites that are known to be of some importance for biodiversity but have not yet been fully evaluated. NHA sites actively going through the legal designation process are excluded from this category.

and protected species' has been caused or is threatened, and with 'protected areas' of the WFD.

AA obligations derive from Article 6(3) of the Habitats Directive, and apply to SACs and, via Article 7 of the Habitats Directive, to SPAs. Member States must ensure that AA of plans and projects is undertaken where significant effects upon the integrity and conservation objectives of European site/s are anticipated, and must exercise their statutory power to withhold consent if it is determined, following AA, that a proposal will adversely affect the integrity of European sites or the risk of such effects cannot be excluded (i.e. the precautionary principle applies). Derogations from this strict protection can be pursued in exceptional circumstances of Imperative Reasons of Overriding Public Interest (IROPI) under Article 6(4).

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 SEA and EIA. Other legal instruments, notably the WFD, FD and ELD, draw upon the Birds and Habitats Directives as far as biodiversity impact assessment issues go.

Many plans, programmes and projects (including those associated with flood risk 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. Compared with SEA and EIA, AA is more specific and has a narrower focus restricted to the impact of a plan or project alone, and in combination with other plans or projects, on discrete European sites that form the Natura 2000 network, with specific attention to the sites' qualifying interests (SACs) or special conservation interests (SPAs), conservation objectives and site integrity. While the focus is narrow, it should be noted that assessments of potential effects may be dependent on assessments of other environmental topics and on their interactions. Other features of biodiversity interest in the site that are not encompassed by the conservation objectives, or habitats and species not included in the relevant annexes, 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 interrelationship (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 European sites under its Article 4(3) and Annex III. Therefore, both SEA and EIA assess potential impacts on habitats and species within designated sites and wider biodiversity areas[1], examining the overall implications for biodiversity (including potential secondary impacts associated with changes in water, soil or climatic conditions, for example). In many instances, information obtained in SEA or EIA 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 implications for species protected under Articles 12–16 of the Habitats Directive (i.e. Annex IV and V species), pollution or deterioration of bird habitats (Article 4(4) of the Birds Directive) and landscape features which are of major importance for wild flora and fauna (Article 10 of the Habitats Directive).

1.3 Communication and Consultation

An efficient IBIA process depends on, and benefits from, effective and timely consultation, and the early inclusion of an ecologist and any other relevant specialists. 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 key biodiversity constraints and considerations;
- Identifying interrelationships between biodiversity and other related environmental aspects (e.g. water, landscape, soils, etc.);
- Identifying any critical data gaps and flagging any technique and database updates throughout the assessment;
- Increasing understanding, assigning appropriate weightings when comparing options or alternatives, avoiding unnecessary controversy and delays; and
- Promoting transparency in the planning and decision-making processes.

The establishment of communication channels between the proponent and the assessment team/s, as well as the relevant environmental authorities, stakeholder groups (including biodiversity and heritage officers, local authority ecologists and non-governmental organisations (NGOs) such as BirdWatch Ireland or An Taisce) and individuals, is critical in ensuring full integration of the IBIA methodological stages and thorough consideration and examination of all relevant biodiversity data, as well as biodiversity conservation priorities and perceptions. This is commonly initiated by a scoping workshop for land-use plans, strategic programmes and large-scale projects which may, for land-use plans in particular, be supported by an 'issues paper' that is previously prepared and distributed, and where the main potential issues are presented for debate. The number and expertise of representatives participating in such a workshop will vary depending on the nature and scale of the plan/programme/project, but also on time frame and resources.

Consultation with the statutory environmental authorities is mandatory under the SEA Directive. These are designated under the SEA Regulations:

- Environmental Protection Agency (EPA);
- Department of Environment, Community and Local Government (DECLG);

1. Note that the term 'designated' is used to refer to designated nature conservation sites; in contrast, the term 'wider biodiversity' refers to the wider countryside and other habitats/species of ecological value. Refer to the Glossary for further details.

- Department of Agriculture, Food and the Marine (DAFM) 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 the built heritage (including archaeology) or nature conservation (National Parks and Wildlife Service – NPWS).

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 (with the exception of strategic infrastructure development applications); nonetheless it is advisable and reasonably common at project planning stage.

In the context of AA or SEA, the DAHG (NPWS) has an advisory role and is commonly consulted, although this is not a legal requisite at pre-planning stage. Responsibility for the Birds and Habitats Directives, as well as for the Wildlife Acts, rests primarily with the DAHG. The DAHG is a statutory consultee under the Planning and Development Regulations, including in relation to spatial plans (regional planning guidelines, development plans and variations, local area plans and variations) and development (strategic infrastructure and certain planning applications). The Birds and Habitats Regulations 2011 provide for the Department to give advice and proposal-specific guidance on AA, and provide a statutory basis for public authorities to consult with and seek advice in relation to AA. Consultation with the NPWS is good practice and, ideally, should be initiated at screening or scoping stages, preferably after having consulted the NPWS website (http://www.npws.ie), and the data and information it contains. The website is updated on an ongoing basis (although it should be noted that this is not the only source of up-to-date information – refer to Appendix 3). In addition, requests for NPWS-held data may be made by submitting a Data Request Form (available from the website).

The normal procedure is for consultation with the NPWS to be initiated via the Development Applications Unit (DAU) of the DAHG (manager.dau@ahg.gov.ie). All relevant information should be provided to assist this process so that it is clear what is entailed, what time frames and consent processes are envisaged, and what surveys and assessments are intended. This affords an opportunity for proposals to be examined; responses are made where possible or necessary but at the Department's discretion, subject to various factors, including resource constraints. This means that consultation may entail correspondence to, rather than dialogue with, the NPWS. Consultation should occur early in the process, both to allow time for responses and to ensure that there is sufficient time for advice to be taken into account, including, for example, seasonal or multi-seasonal data collection. There is no statutory provision for 'ongoing' consultation but continuing communication may be required for high planning tiers (e.g. strategic regional plans) and key infrastructural projects, and for any other proposals with significant ecological issues. All communications and key decisions/advice should be documented and addressed or otherwise followed up.

1.4 Data Sources and Data Management

A good biodiversity baseline is crucial for effective IBIA. Biodiversity data in Ireland derive mainly from conservation management research and inventories, SEA, EIA and AA studies, and academic research. Screening, scoping and baseline data commonly cover environmental resources (e.g. ecological designations) and environmental sensitivities (e.g. Red Data Book species). In addition, biodiversity-related environmental pressures arising from the proposal (e.g. expansion of urban settlements, water contamination or greenhouse gas emissions contributing to climate change) need to be considered to anticipate potential biodiversity impacts. The type and number of datasets used depend on the scope and purpose of the assessment (Table 1.2 and Appendix 3). AA, for example, requires the consideration of potential significant effects on European sites in view of their conservation objectives, meaning that

Table 1.2. Biodiversity-relevant datasets commonly available in the EU and applicable in Ireland (ordered from international to national designations, and down to local inventories/surveys).

Dataset	EU coverage	Applicability	Comment
Ramsar Wetlands of international importance	All Member States	Plans, programmes and projects	International designation Boundaries being revised for Ireland (not released yet)
Biosphere reserves	All Member States	Plans, programmes and projects	International designation
European sites Special Protection Areas, Special Areas of Conservation	All Member States	Plans, programmes and projects	Statutory designation Available at http://www.npws.ie
National designations Natural Heritage Areas, Biosphere Reserves, Refuges for Flora/Fauna, Wildfowl Sanctuaries, National Parks, Nature Reserves	Member States	Plans, programmes and projects	Statutory designation Available at http://www.npws.ie
CORINE CoORdinated INformation on the Environment – Land Cover	All Member States	Plans and programmes	Proxy. Minimum mapping unit constrains application at local level Available at http://www.epa.ie
Habitat maps Inventory of land and seabed cover, habitat indicator map, biodiversity plans	Limited geographical areas in some Member States	Plans and projects	Application at local 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; terrestrial and marine habitat maps are to be prepared by 2015 under the NBP
Green infrastructure and ecological corridors Inventory of green areas and corridors	Limited geographical areas in some Member States	Plans and projects	Often prepared at the local level as part of urban planning Available in some local authorities (e.g. Fingal)
Forest inventories Inventory of green canopy coverage and forest types	Some Member States	Plans, programmes and projects	Proxy. Local-level application constrained by scale of data capture Available from FIPS and Coillte
Water Framework Directive Record of protected areas, waterbodies and their ecological status	All Member States	Plans, programmes and projects	Includes water-dependent habitats Application at local level can be constrained by scale of reporting and map creation Available at http://www.wfdireland.ie
Site-specific surveys Research-based marine and terrestrial flora and fauna surveys; EIA-related surveys	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 http://www.biodiversityireland.ie

additional datasets may become irrelevant. At SEA and EIA levels, incorporation of datasets generally depends on their scale and relevance to the proposal. In all cases, ecological expertise is needed for accurate and objective interpretation of data, as well as to analyse trends and identify key issues and data gaps, some of which will necessitate field surveys.

The location, extent and physical characteristics of European sites, NHAs and proposed NHAs (pNHAs)

represent minimum data requirements in IBIA, given that screening involves, inter alia, establishing the potential for significant effects on such sites. In the case of European sites, and screening for AA, qualifying interests (SAC) or special conservation interests (SPA), and conservation objectives are additional minimum requirements. All European sites have generic conservation objectives. Detailed conservation objectives are available for a small but growing number of sites. In addition, national conservation objectives are in preparation for relevant annexed habitats and species (as yet unpublished at time of writing). The above data are available or will be made available at http://www.npws.ie. Some SACs and National Parks have (draft) conservation management plans.

Additional datasets that are readily available may support the assessment (Appendix 3), and may indicate possible screening distances (river catchments) or environmental conditions such as geology type, soils, topography, etc. These can also facilitate screening by identifying potential pollution vectors (e.g. water, air, soil) and pathways to European sites or other sensitive biodiversity receptors with the consequent risk of secondary, indirect or cumulative effects. Moreover, datasets addressing wider biodiversity considerations (e.g. habitat maps, location of native woodlands and hedgerows, etc.) can provide relevant information on areas of potentially high conservation interest. Such datasets can enable assessment of the ecological connectivity and stepping stones for wildlife, that can significantly contribute to the assessment of the viability and robustness of European sites, as well as to the IBIA process for overall biodiversity conservation.

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 the habitat indicator map and national forest inventories for Ireland. CORINE, in particular, can be relevant for biodiversity impact assessment and planning, as land-use changes are one of the key drivers of biodiversity loss. However, CORINE dates from 2006 (the 2009 update is yet to be made publicly available) and currently available resolution is poor (i.e. 25 ha, and 5 ha for land-cover changes over time such as 2000–2006). The EPA is currently developing a higher resolution land-cover map based on CORINE 2009 and land-parcel boundaries.

Additional data may need to be gathered in the field for project AAs, EIAs and lower-tier planning SEAs (e.g. local area plans). Data requests (to the relevant authorities listed in Appendix 3) need to be submitted as soon as possible in the assessment process, and additional data may need to be gathered on an ongoing basis throughout the assessment to deal with issues as they arise (e.g. further detail on the assessment of potential impacts, data gaps, data quality limitations, etc.). Biodiversity data gathering and creation methods, and the associated pertinent arrangements, need to be established to ensure that sufficient information is made available or is gathered 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).

Biodiversity conservation and impact assessment need to pay special attention to spatial characteristics (e.g. land uses and environmental variables) affecting species and habitat distributions. It is considered that spatial approaches (e.g. through the application of GIS for mapping and spatial assessment, and the use of Global Positioning Systems (GPS) during field surveys) can significantly enhance biodiversity impact assessment by providing evidence-based and spatially specific current information to better support biodiversity conservation, monitoring, plan/programme review and policy making.

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 content and level of detail of the plan/programme/project assessment, the type, quality and scale of the information used must be adequate. Inconsistencies in this regard can affect the

full 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. Natura Impact Statement (NIS) or Natura Impact Report (NIR) for land-use plans[2], SEA Environmental Report (ER) or Environmental Impact Statement (EIS)) to ensure transparency in both the assessment and decision-making processes.

1.5 Links to the IBIA, EU Directives and Guidance

This guidance is based on the IBIA Guidance and promotes the integrated implementation of AA and SEA, as well as AA and EIA, supported by a GIS framework (Fig. 1.2), and draws on the WFD, FD and ELD, as well as the INSPIRE Directive (CEC, 2007b). Specific guidance exists in Ireland for the processes required under these directives and, therefore, this manual should be used in conjunction with the following national guidance:

- Integrated Biodiversity Impact Assessment – Streamlining AA, SEA and EIA Processes: Best Practice Guidance (González et al., 2012);
- Good Practice Guidance: Cumulative Effects Assessment in SEA and AA (EPA, in press);
- Appropriate Assessment of Plans and Projects in Ireland: Guidance for Planning Authorities (DEHLG, 2010);
- 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, 2003b);
- SEA Process Checklist (EPA, 2008);
- Guidelines on the Information to be Contained in EIS (EPA, 2002);
- Advice Notes on Current Practice in the Preparation of EIS (EPA, 2003a);

2. From here on, NIS is used to refer to both Natura Impact Statement and Natura Impact Report. Refer to the Glossary for further details.

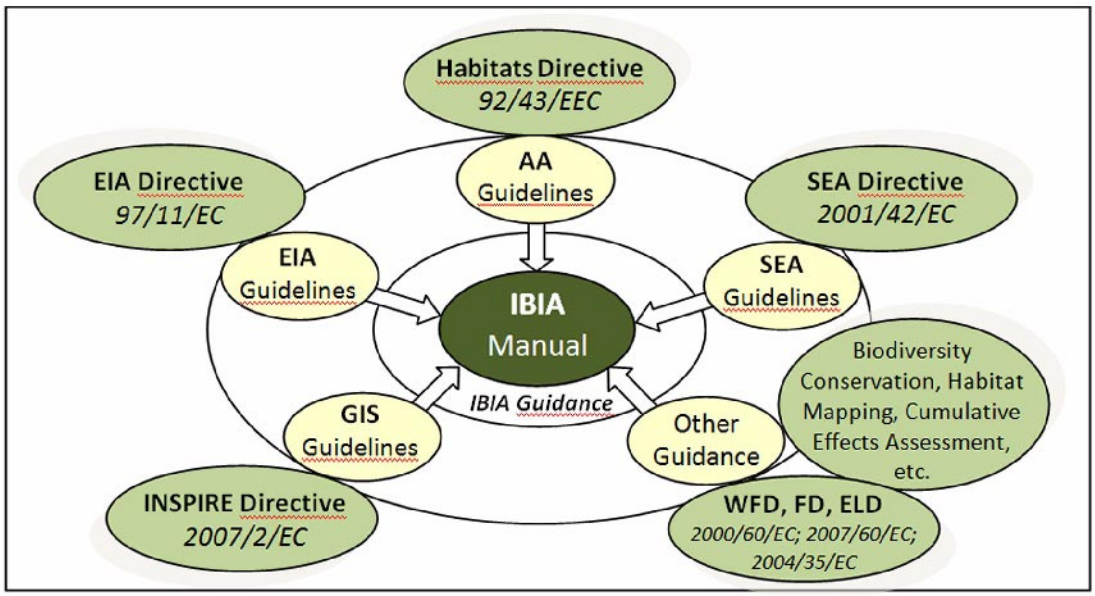

Figure 1.2. This IBIA Manual focuses on addressing the effective integration of existing procedures for biodiversity impact assessment, supported by a GIS framework. In light of this, it should be read in conjunction with other relevant guidelines, advice notes and guidance.

- The Planning System and Flood Risk Management – Guidelines for Planning Authorities (DEHLG, 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 (EPA, 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), 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 provide 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.

2 Step-By-Step IBIA Guidance

2.1 Best Practice Recommendations

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 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. Table 2.1 provides a checklist for integration.

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 effectiveness of the IBIA process and its outputs. In 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; they derive from international and national best practice and have been formulated to address the most common issues affecting biodiversity impact assessment as part of SEA/EIA and AA (as identified in the IBIA Guidance).

2.1.1 Critical key actions for practitioners when undertaking IBIA

- ***Initiate IBIA early in the plan/programme-making or project planning/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 through the planning and design stages up to the emergence of the final proposal.
- ***Define and allocate clear responsibilities*** among consultants and project partners, including information sharing mechanisms and time frames. The role of each member of the assessment team, and the scope of the biodiversity impact assessment, should be determined in order to subsequently co-ordinate data gathering efforts, the timely exchange of information and findings, and the preparation of the final report (e.g. NIS, 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 (e.g. ecologists having an overseeing role in IBIA).
- ***Establish a data sharing mechanism*** between assessment teams to ensure full consideration of all relevant information and to avoid duplication of efforts, ensuring that data collected to meet statutory obligations are also made available in the public domain.
- ***Establish and maintain ongoing and proactive 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, DAFM, DAHG (which includes NPWS), DCENR and DECLG) and key stakeholders. The interplay between the proponent, consultants, public authorities, stakeholders and the general public should be established early in the IBIA process and be proactively maintained to ensure timely information exchange and data sharing. Ongoing consultation and information exchange (in addition to statutory consultation) can facilitate early identification of key biodiversity-relevant issues, conflicts and opportunities, data gathering, and comprehensive assessment and results.
- ***Undertake focused pre-planning consultation*** (i.e. at screening/scoping stage) with key stakeholders, including environmental authorities

Table 2.1. Integrated Biodiversity Impact Assessment (IBIA) checklist: key integration aspects of Strategic Environmental Assessment with Appropriate Assessment (SEA-AA) and Environmental Impact Assessment with Appropriate Assessment (EIA-AA).

Integration criteria	Yes	No	Comment
Screening and scoping			
Have all the biodiversity-relevant issues (including European sites, other habitats and species of ecological value, and supporting environmental features) been identified?			
Has the zone of influence been appropriately defined to take account of all biodiversity-relevant considerations (including supporting features such as water, soils or the landscape)?			
Baseline			
Have all the biodiversity-relevant data sources been identified and datasets collated/gathered?			
Does the biodiversity baseline address designated sites and other habitats and species of ecological value?			
Has AA screening information been incorporated into the SEA/EIA baseline?			
Alternatives			
Are alternatives defined to address spatial biodiversity considerations (e.g. proximity to and implications for European sites)?			
Are AA and SEA/EIA alternatives compatible?			
Do SEA/EIA alternatives incorporate an ecological dimension appropriately addressing any relevant biodiversity issues?			
Impact assessment			
Does the AA give due consideration to the interrelationship between biodiversity-relevant environmental factors and any potential effects on European sites?			
Have any positive, negative, direct, indirect, short/long-term, synergistic, in-combination and/or cumulative effects on biodiversity (including habitats/species within and outside European sites) been identified, spatially assessed and quantified as far as possible?			
Mitigation and monitoring			
Are all the proposed mitigation measures deriving from the various processes consistent and compatible?			
Have all the AA and SEA/EIA mitigation measures been simultaneously considered for incorporation into the plan/programme/project?			
Have indicators and associated targets been included in SEA/EIA for monitoring European sites?			
Reporting			
Does the final report (NIS and/or SEA ER or EIS) address all relevant biodiversity-related considerations?			
Does the final report (NIS and/or SEA ER or EIS) contain all biodiversity-relevant information, data, figures and maps?			
Are the NIS findings included in the SEA ER/EIS flora and fauna and biodiversity sections, or as an appendix, where applicable?			
Communication and consultation			
Have appropriate communication channels been established between the proponent, the consultant teams and relevant stakeholders, including the EPA and the NPWS?			
Have alternatives been developed in a participative way to ensure ecological expertise input and to engage with environmental authorities and stakeholders where possible?			
Is dynamic communication maintained within the AA and SEA/EIA teams in order to ensure information and data exchange and comprehensive assessment outcomes?			

and (where appropriate) the NPWS, for full and early identification of potential significant biodiversity impacts.

- ***Ensure full assessment of all biodiversity-relevant considerations***. The description of the baseline and the impact assessment process should be undertaken at the ecosystem level, should include designated sites, annexed species and other habitats and species of ecological value, and address habitat suitability and integrity, as well as connectivity between designated sites and the wider biodiversity. Similarly, the baseline should assess the interrelationship with other environmental factors, such as water, soil, landscape, climate, etc., and provide an all-inclusive assessment of potential significant effects on biodiversity, including the potential for in-combination, cumulative and indirect effects. Where appropriate, ecosystem services associated with specific biodiversity features (e.g. wetlands and flood alleviation) should be recognised.

- ***Apply standardised methods for ecological surveys and data collation, creation and classification***, as well as metadata creation, by applying existing international and national guidance (e.g. the Heritage Council's *Best Practice Guidance for Habitat Survey and Mapping* (Smith et al., 2011)).

- ***Undertake ecological surveys that, where appropriate, address seasonal change*** where evidence 'beyond reasonable doubt' is not already available in AA screening (particularly at local planning and project level). In the absence of conservation plans, use existing site synopsis, threatened species list, detailed conservation objectives where available and national conservation objectives (to be published at the time of writing) to establish qualifying interests of European sites.

- ***Apply standardised approaches to spatial data management.*** Promote spatial data generation during field surveys by applying existing national guidance on data collation (e.g. Smith et al., 2011), creation of metadata following EU guidance (CEC, 2007b), and application of spatial analysis techniques for the assessment of biodiversity-relevant aspects where feasible.

- ***Assessment approaches should fit the scale and scope of the proposal*** in order to provide scientifically robust and, as far as possible, spatially specific and quantitative outputs that facilitate understanding of potential issues.

- ***Report and acknowledge data gaps and inconsistencies*** that may limit assessment results to ensure transparency in IBIA.

- ***Develop alternatives as realistic and achievable strategic ecological solutions***. This can be achieved by identifying land-use zonings or development specifications that ensure protection of sensitive biodiversity areas by taking into consideration intrinsic biodiversity (and environmental) vulnerabilities.

- ***Develop and fully integrate specific measures to protect European sites*** (ensuring avoidance of impacts during AA screening through appropriate site location or land-use zoning, and best practice design measures, and providing mitigation for AA), with specification of aspects to be dealt with at lower planning tiers or project level.

- ***Fully incorporate SEA/EIA and AA findings*** in the form of mitigation measures and recommendations into the plan/programme/ project. The source of the mitigation measures (i.e. AA versus SEA/EIA) should be recognised to take account of their statutory implications.

- ***Formulate a monitoring scheme to fit the scale and scope of the proposal in the context of the biodiversity characteristics and potential vulnerabilities***, including indicators for European sites. Avail, as far as possible, of existing monitoring arrangements (e.g. EPA water quality monitoring or NPWS habitat monitoring projects). Monitoring should follow up on the effective implementation of mitigation measures, identify any predicted/unforeseen

adverse impacts and, where possible, address any identified data gaps.

- ***Reflect AA findings in the SEA ER/EIS*** (e.g. providing the main findings of the NIS into the flora and fauna sections, or as an appendix), and report on 'full-range' of biodiversity impacts, incorporating all mapped results and stating the process/es from which such findings (and proposed mitigation) derive to acknowledge their legal implications.

The following sections outline specific step-by-step recommendations grouped into six correlating and practical methodological stages, as presented in the overall flowchart diagram provided in Fig. 2.1 (and Appendix 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. The IBIA Guidance 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 reappear on several occasions throughout the different stages.

This manual is to be piloted to ascertain its applicability and to highlight any procedural steps where timing or resource constraints may act as barriers to its effective implementation.

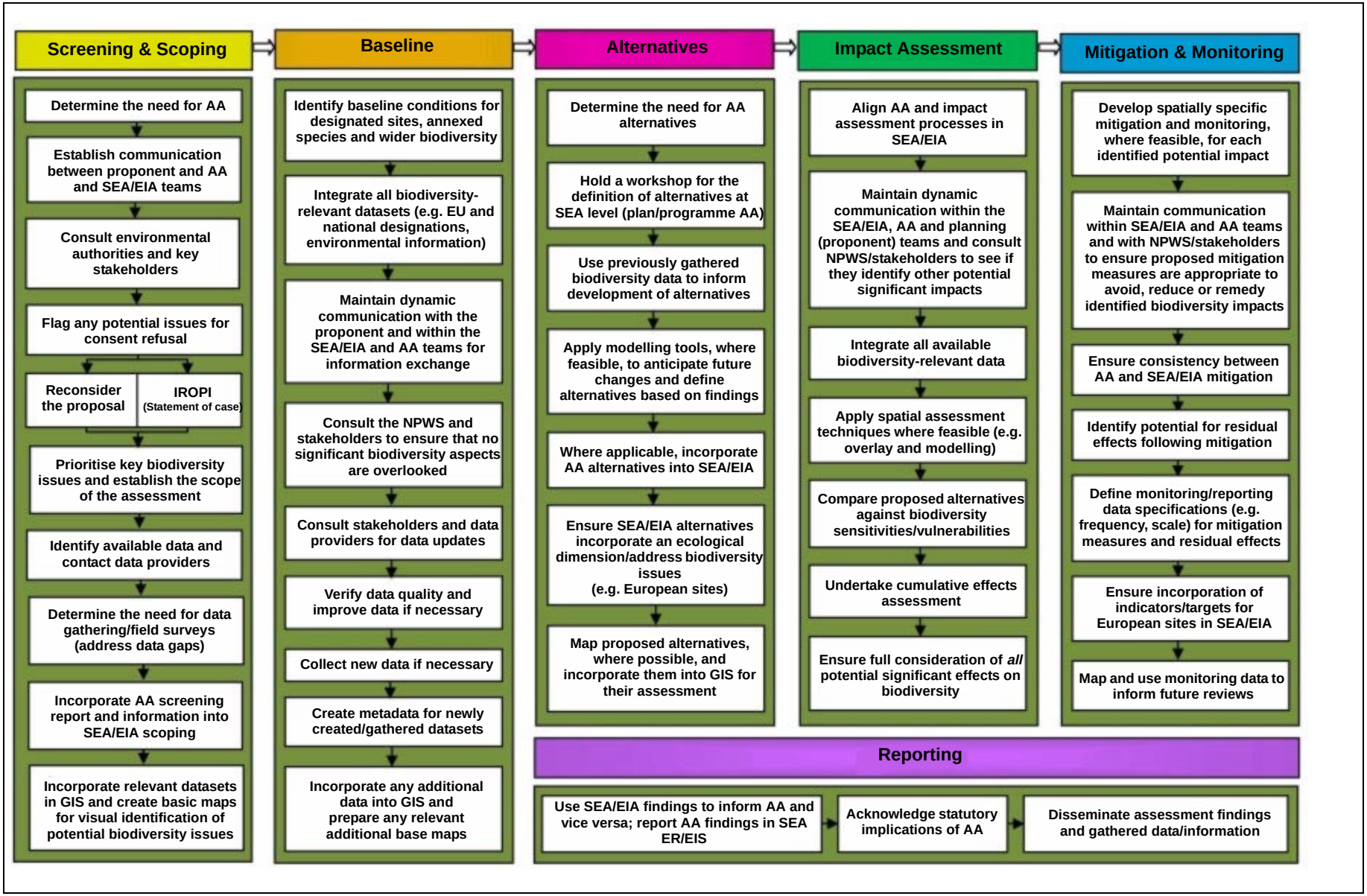

Figure 2.1. Flowchart diagram illustrating the overall recommendations for integrating the requirements of AA and SEA/EIA.

2.2 Screening and Scoping

2.2.1 Legal requirements and methodological steps

The legal framework for AA screening and SEA/EIA screening and scoping is outlined in Box 2.1.

The following steps refer to the general methodological aspects to be considered during AA screening and SEA/EIA screening and scoping (see also Fig. 2.2).

1. Determine the need for AA by undertaking AA screening. The AA process initiates IBIA (i.e. AA screening is undertaken before SEA/EIA scoping) so that screening for AA can flag any potential issues on European sites that may lead to consent refusal (under Article 6 of the Habitats Directive). Identify any European sites that could be affected by the proposal's implementation and identify the potential for significant impacts on the integrity of such sites. Where significant effects on a European site are anticipated or cannot be ruled out, the proposal shall undergo AA.

2. Where AA screening flags any potential issues that 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 with the proposal in its current form, whether the assessment should not proceed further, or whether an alternative proposal needs to be developed. If appropriate or necessary, an alternative should be developed with the aim of avoiding the possibility of adversely affecting any European sites.

3. In exceptional cases only, for projects that must be carried out for imperative reasons of overriding public interest where there are no alternative solutions, it may be prudent to consider the need to prepare a statement of case for IROPI under Article 6(4)of the Habitats Directive – and to devise the necessary compensatory measures. However, all reasonable and realistic alternatives must be first considered and examined.

4. Where AA screening does not identify any potential issues that may lead to consent refusal or where such issues have been satisfactorily

Box 2.1. Legal framework for Appropriate Assessment (AA) screening and Strategic Environmental Assessment/Environmental Impact (SEA/EIA) Assessment screening and scoping.

AA Screening

Article 6(3) of the Habitats Directive obliges Member States to screen all proposals and apply the precautionary principle when evaluating the potential for significant effects on European sites, in view of conservation objectives, that may arise from the proposal alone or in combination with other plans, programmes and/or projects. The ongoing requirement for AA entails screening any changes to the proposal. Where significant effects are anticipated or cannot be ruled out, the proposal is required to undergo AA.

SEA Screening and Scoping

Article 3 of the SEA Directive establishes that an environmental assessment shall be carried out for all sectoral plans/programmes that are prepared for agriculture, forestry, fisheries, energy, industry, transport, waste management, water management, telecommunications, tourism, and land-use or town and county planning. The need for SEA in other plans/programmes is set through case-by-case screening on the basis of the potential for significant impact. Where SEA is required, the scoping stage is to identify potential significant effects on biodiversity, flora and fauna and other relevant environmental factors, including interrelationships.

EIA Screening and Scoping

Annexes I and II of the EIA Directive specify the projects subject to EIA. EIA may be required by law for other projects, including 'sub-threshold' projects, on a case-by-case basis. Where EIA is required, scoping is to identify potential significant effects on biodiversity, flora and fauna and other relevant environmental factors, including interactions.

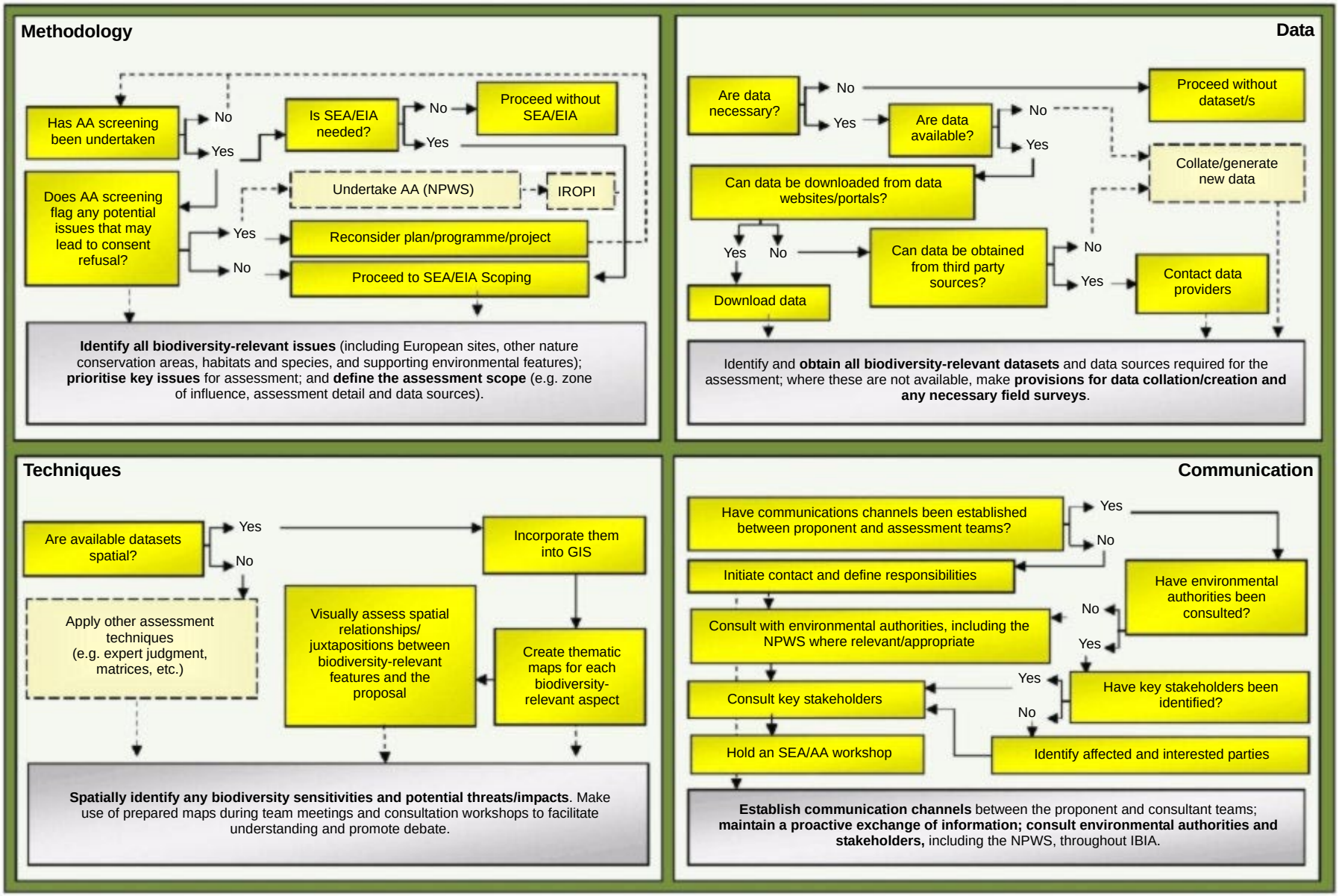

Figure 2.2. Flow-chart diagrams for screening and scoping.

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 such). Note that where an AA is required because a significant adverse effect on a European site cannot be ruled out, following AA screening, scoping for a NIS should also be initiated.

5. Incorporate the information gathered during AA screening into SEA/EIA scoping (and baseline). Any information in relation to the qualifying interests, conservation status, location and extent of European sites should be used to inform the scoping of issues, including potential for cumulative effects, and establishment of the baseline for the SEA/EIA biodiversity, flora and fauna sections.

6. Identify and (where relevant) prioritise key biodiversity and related issues that need further attention in the assessment. This should be undertaken through collaboration between AA and SEA/EIA teams, with ecological and, where relevant, hydrological, geophysical and other expert input (and in consultation with the environmental authorities, the NPWS and stakeholders where appropriate), in order to ensure that all relevant biodiversity and related issues are identified. This should include an assessment of the interrelationship between biodiversity and other relevant environmental factors (e.g. water, soils, landscape, climate, etc.), as well as the potential for cumulative/in-combination effects.

7. Identify available data sources (see Appendix 3) and data needs. All relevant data should be gathered early in the AA and SEA/EIA processes to provide a comprehensive overview of biodiversity considerations (i.e. vulnerability of and potential to significantly impact on biodiversity) and support their assessment.

8. Ensure that the scope of the assessment is suitable to address all potential significant adverse effects on biodiversity and that it fulfils the requirements of AA and the SEA Directive for plans/programmes and of AA and the EIA Directive for projects (including construction and operation effects). 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, the relative importance/significance of each biodiversity parameter and their interrelationships should be given due consideration.

2.2.2 Data gathering, creation and manipulation

The following steps aim to promote best practice in biodiversity data gathering and creation during screening and scoping. Many of these may not be deemed necessary when the proposal can be screened out relatively easily for AA, but may still be needed to fulfil SEA/EIA scoping requirements.

1. 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 – see Appendix 3 for all the biodiversity datasets currently available in Ireland (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).

2. Identify data websites and portals of online spatial and non-spatial data for immediate download. The most relevant national data download sources are provided in Appendix 3 (e.g. http://www.npws.ie, http://www.epa.ie and http://www.biodiversityireland.ie). Additional useful data portals are also available at European level (e.g. http://www.gbif.org).

3. Identify data sources and contact data providers early in the assessment process in order to obtain all relevant offline datasets in a timely manner. The most relevant national data providers are listed in Appendix 3. International and individual sources may be also relevant depending on the scope and geographical extent of the assessment (e.g. Northern Ireland). Data requests should be submitted prior to scoping; nevertheless, additional datasets may need to be gathered at a later stage for those key issues identified during

scoping and throughout the assessment.

4. Identify data gaps, access and quality limitations (e.g. level of detail or date of data capture) that may require additional field surveys or gathering efforts at later stages. In some cases, ecological investigations and seasonal change assessments may be required where evidence 'beyond reasonable doubt' cannot be obtained in AA screening (particularly at project level). Make the necessary arrangement for field surveys or other data collation methods (e.g. remote sensing).

2.2.3 Application of GIS methods and techniques

The following steps aim to provide guidance on spatial assessment during screening and scoping (see also Appendix 2). For further detail on GIS techniques, refer to the GISEA Manual (EPA, 2009).

1. 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 GIS. An appropriate spatial reference system (e.g. Irish Transverse Mercator for national studies) should be adopted.

2. Adopt the geographical extent and level of detail (i.e. scale) defined during scoping that fit 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. Although it has no legal or ecological basis, governmental guidance recommends an ex-situ 15-km buffer area for European sites around the proposal boundary when undertaking AAs (for plans/programmes). Nevertheless, larger zones of influence may need to be considered if there are ecological and hydrological connections (upstream and downstream) 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. In contrast, smaller zones of influence can often be defined at project level. The level of detail of the assessment is commonly defined by the scale of the intervention. In all cases, appropriate background mapping should be used (e.g. 1:50,000 for regional and county plans/programmes; 1:2,500 for local plans/large-scale projects).

3. Create basic thematic maps (also known as choropleth maps) using GIS 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 to enhance readability. GIS tools can assist in rapidly bringing spatial data together. Overlay the spatial data with the plan/ programme/project boundary and its zone of influence, and thus undertake a preliminary assessment of biodiversity and other environmental aspects. 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 (Fig. 2.3).

4. Use the maps generated to visually identify any biodiversity sensitivities and support the preparation of the AA screening and SEA/EIA scoping 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 the proposal's implementation, and promote debate.

5. Apply appropriate alternative assessment techniques (e.g. expert judgment, matrix-based assessments, statistical analysis, etc.), using other published information (such as the EPA's State of the Environment reports or the findings of biodiversity research studies undertaken at national, regional or local level) where relevant or where up-to-date spatial datasets are not readily available. This is also necessary in order to address non-spatial considerations and ensure that all potential biodiversity impacts (including significant effects on qualifying interests, conservation objectives and integrity of European

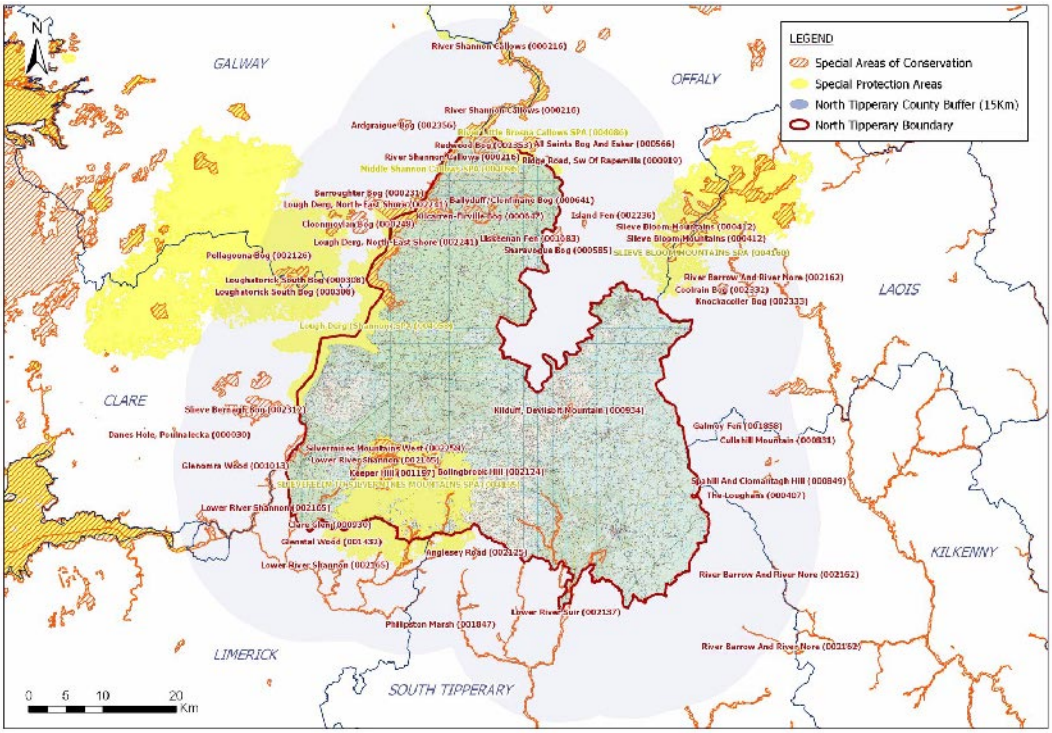

Figure 2.3. Sample map of European sites within 15-km buffer for North Tipperary County Development Plan. Data sources: Ordnance Survey Ireland and Tipperary County Council.

sites) are identified and appropriately examined before scoping them out from IBIA, while acknowledging that biodiversity issues may turn up at a later stage in the assessment process.

2.2.4 Communication, consultation and public involvement

The following steps aim to promote the establishment of proactive communication and consultation mechanisms during screening and scoping.

1. 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), frequency (e.g. weekly updates, progress meetings), and role/responsibility of each partner in driving interactions and consultations. In order to ensure that all scoping and assessment findings are integrated (and eventually incorporated into the proposal), an iterative process should be promoted where planning, AA and SEA/EIA are linked to ensure ongoing communication and exchange of information throughout the processes. To facilitate this, the planning, AA and SEA/EIA teams should meet on a regular basis from the beginning of the processes and, as appropriate, liaise with key public authority officials (e.g. heritage officers or NPWS representatives).

2. Consult statutory environmental authorities at AA screening and, particularly, SEA scoping stages to fulfil statutory requirements (see Section 1.3 for further detail). Engage with the NPWS and other appropriate statutory and relevant public authorities (e.g. Office of Public Works (OPW) and River Basin District (RBD)), where relevant, to gather their views and promote best practice. NPWS input and advice during screening/scoping will be important in helping to fully identify potential impacts.

3. To facilitate communication at this point, clear and focused consultation requests should be provided to statutory authorities and stakeholders. The requests should make it clear to the consultee the level of biodiversity information that the practitioner already has, in order to reduce duplication of effort and inefficiencies. In addition,

consideration should be given to organising an AA/SEA screening and scoping workshop, as well as to setting up a steering committee or technical working group for significant plans/programmes and strategic infrastructure developments. Consideration should also be given to consulting the consent (e.g. planning) authority at EIA scoping stage.

4. Identify key stakeholders and affected parties and initiate communication with them early in the process.

2.3 Baseline

2.3.1 Legal requirements and methodological steps

The legal framework for AA screening and SEA/EIA baseline is outlined in Box 2.2.

The following steps refer to the general methodological aspects to be considered during AA screening and SEA/EIA baseline (see also Fig. 2.4).

1. Ensure that SEA/EIA baseline gives due consideration to all designated sites and annexed habitats and species. Determining the conservation status and identifying any existing problems associated with the qualifying interests of potentially affected European sites should be a priority at this assessment stage. The interrelationship between these European sites, other designated sites and wider biodiversity 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 interrelationship with biodiversity-supporting environmental factors such as water, soils, air quality and climate, and the landscape, should be examined.

2. Ensure that AA screening and AA, if required, take into consideration SEA/EIA baseline findings on biodiversity-related aspects. As noted above, any existing relationship between European sites and supporting environmental factors (e.g. water-dependent habitats) should be carefully examined to identify the potential for significant indirect effects on the integrity of the sites. A landscape or ecosystem-based biodiversity impact assessment approach should be promoted (i.e. that which addresses ecological integrity and connectivity between designated areas), in order to protect not only the qualifying interests of European sites but also their ecological coherence through the protection of national designations, other habitats and species of ecological value, and the environmental resources (e.g. water, soils, air and climate) that support them.

3. Ensure that all biodiversity-relevant datasets are integrated within the baseline description. Merging the baseline requirements under the relevant processes can provide a comprehensive

Box 2.2. Legal framework for Appropriate Assessment screening and Strategic Environmental Assessment/Environmental Impact Assessment baseline.

AA Screening

The Habitats Directive establishes the requirement to assess potential impacts of plans and projects on the qualifying interests and conservation objectives (including structure and function) of designated European sites/Natura 2000 network only (and, where relevant, non-qualifying interests that are important to the overall functioning of the site, and Annex I habitats and Annex II species outside designated sites but linked to the conservation objectives, as required under Articles 10, and 12–16 of the Habitats Directive).

SEA Baseline

Annex I of the SEA Directive establishes the description of the likely significant effects on the environment (for which a baseline needs to be first established), including issues such as biodiversity, fauna, flora, population, human health, soil, water, air, climatic factors, material assets, cultural heritage (including architectural and archaeological heritage), landscape and the interrelationship between the above factors.

EIA Baseline

Annex IV of the EIA Directive requires a description of the aspects of the environment (on and adjacent to the proposed development site) likely to be significantly affected by the proposed project, including population, fauna, flora, soil, water, air, climatic factors, material assets (including the architectural and archaeological heritage), landscape and their interactions.

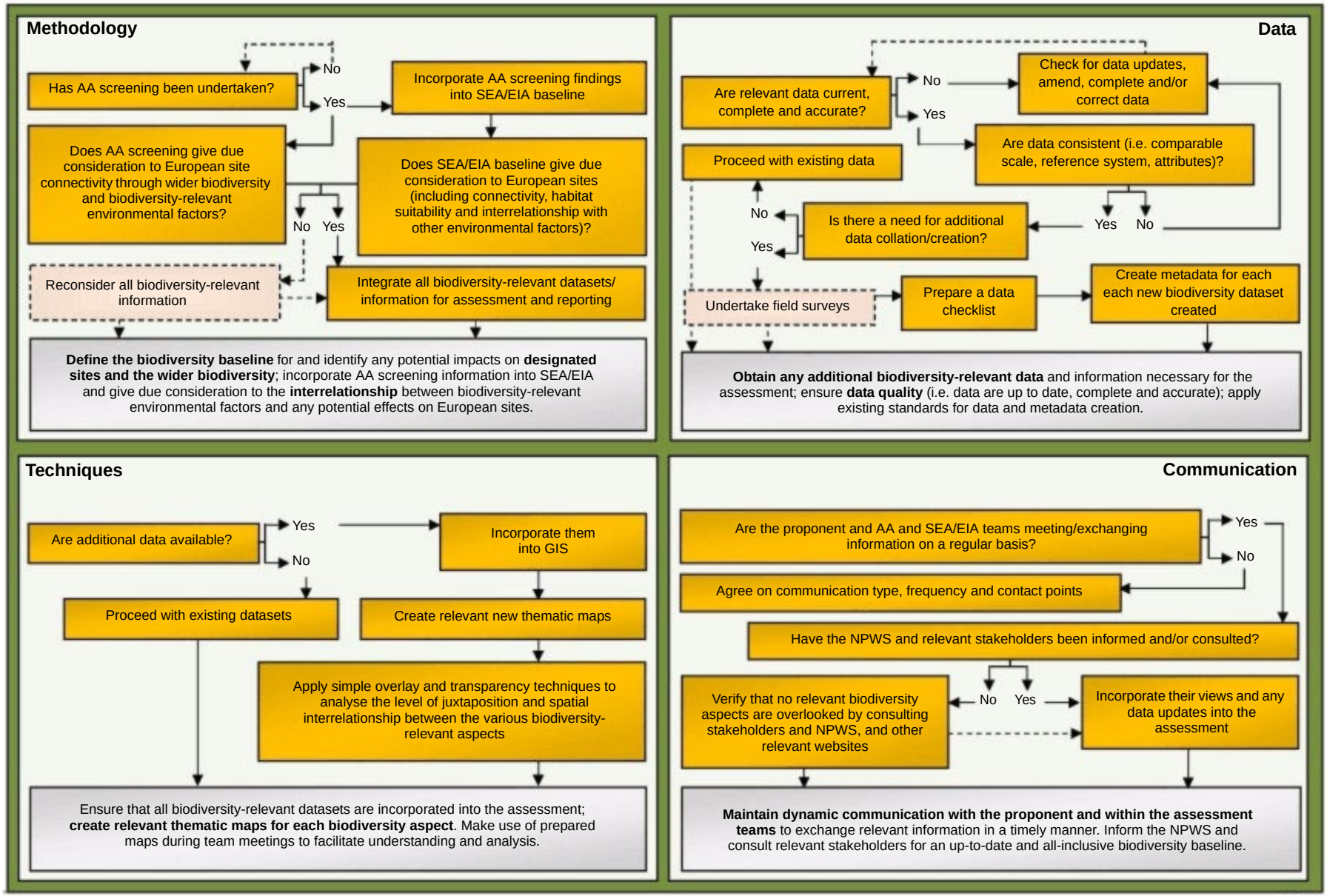

Figure 2.4. Flow-chart diagrams for the baseline stage.

and holistic reference basis for biodiversity impact assessment, rather than the fragmented picture provided by each of the different assessments. Therefore, all relevant information should be simultaneously considered to inform the establishment of a 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 interrelationships and juxtapositions. In this context, it should be ensured that any key constraints posed by the European sites and other biodiversity conservation legislation are highlighted in the maps (e.g. annexed habitats and species, NHAs, buffer zones around rivers, bogs, etc.).

2.3.2 Data gathering, creation and manipulation

The following steps aim to promote best practice in data gathering, creation and manipulation for setting up the biodiversity baseline.

1. Verify the scope of the assessment, as defined during screening/scoping, to ensure that all the relevant biodiversity aspects are investigated at an appropriate scale and level of detail when establishing the baseline. While the SEA Directive does not normally require new data collation or generation, EIA practice relies on site-specific, often intensive, field surveys for data gathering. These approaches to baseline detail have been respectively transferred to plan/programme and project AAs; as a result, high-level plan/ programme AAs often rely on NPWS data and other available information on European sites, while local area plan and project AAs are likely to require ground-truthing or site surveys.

2. 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.

3. Check periodically for data updates throughout the assessment processes. Data providers and their websites (NPWS and the National Biodiversity Data Centre (NBDC) in particular) may be consulted throughout 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. Also, it will be necessary to update information about other plans and projects that may have implications for assessing in-combination and cumulative effects.

4. Undertake data consistency checks to ensure that the quality and scale are appropriate for the assessment. Biodiversity data are likely to derive from multiple sources, and are collated using different survey methods and scales. When amalgamating data for assessment purposes (e.g. combining them in GIS), their consistency or complementarity (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.

5. Where relevant data are not available or have insufficient detail, additional data collation requirements need to be determined in consultation with relevant agencies and stakeholders. Where relevant information cannot be sourced from third-party providers, the NPWS and/or consent authority could be consulted to ascertain the need for such 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 local-level/project AA in particular).

6. Ensure that data collation surveys fit the scale and scope of the assessment requirements. Apply standardised methods for data collation and sharing, such as the Heritage Council's habitat mapping guidance (Smith et al., 2011) or the global biodiversity information guidelines (GBIF, 2011). Prepare a data checklist (including scale, geographical coverage, level of detail and aspects/attributes to be recorded) before

fieldwork for quality control. Promote spatially specific data collation during field surveys (i.e. support data gathering efforts by recording location co-ordinates and mapping using GPS). Group datasets according to established criteria (e.g. taxonomic group, site, etc.) and consider timing issues (e.g. seasonal requirements that may necessitate the collection of data at a particular time or times of year).

7. Create/Record metadata for each biodiversity dataset. In particular, the following aspects should be recorded to comply with the requirements of the INSPIRE Directive: 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.

2.3.3 Application of GIS methods and techniques

The following steps aim to provide guidance on spatial assessment during baseline description and assessment (see also Appendix 2 and refer to the GISEA Manual – EPA, 2009).

1. Immediately incorporate any additional data collated throughout the processes into GIS. 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. Editing tools can also be used to complete and correct any data inconsistencies, and appropriately integrate data into the GIS interface.

2. Prepare any relevant additional maps to support the description of the biodiversity and environmental baseline. Use these maps for the preparation of NISs, SEA ERs or EISs, and incorporate them into the proposal where appropriate. 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 (Fig. 2.5).

3. Overlay the relevant thematic layers and use the transparency tool 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 (Fig. 2.6). These approaches help, at a later stage, the exploration of potential cumulative or in-combination effects. However, careful consideration needs to be given to the development and application of a context-specific (i.e. area- and proposal-specific) weighting system 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.

2.3.4 Communication, consultation and public involvement

The following steps aim to promote the maintenance of proactive communication during the baseline stage.

1. Maintain dynamic communication between the proponent and the AA and SEA/EIA teams. To ensure that baseline information from AA screening and SEA/EIA is integrated and that data obtained through each process provide a comprehensive and updated understanding of the biodiversity baseline, both assessment teams should maintain regular communication.

2. Check NPWS, NBDC and other relevant websites and, where appropriate, consult informally with

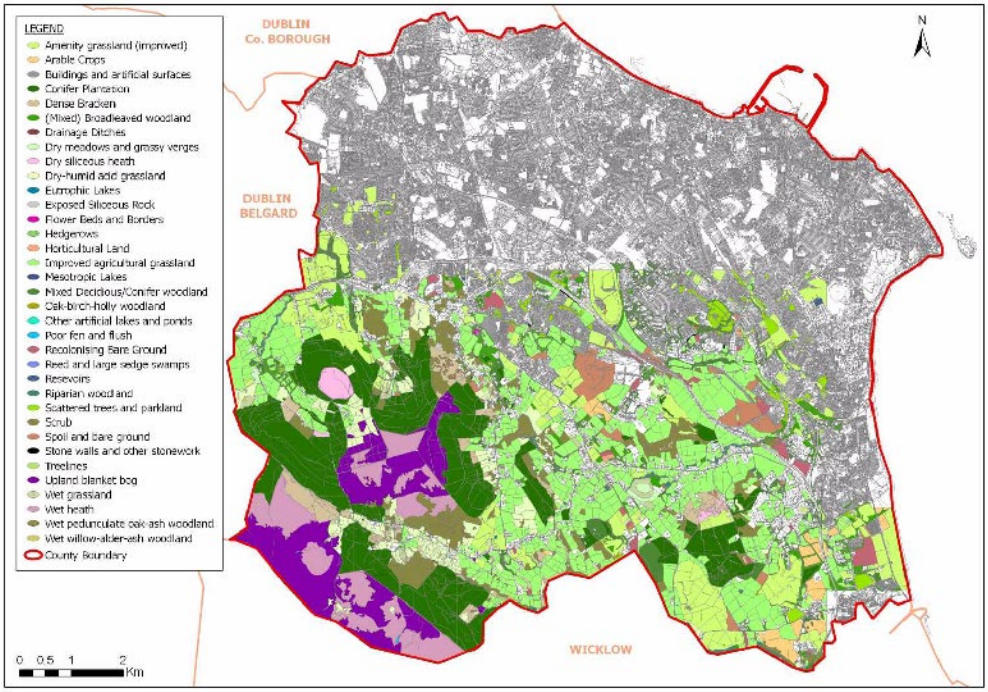

Figure 2.5. Sample of thematic habitat mapping for Dun Laoghaire–Rathdown County Council. Data sources: Ordnance Survey Ireland and Dun Laoghaire–Rathdown County Council.

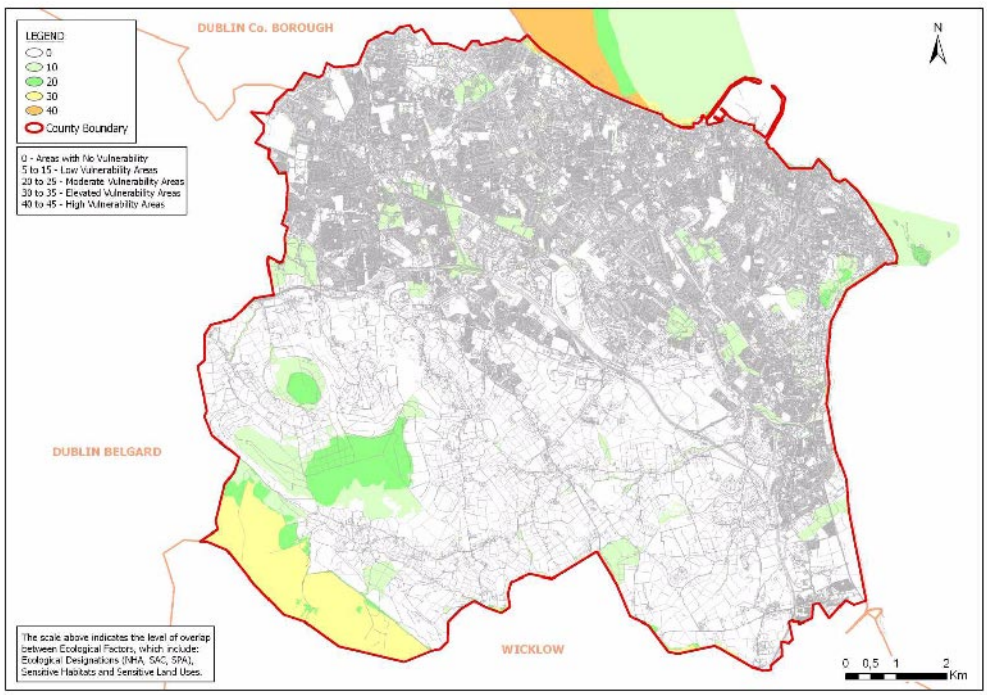

Figure 2.6. Sample of weighted overlay mapping illustrating a composite view of the relative ecological sensitivity of the different areas for Dun Laoghaire–Rathdown County Council. Note: all biodiversity considerations are given equal weight (i.e. level of importance); the resulting relative sensitivity relates to the level of overlap between ecological designations and sensitive habitats/land uses. Data sources: Ordnance Survey Ireland, National Parks and Wildlife Service and Dun Laoghaire–Rathdown County Council.

the NPWS, the NBDC and other relevant organisations (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 (as there is no statutory requirement to consult the planning authority, the environmental authorities, the NPWS or the public during the baseline stage).* However, communication is essential to identify all relevant issues and data sources for the assessment.

3. Engage with previously identified stakeholders, including NGOs and local experts where appropriate, to ensure that no biodiversity issues are overlooked when establishing the baseline. Their perceptions are also vital when assigning importance values (i.e. weights) to the various biodiversity considerations. The key agencies of the State (which generally include the NPWS, the EPA and other significant data holding/generating authorities) should liaise with each other regarding their respective inputs and communications with the planners or project proponent and both the AA and SEA/EIA teams. Their collective involvement may also be relevant at other procedural stages (e.g. definition of alternatives and impact assessment).

2.4 Alternatives

2.4.1 Legal requirements and methodological steps

The legal framework for AA and SEA/EIA alternatives is outlined in Box 2.3.

The following steps refer to the general methodological aspects to be considered during the definition of alternatives in AA and SEA/EIA (see also Fig. 2.7).

1. A proactive approach to alternative development early in the planning and assessment processes is required within SEA/EIA (under Article 5 of each Directive), while AA only requires consideration of alternatives where the potential for significant impacts has been identified in the assessed option. SEA and EIA are required to look at broader environmental considerations (including biodiversity) when identifying reasonable and realistic alternatives prior to selecting a preferred option; in contrast, AA focuses on identifying alternative solutions that specifically address ecological concerns in relation to the previously identified potential impacts on European sites.

2. Ensure that reasonable and realistic SEA/EIA alternatives give due consideration to ecological aspects (including the full range of biodiversity-related topics, such as water, hydrogeology or climate) and that they are not bounded by administrative or site boundaries but rather look at the ecological zone of influence of the proposal. At planning level, this can be achieved by ensuring appropriate and suitable zoning of lands (e.g. avoiding development on or in proximity to European sites). At project level, biodiversity aspects could be incorporated by promoting, where appropriate, planting of native species and creation of wetland areas for nature conservation.

3. Where appropriate (i.e. where alternatives have been defined as a result of AA), ensure that pragmatic AA solutions that address ecological concerns and protect biodiversity are compatible with SEA/EIA alternatives. Note that biodiversity-related aspects of the 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 during the AA process do not contravene or undermine the SEA/EIA alternatives and vice versa and, in case

Box 2.3. Legal framework for Appropriate Assessment and Strategic Environmental Assessment/Environmental Impact Assessment alternatives.

AA

Article 6 of the Habitats Directive implies that alternative solutions addressing ecological concerns are explored (e.g. alternative locations, policy or zoning options) in order to mitigate or avoid the significant impacts on integrity of European sites identified during the AA. Alternatives should also address the requirements under Article 10 in relation to landscape features of importance to wildlife, Articles 12–16 for the protection of species, and Article 4(4) of the Birds Directive with regard to the pollution and deterioration of bird habitats.

SEA Alternatives

Article 5(1) of the SEA Directive establishes the need for identifying, describing and evaluating reasonable alternatives (e.g. policy or zoning options), taking into account the objectives and the geographical scope of the plan or programme, while addressing any environmental issues identified during scoping. The SEA statement must include reasons for choosing the plan/programme in the light of other reasonable alternatives considered.

EIA Alternatives

Article 5(3) of the EIA Directive requires the provision of an outline of the main alternatives studied (e.g. alternative locations or site-specific layouts) and an indication of the main reasons for the selection, taking into account the environmental effects.

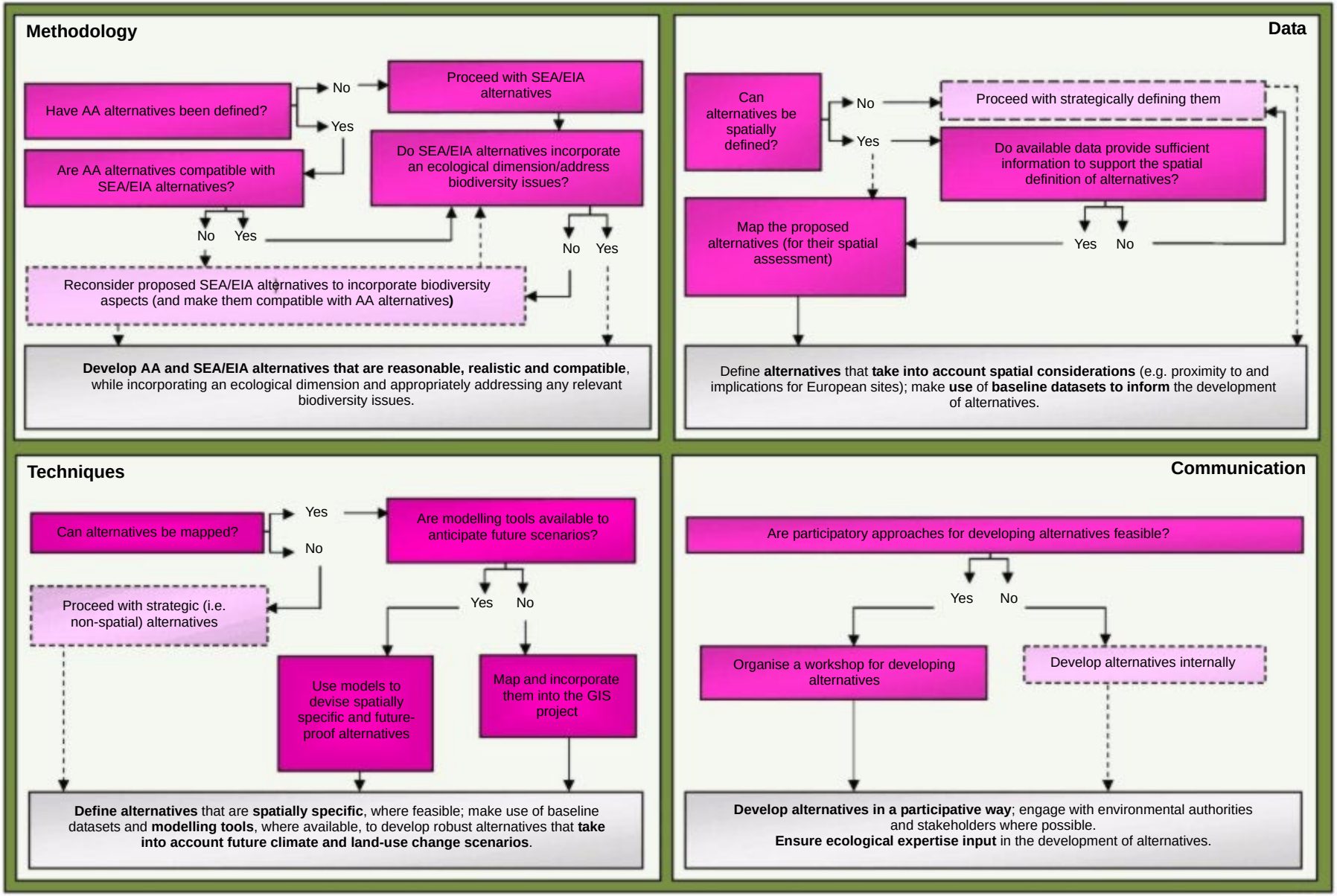

Figure 2.7. Flow-chart diagrams for the definition of alternatives.

of conflict, appropriate adjustments are accordingly made.

4. Where applicable, incorporate AA alternatives that address ecological concerns into SEA/EIA and assess them correspondingly. Once the compatibility check has been undertaken, the proposed alternative solutions that address ecological concerns and protect biodiversity should also be assessed against the mapped environmental vulnerabilities or the strategic environmental objectives set in SEA/EIA.

2.4.2 Data gathering, creation and manipulation

The following steps aim to promote best practice in biodiversity data use and creation for the definition of alternatives.

1. Use previously gathered datasets to inform the development of SEA/EIA alternatives and AA solutions addressing ecological concerns, where required. Spatial datasets can help in formulating alternatives that avoid or take consideration of the proximity of land-use zonings or specific development/s to designated sites and other important habitats. Information on the location and vulnerability of species or communities of flora/fauna should also be used to develop biodiversity-compatible solutions.

2. Create alternatives as individual spatial datasets or GIS layers, where feasible. Alternatives should take into account spatial considerations, particularly their proximity to, and implications for, European sites and other sensitive biodiversity areas and features as noted above. Where strategically defined (e.g. broad policies at higher planning tiers), they should also give consideration to their implications for designated sites and other sensitive habitats or species, and be accordingly assessed against biodiversity conservation objectives.

3. Ensure that data permit the assessment and ranking of the relative biodiversity (and environmental) effects of different alternatives. This may require the application of data overlay techniques to identify zones of particular biodiversity sensitivity and/or 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 of alternatives in terms of compliance with legal requirements and/or performance with regards to biodiversity conservation objectives in SEA/EIA.

2.4.3 Application of GIS methods and techniques

The following steps aim to promote guidance on spatial assessment and methods for the definition of alternatives (see Appendix 2 and refer to the GISEA Manual – EPA, 2009).

1. Where feasible map the proposed alternatives to facilitate their spatial assessment. Use previously collated baseline spatial data to identify highly sensitive biodiversity (and environmental) areas and inform the formulation and definition of alternatives, thereby taking account of any spatial considerations, particularly their proximity to and implications for European sites and other sensitive biodiversity areas and features.

2. 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 or land-use change scenarios) can help develop robust climate-proof alternatives for biodiversity conservation.

2.4.4 Communication, consultation and public involvement

The following steps aim to promote proactive communication for the definition of alternatives.

1. AA and SEA/EIA teams should collaborate in developing reasonable, realistic, consistent and compatible alternatives for biodiversity protection, conservation and enhancement (where deemed necessary). 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. Moreover, this can ensure the incorporation of expert ecological input into their definition and assessment.

2. Hold a workshop for the definition of alternatives at plan/programme level. This should include representatives from the planning and development, and AA and SEA teams and, ideally, statutory environmental authorities, including the NPWS. In all cases, the workshop should ensure inclusion of ecological and, where relevant, hydrological experts. Where feasible, engage previously identified stakeholders.

2.5 Impact Assessment

2.5.1 Legal requirements and methodological steps

The legal framework for AA and SEA/EIA is outlined in Box 2.4.

The following steps refer to the general methodological aspects to be considered during AA and impact assessment in SEA/EIA (see also Fig. 2.8).

1. Align 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 on the precautionary principle and simultaneously address designated sites and wider biodiversity areas and features, 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 European sites). In this context, potential impacts on the integrity of European sites should not be overlooked.

2. Apply previously gathered spatial and non-spatial data to contrast the proposed alternatives against the mapped sensitive biodiversity areas and/or features, or biodiversity conservation objectives. Use the impact assessment results to revise the plan/programme/project and make the necessary adjustments through the formulation of mitigation measures (Fig. 2.9).

3. Undertake a cumulative effects assessment as part of SEA when addressing potential impacts on European sites. Ensure that expertise and knowledge on vulnerability of receptors (i.e. habitats or species) as well as on changes to the

Box 2.4. Legal framework for Appropriate Assessment and Strategic Environmental Assessment/Environmental Impact Assessment.

AA

Article 6(3) of the Habitats Directive requires an AA of plans and projects likely to have a significant effect on European sites, in view of the site's conservation objectives. Linked to such conservation objectives, and in light of the scope of SEA/EIA, provisions are made in Articles 10, and 12–16 of the Habitats Directive and in Article 4 of the Birds Directive to take into consideration the protection of birds and annexed species from habitat destruction, pollution and deterioration, and from unsustainable exploitation, as well as the protection of landscape features that are of major importance for wild flora and fauna. In addition, Article 6(3) of the Habitats Directive specifically refers to the cumulative nature of effects (i.e. in combination with other plans and projects).

SEA Impact Assessment

Article 1 of the SEA Directive establishes the need for environmental assessment of certain plans and programmes that are likely to have significant effects on the environment. Annex I specifies that the assessment should give due consideration to the potential for significant (secondary, cumulative, synergistic, short, medium and long-term permanent and temporary, positive and negative) impacts on biodiversity, fauna, flora (including SACs, SPAs, NHAs/pNHAs, Nature Reserves, Ramsar and flora/fauna protection orders within and adjacent to the plan/programme area), population, human health, soil, water, air, climatic factors, material assets, cultural heritage (including architectural and archaeological heritage), landscape and their interrelationship.

EIA Impact Assessment

Article 1 of the EIA Directive requires an assessment of the effects of projects that are likely to have significant (indirect, secondary, cumulative, short, medium and long-term, permanent and temporary, positive and negative) environmental effects by virtue of, inter alia, their nature, size or location. Annex IV states that the assessment of significant impacts should consider population, fauna, flora, soil, water, air, climatic factors, material assets (including the archaeological and architectural heritage), landscape and their interactions.

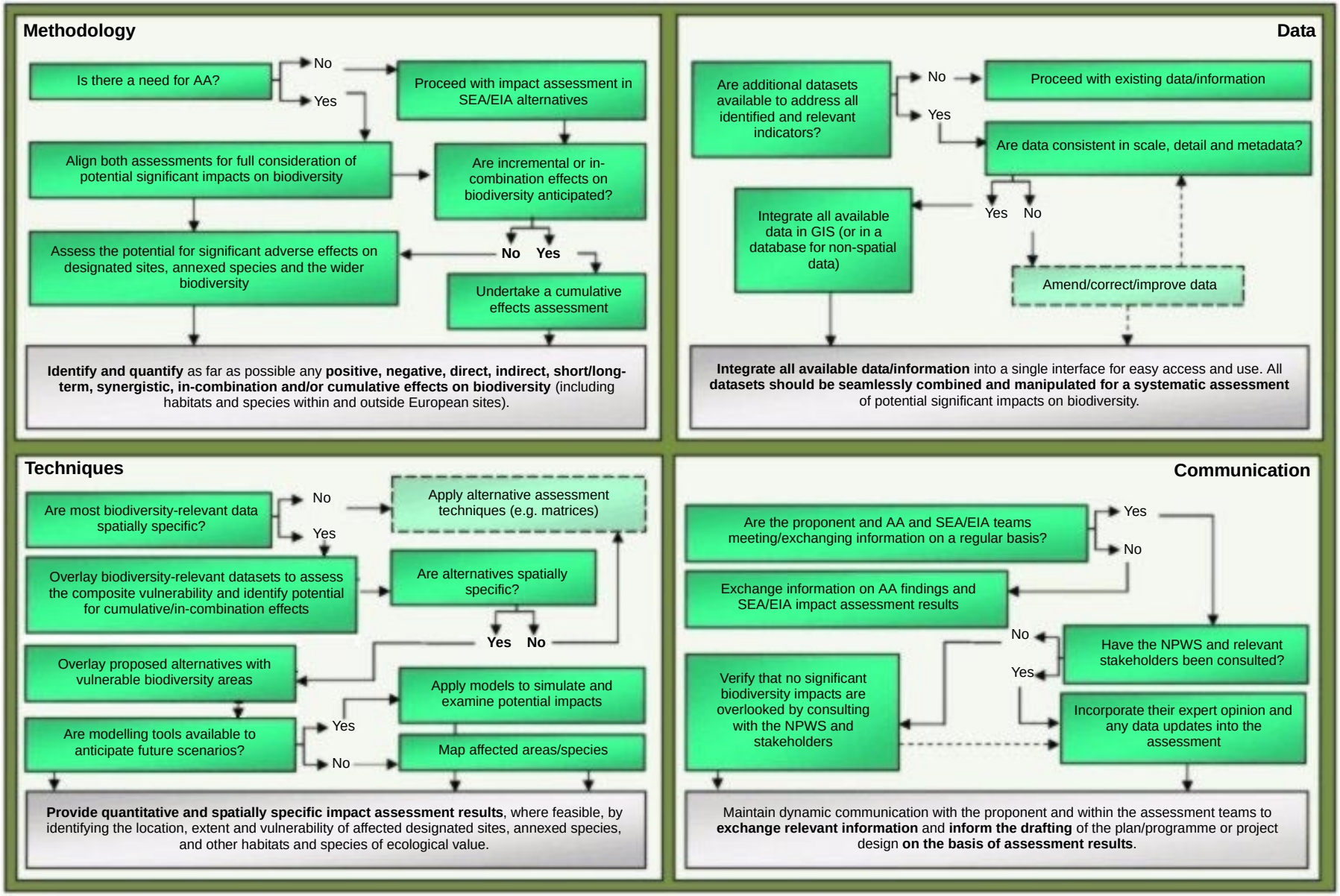

Figure 2.8. Flow-chart diagrams for impact assessment.

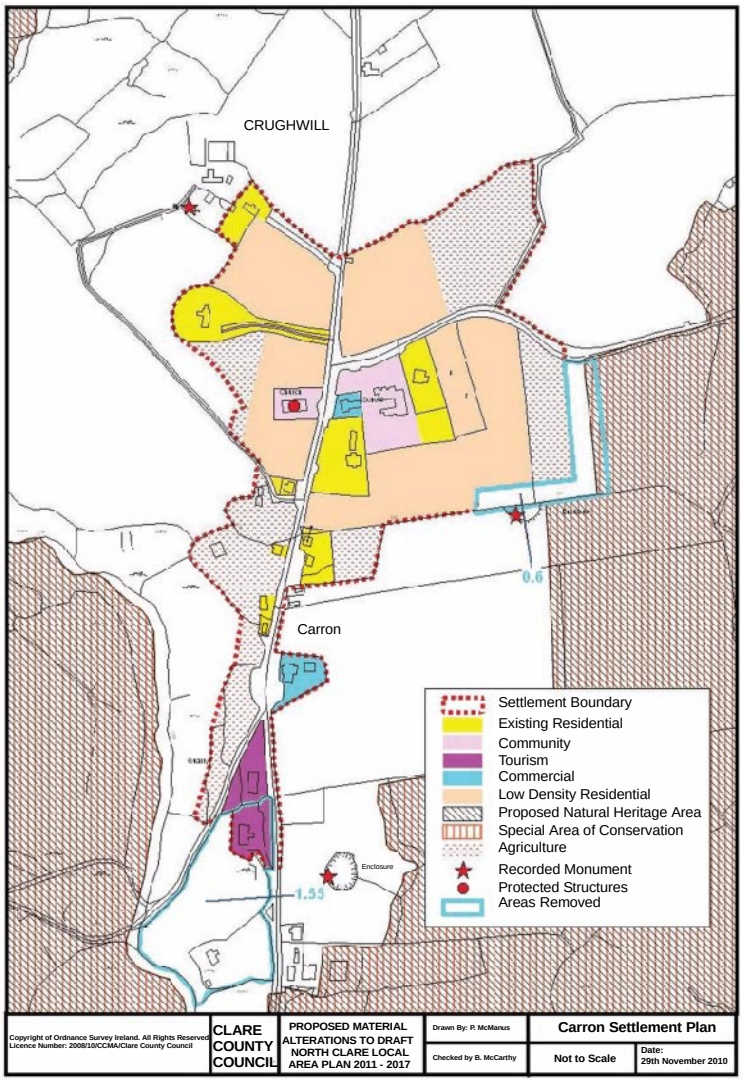

Figure 2.9. Carron Settlement Plan illustrating in light blue the areas that have been removed from the proposed zoning due to their ecological sensitivity and/or proximity to European sites. Source: Clare County Council Planning and Enterprise Department.

environmental conditions resulting from the proposal are available for an effective and precise assessment. 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/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 or already approved within or adjacent to such areas.

4. Adopt an ecosystem-based approach to biodiversity impact assessment. In current practice, an indicative 15-km zone of influence around the plan/programme boundary is generally adopted for screening for potential impacts on European sites. This area may, where scientifically appropriate, be scaled down for project-level assessments. In certain cases (e.g. projects impacting on water quality or flow volume in a river) and in the context of transboundary effects, the impact of plans or projects outside a 15-km zone may need to be considered, individually or for cumulative/in-combination impacts. Thus, assessors need to consider the ecosystems, habitats and species that may be

affected by the proposal's implementation and use, in order to identify the appropriate potential zone of influence, rather than solely using distance as an indicator of influence.

2.5.2 Data gathering, creation and manipulation

The following steps aim to promote best practice in biodiversity data use, creation and manipulation during the impact assessment stage.

1. Verify that data gathered during the baseline stage are sufficient to support a robust assessment, by ensuring that their quality, scale and temporality (e.g. up to date) are appropriate. Where significant gaps or limitations are identified, gather additional relevant data. Note that the majority of existing national datasets have been created at small scale (i.e. low resolution) and that these 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 detailed surveys (i.e. large scale) are likely to be needed to provide the necessary evidence to support detailed assessments at the local or project level.

2. Integrate all available biodiversity-relevant data (including previously defined alternatives) into a GIS to facilitate spatial and cumulative effects assessment. Where spatial datasets are not available, key considerations (e.g. status, qualifying interests and risk to sensitive receptors) should be compiled in a database for their systematic consideration.

3. 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.

4. Ensure that any new datasets generated in this stage (e.g. relative vulnerability of the different areas) comply with or complement previously established scale, detail and metadata requirements. This is a prerequisite to ensure that datasets are comprehensive, compatible and comparable. Report any assessment difficulties associated with data gaps and/or limitations.

2.5.3 Application of GIS methods and techniques

The following steps aim to provide guidance on spatial approaches and techniques for impact assessment (see Appendix 2 and refer to the GISEA Manual – EPA, 2009).

1. Adopt impact assessment techniques that fit the scale and scope of the proposal. 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 and robust.

2. When applying GIS, 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 cumulative and 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:

   (i) Using transparency tools in GIS to visually identify areas where two or several datasets overlap (illustrating increasing vulnerability); or

   (ii) Applying weighted overlay tools to assign a level of importance (i.e. weight) to each relevant dataset and, consequently, compute the vulnerability of a given area according to expert or public perceptions.

3. 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.

4. If available, apply modelling tools to examine potential effects of implementing proposed alternatives. They enable simulation of future conditions, risk-based sensitivity analysis of

receptors and linkages between habitat loss, fragmentation, degradation and/or disturbance impacts and the overall objectives for biodiversity conservation.

5. 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.

6. Where spatial datasets are not available, apply alternative quantitative or qualitative assessment techniques (e.g. expert judgement, matrix-based assessments, statistical analysis, risk analysis, etc.). In all cases, ensure that assessment assumptions are clearly set out.

7. Define and make use of a set of well-selected biodiversity conservation objectives and indicators, such as those measured by the NBDC or Comhar[3], or the headline indicators that are to be developed under the National Biodiversity Plan (Appendix 4), to facilitate a systematic and quantitative assessment.

8. Provide scientifically comprehensive and, as far as possible, quantitative results. 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. Assessment of cumulative/in-combination effects should be an integral part of SEA and AA processes, in particular.

3. The Sustainable Development Council.

2.5.4 Communication, consultation and public involvement

The following steps aim to promote the maintenance of proactive communication during impact assessment.

1. Exchange critical information between the AA and SEA/EIA, and the plan/programme/project teams to ensure that any potential significant impacts have been identified and appropriately appraised. 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.

2. Consult informally with the NPWS, the NBDC and other relevant organisations (e.g. BirdWatch Ireland, An Taisce) and, where appropriate, the scientific community for any updates in biodiversity-relevant information, and to see if they identify other potentially significant biodiversity impacts.

3. Engage with stakeholders (including, at project level and, where appropriate, the local community) to tap into their expertise and ensure that no potential biodiversity concerns are overlooked in the assessment process. Stakeholders will have been identified during scoping, but others may always be identified at this late stage.

2.6 Mitigation and Monitoring

2.6.1 Legal requirements and methodological steps

The legal framework for AA mitigation and SEA/EIA mitigation and monitoring is outlined in Box 2.5.

The following steps refer to the general methodological aspects to be considered during AA mitigation, where AA has identified the potential for significant impacts, and SEA/EIA mitigation and monitoring (see also Fig. 2.10).

1. Mitigation and monitoring measures should be developed for, and linked to, each of the likely significant adverse effects identified. Where possible, proposed monitoring measures should be linked to existing monitoring schemes.

2. Mitigation measures resulting from both AA and SEA/EIA 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;
   - Mitigation to prevent any adverse effect on site integrity; and,
   - In an IROPI context, compensatory measures.

3. Best practice approaches include exploring measures and elements of a proposal that avoid impacts from the onset and, in this way, enable screening out the plan/programme/project for AA. Appropriate site location and land-use zonings, application of good practice design measures and early incorporation of design standards, together with the full consideration of the sensitivity of receptors, will facilitate mitigation by avoidance.

4. In SEA/EIA, mitigation measures are formulated to avoid, reduce and remedy as far as possible potential significant impacts, but are rather discretionary (i.e. do not have the legal implications of AA mitigation). Compatibility and consistency checks should be undertaken to

Box 2.5. Legal framework for Appropriate Assessment mitigation and Strategic Environmental Assessment/Environmental Impact Assessment mitigation and monitoring.

AA Mitigation

The Habitats Directive states that mitigation measures may be implemented to reduce or offset negative significant effects on European sites in order to enable passing the AA tests. Where mitigation cannot rule out an impact on the integrity of a site, the plan or project may only proceed if it meets IROPI criteria. Where a statement of case for IROPI is invoked, mitigation measures must take the form of compensatory measures to ensure that the overall coherence of European sites is protected. The Directive does not include any monitoring requirement, although a consenting authority may impose such a requirement.

SEA Mitigation and Monitoring

The Planning and Development Act 2010 and Article 9 of the SEA Directive require a description of how environmental considerations (including biodiversity, flora and fauna on designated sites and wider biodiversity areas within and adjacent to the plan/programme area) have been integrated into decision making. Mitigation measures constitute the common approach to such integration. Article 10 requires the monitoring of significant environmental effects of the implementation of plans/programmes in order to identify at an early stage unforeseen adverse effects, and to be able to undertake appropriate remedial action.

EIA Mitigation and Monitoring

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 environmental effects, including effects on flora and fauna on designated sites and wider biodiversity areas within and adjacent to the development site.

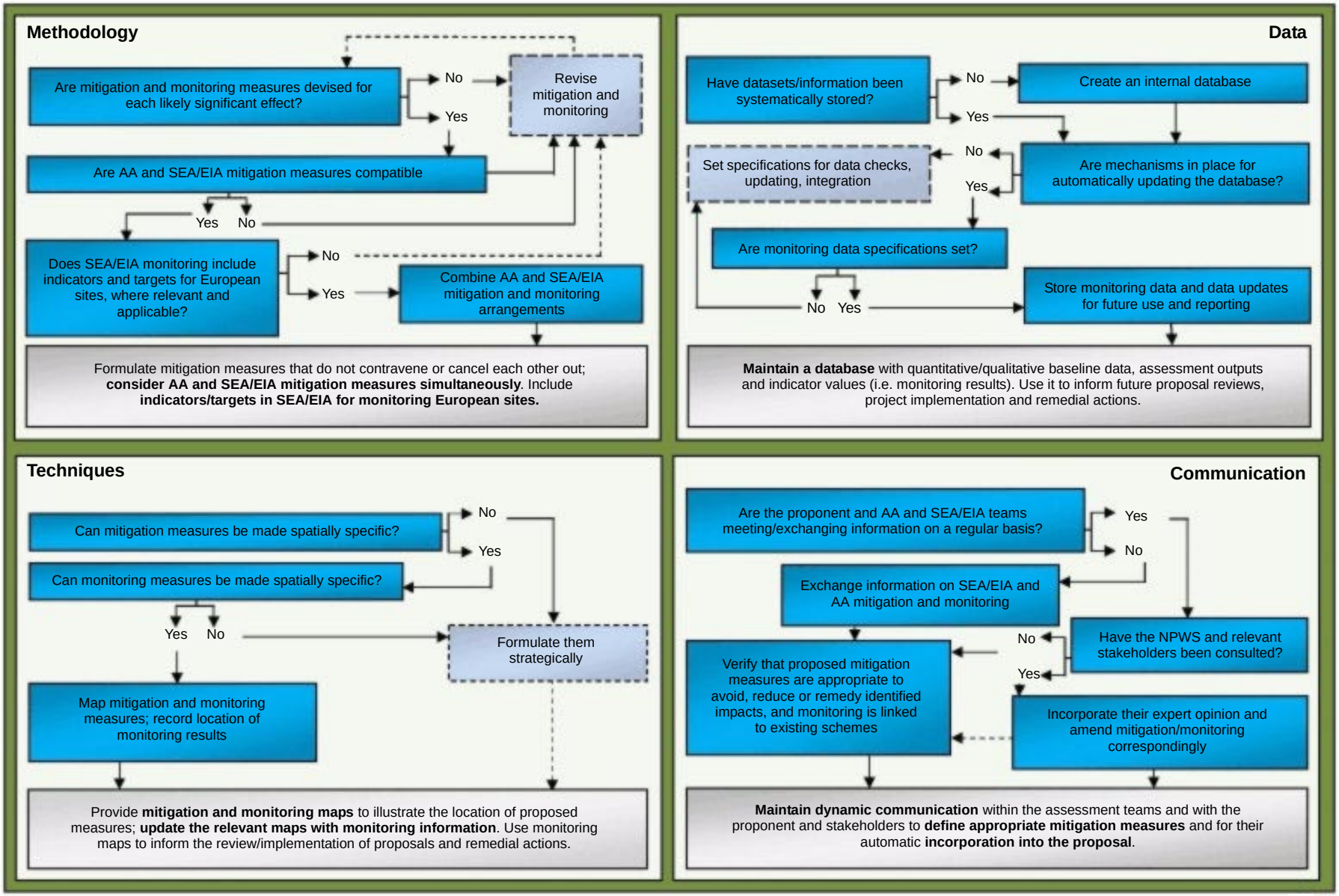

Figure 2.10. Flow-chart diagrams for mitigation and monitoring.

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, all proposed mitigation measures resulting from AA and SEA, or AA and EIA, should be simultaneously considered for their incorporation into the proposal. Mitigation measures from AA, in particular, need to be integrated into the proposal (acknowledging their legal implications).

5. Although AA processes do not formally require the definition of monitoring arrangements, indicators and targets for European sites (as well as protected species) should be specified as part of SEA/EIA monitoring, where relevant, and thus promote AA monitoring. Consent authorities should use their powers to require AA monitoring as one of the conditions of consent. 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 (e.g. to address concerns that have been identified in the AA process). As far as possible, this should avail of existing monitoring arrangements. To ensure the integration of AA considerations into SEA/EIA, specific indicators (Appendix 4) should be formulated to enable monitoring of any direct, indirect or cumulative effects on the integrity, or any of the qualifying interests, of European sites. This may also include hydrological monitoring under the WFD RBD plans for water-dependent habitats.

6. Monitoring arrangements should also be put in place to address any previously identified key data gaps and, therefore, improve the accuracy of assessments during plan/programme review as well as at lower planning tiers (e.g. EIA). 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.

7. Assess and acknowledge the potential for residual effects following mitigation. Any potential adverse or other significant effects anticipated after mitigation should be accordingly evaluated and indication on their significance provided. Monitoring measures should also account for such residual effects.

2.6.2 Data gathering, creation and manipulation

The following steps aim to promote best practice in biodiversity data use, creation and manipulation during mitigation and monitoring.

1. 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 AAs and SEAs/EIAs, and support plan/programme/project monitoring.

2. Set monitoring data specifications to ensure that data updates and reporting (based on previously established indicators) are undertaken at appropriate frequencies, that data collection campaigns cover the geographical scope of the study area (as well as the zone of influence, where applicable) at appropriate scales, and that data gathering is spatially specific as far as feasible.

3. 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.

4. 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 plan/ programme/project in order to remediate any adverse effects on biodiversity and the environment.

2.6.3 Application of GIS methods and techniques

The following steps aim to provide guidance on spatial approaches and techniques to support the formulation of mitigation measures and monitoring (see Appendix 2 and the GISEA Manual – EPA, 2009).

1. Use the previously prepared baseline and assessment maps to formulate spatially specific mitigation measures and identify these in a mitigation map, where feasible. The geographical scope of mitigation (and monitoring) measures is based on the scope adopted for the assessment (determined by administrative boundaries or by the proposal's zone of influence). The planning hierarchy determines the level of detail of AA/SEA/EIA mitigation measures. 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.

2. Incorporate any new datasets and data updates obtained during monitoring into GIS. 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.

3. 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.

2.6.4 Communication, consultation and public involvement

The following steps aim to promote the maintenance of proactive communication during the formulation of mitigation measures and monitoring.

1. Although there are no requirements for consultation at this procedural stage, AA and SEA/EIA teams should communicate at this point and share information on proposed mitigation measures to ensure that they are appropriate and sufficient to avoid, reduce or remedy all identified biodiversity impacts (see Table 2.2) and evaluate the potential for residual impacts.

2. Engage with previously identified public authorities and other relevant stakeholders to seek advice that proposed mitigation measures are appropriate and to support monitoring arrangements.

3. 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.

Table 2.2. Detail of proposed monitoring indicators of the Lee Catchment Flood Risk Assessment and Management Study. Note that the reference to the monitoring of conservation status of designated sites is an important linkage between the standardised use of indicators in Strategic Environmental Assessment and the Appropriate Assessment process, where monitoring is not a statutory requirement. Sources: Office of Public Works, Cork City Council and Cork County Council.

Objective	Sub-objective	Indicator	Minimum requirement	Aspirational target
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

2.7 Reporting

2.7.1 Legal requirements and methodological steps

The legal framework for AA, SEA and EIA reporting is outlined in Box 2.6.

The following steps refer to the general methodological aspects to be considered when preparing the NIS and SEA ER or EIS (see also Fig. 2.11).

1. Use SEA/EIA findings to inform and report on AA findings and vice versa. Acknowledge the sensitivity of threats to and interactions between European 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).

2. The final report (i.e. NIS, SEA ER or EIS) should simultaneously consider and reflect all significant biodiversity-relevant effects (Table 2.3). As noted above, due consideration should be given to designated sites, other habitats and species of ecological value (i.e. wider biodiversity), and all biodiversity-relevant aspects.

3. Note which proposed mitigation measures and recommendations derive from specific elements of AA or SEA/EIA processes. Furthermore,

Box 2.6. Legal framework for Appropriate Assessment, Strategic Environmental Assessment and Environmental Impact Assessment reporting.

AA Reporting

The reporting on likely significant impact on European sites is presented in a NIS, which is specifically referred to in the Birds and Habitats Directive Regulations, or a NIR for land-use plans under the Planning and Development Act.

SEA Reporting

Annex I of the SEA Directive provides the list of information to be included in the SEA ER, which includes:

- An outline of the contents and main objectives of the plan/programme;
- The environmental characteristics of areas likely to be significantly affected including any environmental problems associated with European sites;
- Environmental protection objectives;
- Likely significant effects on the environment;
- Proposed mitigation measures;
- Monitoring measures; and
- A non-technical summary.

EIA Reporting

Annex IV of the EIA Directive indicates that EIS reporting must include:

- A description of the project;
- An outline of the main alternatives studied;
- Aspects of the environment likely to be significantly affected;
- A description of the likely significant environmental effects;
- Mitigation measures; and
- An indication of any difficulties encountered in compiling the required information.

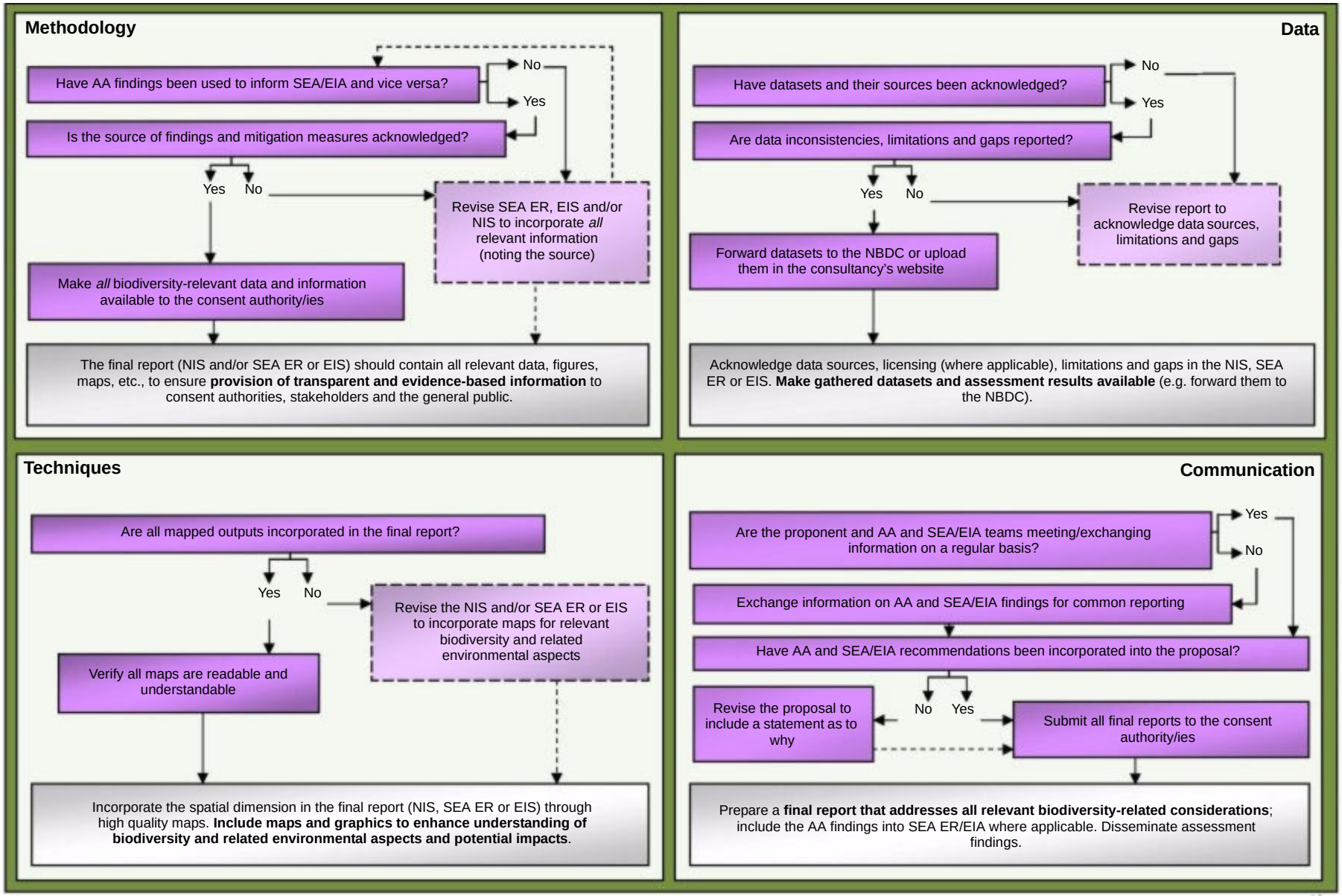

Figure 2.11. Flow-chart diagrams for reporting.

Table 2.3. Reporting checklist for Strategic Environmental Assessment/Environmental Impact Assessment.

SEA/EIA section	Integration of biodiversity considerations
Non-technical summary	Recognition of biodiversity as a component of SEA/EIA. Inclusion of a summary on the baseline, identified impacts on biodiversity and proposed mitigation (including designated sites and wider biodiversity).
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 European sites, NHAs, other habitats and species of ecological value, and their significance (e.g. movement and dispersal, ecosystem services, population size and dynamics), interrelationships and supporting features (e.g. water, soil, landscape, 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 sites and wider biodiversity. 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 sites, in particular, and wider biodiversity.
Proposed monitoring	Inclusion of specific biodiversity indicators (including European 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, or a summary of the main findings of AA, where applicable.

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 European 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 as in the case of AA) decision making.

4. 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.

2.7.2 Data gathering, creation and manipulation

The following steps aim to promote best practice in biodiversity-relevant data use when reporting.

1. Acknowledge datasets used in AA and SEA/EIA 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, SEA ER or EIS.

2. Upload datasets and metadata gathered and created during AA, SEA or EIA studies in the consultancy's (private) database or website for open or restricted (i.e. on request) distribution. If possible, forward newly created datasets to the NBDC for their inclusion in its GIS database. Data sharing will facilitate the preparation and improve the effectiveness of future AAs and SEAs/EISs, as well as contribute to avoiding duplication and unnecessary data collation efforts.

2.7.3 Application of GIS methods and techniques

The following steps aim to provide guidance on spatial approaches for reporting (see Appendix 2 and refer to the GISEA Manual – EPA, 2009).

1. Incorporate the previously prepared baseline and assessment maps into the NIS, 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.

2. 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.

2.7.4 Communication, consultation and public involvement

The following steps aim to maintain proactive communication during reporting.

1. Maintain proactive communication throughout the preparation of the NIS, SEA ER or EIS, 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.

2. Where ecological sensitivities have been identified, the NPWS should be consulted at project pre-application stage for its advice on whether any biodiversity-relevant issues have been overlooked.

3. Submit the SEA ER and NIS 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). Submit any new data collected to the NBDC.

4. Disseminate assessment findings (e.g. publish them online).

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Acronyms

AA	Appropriate Assessment
BAP	Biodiversity Action Plan
CEC	Commission of the European Communities
CFRAMS	Catchment Flood Risk Assessment and Management Study
CORINE	Coordinated Information on the Environment
DAFM	Department of Agriculture, Food and the Marine
DAHG	Department of Arts, Heritage and the Gaeltacht
DAU	Development Applications Unit
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
ER	Environmental Report
EU	European Union
FD	Floods Directive
GBIF	Global Biodiversity Information Facility
GIS	Geographic Information Systems
GPS	Global Positioning Systems
GSI	Geological Survey of Ireland
IBIA	Integrated Biodiversity Impact Assessment
INSPIRE	Infrastructure for Spatial Information in the European Community
IROPI	Imperative Reasons of Overriding Public Interest
NBDC	National Biodiversity Data Centre
NBP	National Biodiversity Plan
NGO	Non-Governmental Organisation
NHA	Natural Heritage Area
NIR	Natura Impact Report
NIS	Natura Impact Statement
NPWS	National Parks and Wildlife Service
OPW	Office of Public Works

OSI	Ordnance Survey Ireland
pNHA	Proposed Natural Heritage Area
RBD	River Basin District
SAC	Special Area of Conservation
SEA	Strategic Environmental Assessment
SEA ER	Strategic Environmental Assessment Environmental Report
SI	Statutory Instrument
SPA	Special Protection Area
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 Statement for projects, or a Natura Impact Report for plans/programmes under the Planning and Development (Amendment) Act 2010.
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, and is legally compliant. For the purpose of this guidance, the term is interchangeably used with Ecological Impact Assessment.
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 (e.g. two or more individual plans or projects), 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' should be taken to include the following nature conservation sites: international sites (e.g. Ramsar, Biosphere Reserve), European sites (i.e. SACs and SPAs), national sites (e.g. NHAs, pNHAs, Nature Reserves) and any other designated sites (e.g. National Parks, Wildfowl Sanctuaries, Refuges for Fauna) that are designated by law, national policy or land-use planning, or are going through the process of designation, and that are, therefore, legally protected.
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 SEA/EIA or to support other forms of environmental assessment or appraisal. See also Biodiversity Impact Assessment.
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' has the meaning assigned to it in the EC (Birds and Natural Habitats) Regulations 2011, which is also commonly known as a Natura 2000 site (see also Natura 2000 network below).

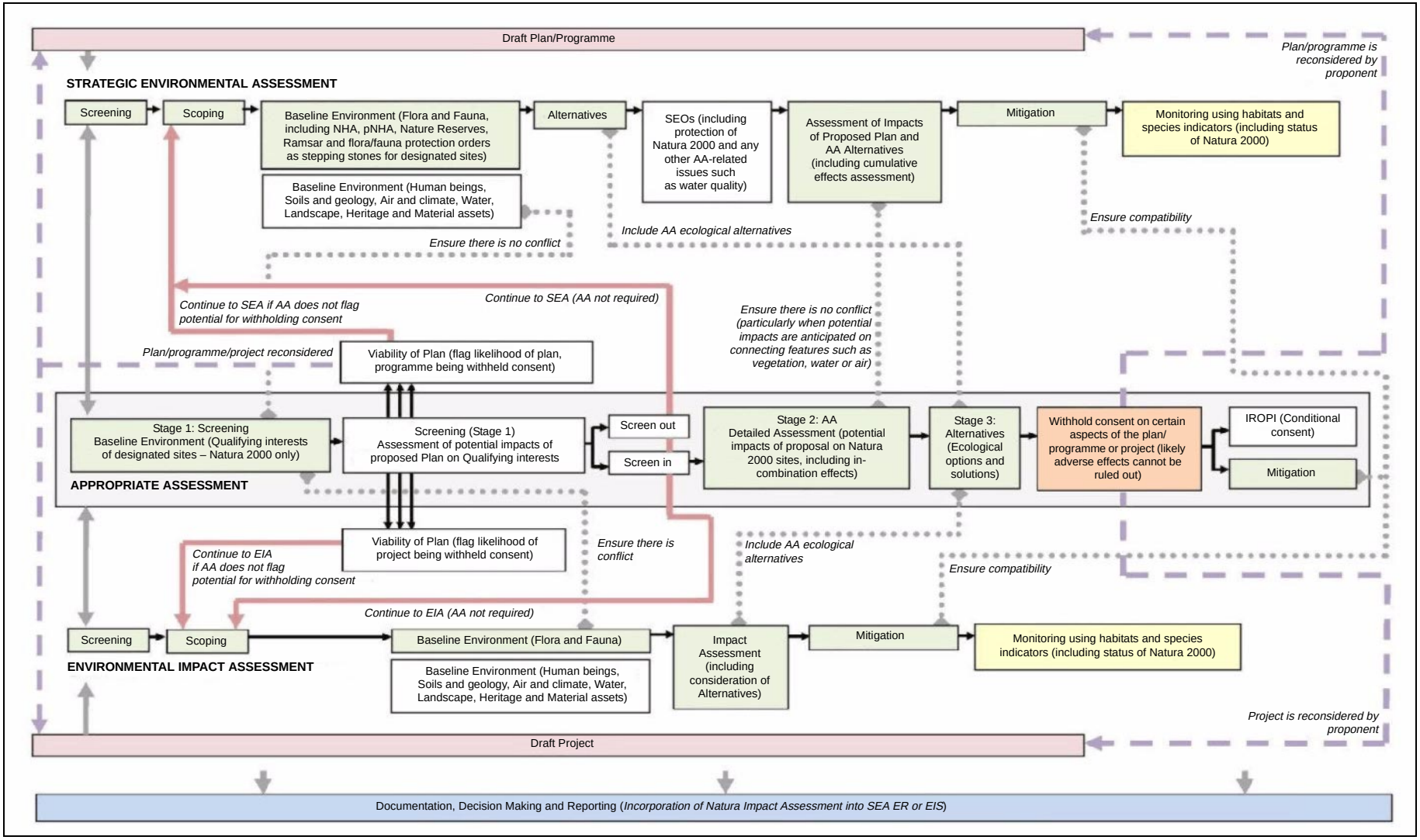
Geographic Information Systems	Array of technological tools for the management, analysis and display of spatial data that can provide evidence-based information to support biodiversity impact assessment and natural resource management.
In-combination effects	Incremental effects resulting from a combination 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 interchangeably with cumulative effect.
Indicators	Data that provide information about more than the data themselves (i.e. that indicate or provide a proxy for the overall status or some aspect of the status of a specific biodiversity or environmental parameter).
INSPIRE Directive	Establishes an infrastructure for spatial information in the EU to support Community environmental policies, and policies or activities that may have an impact on the environment (http://inspire.jrc.ec.europa.eu/).
Integrated Biodiversity Impact Assessment	Practical and systematic 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 co-ordinate the collection of data, amalgamate assessment processes, promote best practice, optimise time and resources, reduce/avoid duplication of efforts by developers, assessors and the administration 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 or activity at project level (the definition entailing that interventions commonly result from proposals).
Metadata	Information that identifies, locates and describes 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 designed to prevent, reduce and, as fully as possible, offset any significant adverse impacts on biodiversity (and other environmental 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 conservation areas established under the 1992 Habitats Directive (and 1979 Birds 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 SACs and SPAs.

Natura Impact Statement and Natura Impact Report	The findings of the AA must be reported in a Natura Impact Statement for projects and a Natura Impact Report for land-use plans/programmes. They both represent a statement for the purposes of Article 6 of the Habitats Directive of the implications of a proposed plan objective, on its own or in combination with other plans and projects for one or more European sites, in view of the conservation objectives of the site. In the context of this guidance and in recognition of common usage, NIS is used to refer to both Natura Impact Statement and Natura Impact Report.
Wider biodiversity	In the context of this guidance and in recognition of common usage, the term 'wider biodiversity' is used to refer to biodiversity-relevant areas or habitats and species of ecological interest/value that are not designated (or protected) or that are not in the process leading to designation.
Proponent	In the context of this guidance, and unless otherwise specified, the term 'proponent' is used to refer to the individual, group, or authority proposing or responsible for the plan, programme or project, and those acting on their behalf (e.g. planning team or 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 plans/programmes/projects/activities. Note that plan/programmes refer to SEA, while projects relate to 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' and activities within the term 'project'.
Proxy data	Data that substitute 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 a 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 AA (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

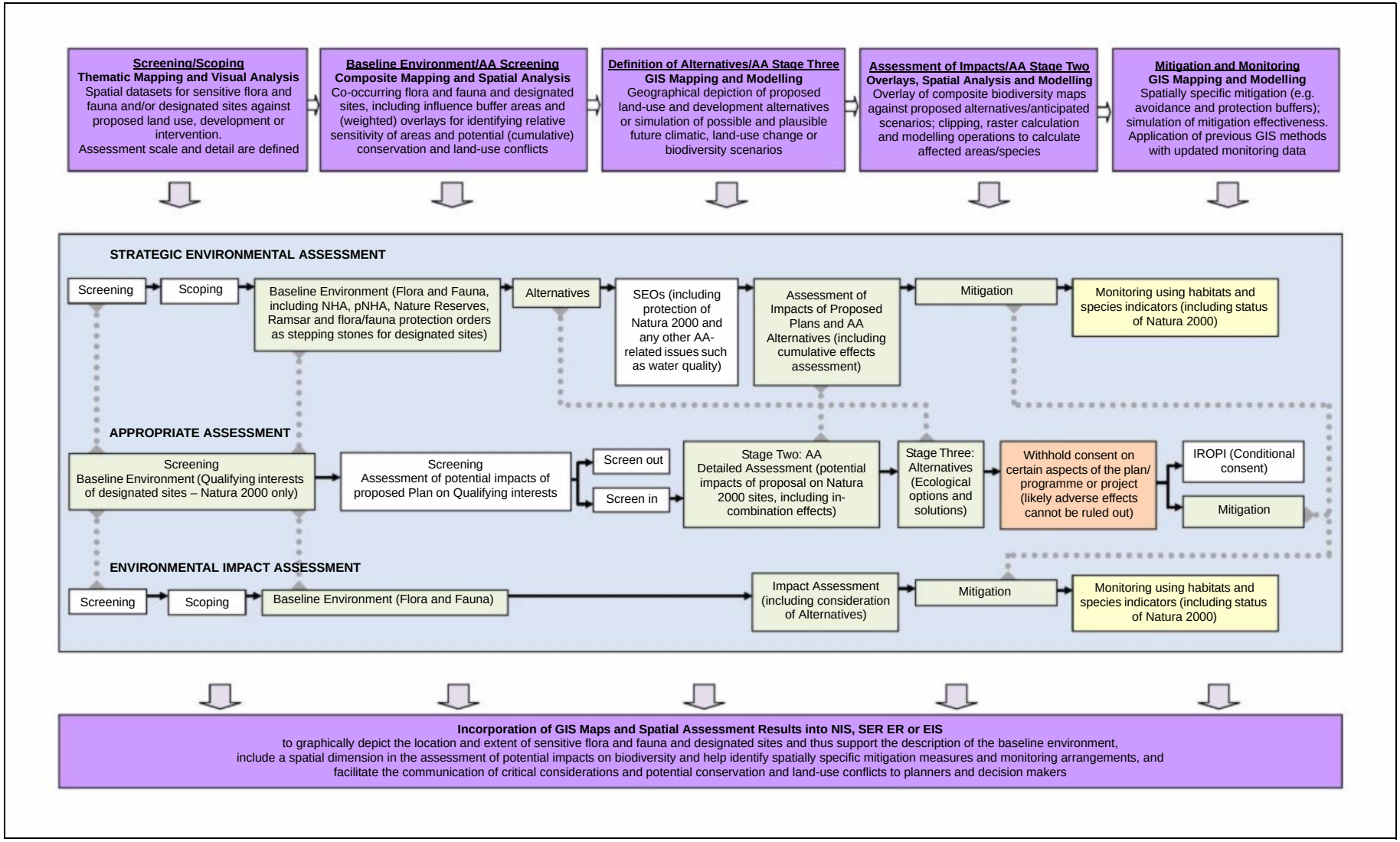
A zone of influence of a proposal is the potential geographic area that could be affected by its implementation. Governmental guidance recommends consideration of an ex-situ 15-km buffer area for European sites around the proposal boundary for plans/programmes. Nevertheless, the zone of influence should be regarded as having flexible boundaries that may change during the assessment: more extensive areas may be considered where there are hydrological connections or smaller areas may suffice at project level.

Appendix 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 the relevant stages; discontinuous grey arrows point to reconsideration of proposals in light of IROPI.

Appendix 2 Sequential Stages in the Methodological Framework where Spatial Data and GIS Methods can be Applied



Appendix 3 Biodiversity-Relevant Datasets Available in the Republic of Ireland

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.

Data creator	Dataset	Scale/Resolution	Coverage	Access
FRAMEWORK DATA (Geographic Setting)				
ERA–MAPTEC http://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) http://www.osi.ie	✓ Aerial photographs for 1995, 2000 and 2005	1:40,000	National	Purchase
	✓ Digital Terrain Models (DTMs) and Digital Elevation Models (DEMs) 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 co-ordinates)	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 (DEMs)	90 m – http://srtm.csi.cgiar.org 15 m – http://www.gdem.aster.ersdac.or.jp	Global	Free Request
BASELINE DATA (Biodiversity, Flora and Fauna)				
Coillte Teoranta http://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 http://www.agriculture.gov.ie	✓ Forest Inventory Database 2007	1:10,560	National	Free Request

Data creator	Dataset	Scale/Resolution	Coverage	Access
Marine Institute http://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
	✓ 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

Data creator	Dataset	Scale/Resolution	Coverage	Access
Marine Institute *contd*	✓ 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
	✓ 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) http://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

Data creator	Dataset	Scale/Resolution	Coverage	Access
MIDA *contd*	✓ 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) http://www.biodiversityireland.ie/	**Plants**			
	✓ Bryophytes of Ireland (British Bryological Society)	Various scales and resolutions (10 km^2 to 100 m^2; 117,514 records)	National (& N. Ireland)	Free Request
	✓ Heritage Trees of Ireland (Tree Council of Ireland)	Various scales and resolutions (10 km^2 to 100 m^2; 686 records)	National	Free Request
	✓ Irish Fungal records (British Mycological Society)	Various scales and resolutions (10 km^2 to 100 m^2; 14,319 records)	National (& N. Ireland)	Free Request
	✓ Phytoplankton of Irish lakes (EPA)	Various scales and resolutions (10 km^2 to 100 m^2; 14,319 records)	National	Free Request
	✓ Tetrad map scheme data for Ireland (Botanical Society of the British Isles)	Various scales and resolutions (10 km^2 to 100 m^2; 373,689 records)	National (& N. Ireland)	Free Request
	Mammals			
	✓ Atlas of Mammals in Ireland 2010–2015 (NBDC)	Various scales and resolutions (10 km^2 to 100 m^2; 1,733 records)	National	Free Request
	✓ Badger and Habitat Survey of Ireland (NPWS)	Various scales and resolutions (10 km^2 to 100 m^2; 4,176 records)	National	Free Request
	✓ ESAS cetacean sightings from 1980 to 2003 (Joint Nature Conservation Committee)	Various scales and resolutions (10 km^2 to 100 m^2; 3,045 records)	North-east Atlantic	Free Request
	✓ Hare Survey of Ireland 2006/07 (NPWS)	Various scales and resolutions (10 km^2 to 100 m^2; 1,605 records)	National	Free Request

Data creator	Dataset	Scale/Resolution	Coverage	Access
NBDC *contd*	**Mammals *contd***			
	✓ Irish Deer Database (Ruth Carden, National Museum of Ireland)	Various scales and resolutions (10 km^2 to 100 m^2; 794 records)	National	Free Request
	✓ Irish National Badger Sett Database (Department of Agriculture, Fisheries and Food)	Various scales and resolutions (10 km^2 to 100 m^2; 25,727 records)	National	Free Request
	✓ Irish Squirrel Survey 2007 (COFORD)	Various scales and resolutions (10 km^2 to 100 m^2; 1,627 records)	National	Free Request
	✓ National Bat Database (Bat Conservation Ireland)	Various scales and resolutions (10 km^2 to 100 m^2; 3,552 records)	National	Free Request
	✓ Pine Marten Database (NPWS)	Various scales and resolutions (10 km^2 to 100 m^2; 175 records)	National	Free Request
	✓ Otter Survey of Ireland 1982 (NPWS)	Various scales and resolutions (10 km^2 to 100 m^2; 2,167 records)	National	Free Request
	✓ Road Kill Survey (http://biology.ie)	Various scales and resolutions (10 km^2 to 100 m^2; 2,042 records)	National (& N. Ireland)	Free Request
	✓ Seal Database (NPWS)	Various scales and resolutions (10 km^2 to 100 m^2; 1,210 records)	National	Free Request
	Birds			
	✓ Atlas of Wintering Birds in Britain & Ireland (BirdWatch Ireland)	Various scales and resolutions (10 km^2 to 100 m^2; 55,690 records)	National (& N. Ireland)	Free Request
	✓ First Atlas of Breeding Birds in Britain & Ireland (BirdWatch Ireland)	Various scales and resolutions (10 km^2 to 100 m^2; 63,985 records)	National (& N. Ireland)	Free Request
	✓ Irish Wetland Birds Survey 1994 to 2001 (BirdWatch Ireland)	Various scales and resolutions (10 km^2 to 100 m^2; 10,908 records)	National	Free Request
	✓ Kingfisher Survey 2010 (NPWS)	Various scales and resolutions (10 km^2 to 100 m^2; 6,883 records)	River systems: Barrow, Blackwater (Munster), Boyne, Clare, Moy & Nore	Free Request
	✓ Second Atlas of Breeding Birds in Britain and Ireland (BirdWatch Ireland)	Various scales and resolutions (10 km^2 to 100 m^2; 247,842 records)	National (& N. Ireland)	Free Request

Data creator	Dataset	Scale/Resolution	Coverage	Access
NBDC *contd*	**Insects**			
	✓ Anisopodidae and Thaumaleidae of Ireland (Paddy Ashe)	Various scales and resolutions (10 km^2 to 100 m^2; 84 records)	National (& N. Ireland)	Free Request
	✓ Bees of Ireland (Una Fitzpatrick and Tomas Murray)	Various scales and resolutions (10 km^2 to 100 m^2; 10,436 records)	National (& N. Ireland)	Free Request
	✓ Centipedes of Ireland (Biological Records Centre, UK: Tony Barber)	Various scales and resolutions (10 km^2 to 100 m^2; 476 records)	National (& N. Ireland)	Free Request
	✓ Craneflies of Ireland (Irish Biogeographical Society)	Various scales and resolutions (10 km^2 to 100 m^2; 3,310 records)	National (& N. Ireland)	Free Request
	✓ Dixidae (Diptera) of Ireland (Irish Biogeographical Society: Paddy Ashe and J.P. O'Connor)	Various scales and resolutions (10 km^2 to 100 m^2; 89 records)	National (& N. Ireland)	Free Request
	✓ Dragonfly Ireland (CEDaR, N. Ireland)	Various scales and resolutions (10 km^2 to 100 m^2; 28,676 records)	National (& N. Ireland)	Free Request
	✓ Ephemeroptera of Ireland (University College Dublin: Mary Kelly Quinn)	Various scales and resolutions (10 km^2 to 100 m^2; 6,000 records)	National (& N. Ireland)	Free Request
	✓ Fleas (Siphonaptera) of Ireland (University College Dublin: Paddy Sleeman)	Various scales and resolutions (10 km^2 to 100 m^2; 2,123 records)	National (& N. Ireland)	Free Request
	✓ Harvestmen (Opiliones) of Ireland (Martin Cawley)	Various scales and resolutions (10 km^2 to 100 m^2; 2,109 records)	National (& N. Ireland)	Free Request
	✓ Irish Butterfly Monitoring Scheme (NBDC)	Various scales and resolutions (10 km^2 to 100 m^2; 20,072 records)	National	Free Request
	✓ Lice (Phthiraptera) of Ireland (NBDC)	Various scales and resolutions (10 km^2 to 100 m^2; 306 records)	National	Free Request
	✓ Microlepidoptera of Ireland (National Museum of Ireland)	Various scales and resolutions (10 km^2 to 100 m^2; 6,902 records)	National (& N. Ireland)	Free Request
	✓ Millipedes (Diplopoda) of Ireland (Biological Records Centre, UK: Paul Lee)	Various scales and resolutions (10 km^2 to 100 m^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 (10 km^2 to 100 m^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 (10 km^2 to 100 m^2; 272 records)	National (& N. Ireland)	Free Request
	✓ Pseudoscorpions of Ireland (Irish Biogeographical Society)	Various scales and resolutions (10 km^2 to 100 m^2; 234 records)	National (& N. Ireland)	Free Request
	✓ Water Beetles of Ireland (Balfour Brown Club: Garth Brown)	Various scales and resolutions (10 km^2 to 100 m^2; 34,392 records)	National (& N. Ireland)	Free Request

Data creator	Dataset	Scale/Resolution	Coverage	Access
NBDC *contd*	**Marine**			
	✓ BioMar: marine dataset (NPWS)	Various scales and resolutions (10 km^2 to 100 m^2)	Irish Coast	Free Request
	✓ Marine Turtles in Irish Waters (Gabrial King and Simon Berrow)	Various scales and resolutions (10 km^2 to 100 m^2)	Irish Coast	Free Request
	✓ Rocky Shore Macroalgae (EPA)	Various scales and resolutions (10 km^2 to 100 m^2; 2,791 records)	Irish Coast	Free Request
	✓ Seaweeds of Ireland (Michael Guiry and British Phycological Society)	Various scales and resolutions (10 km^2 to 100 m^2; 48,927 records)	Irish Coast	Free Request
	✓ Sponges of Rathlin Island (Ulster Museum: Bernard Picton and Claire Goodwin)	Various scales and resolutions (10 km^2 to 100 m^2; 17,855 records)	Rathlin Island, Co. Antrim	Free Request
	Invasive Species			
	✓ Irish Didemnum Species Database (NBDC)	Various scales and resolutions (10 km^2 to 100 m^2; 10 records)	National (& N. Ireland)	Free Request
	✓ Irish New Zealand Flatworm Database (Agri-food and Bioscience Institute: Archie Murchie)	Various scales and resolutions (10 km^2 to 100 m^2; 1,141 records)	National (& N. Ireland)	Free Request
	✓ Irish Wire Weed Database (Irish Seaweed Centre: Stefan Kraan)	Various scales and resolutions (10 km^2 to 100 m^2; 106 records)	National (& N. Ireland)	Free Request
	✓ National Invasive Species Database (NBDC)	Various scales and resolutions (10 km^2 to 100 m^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 (10 km^2 to 100 m^2; 78,200 records)	National (& N. Ireland)	Free Request
	✓ Biodiversity Records from Ireland (NBDC)	Various scales and resolutions (10 km^2 to 100 m^2; 7,047 records)	National (& N. Ireland)	Free Request
	✓ CréBeo Earthworm Database (University College Dublin: Aidan Keith and Olaf Schmidt)	Various scales and resolutions (10 km^2 to 100 m^2; 340 records)	National (& N. Ireland)	Free Request
	✓ EPA River Biologists Data (EPA)	Various scales and resolutions (10 km^2 to 100 m^2; 29,291 records)	National (& N. Ireland)	Free Request
	✓ Freshwater fish in Irish lakes (Inland Fisheries Ireland)	Various scales and resolutions (10 km^2 to 100 m^2; 6,035 records)	National (& N. Ireland)	Free Request
	✓ Irish National Crayfish Database (NPWS)	Various scales and resolutions (10 km^2 to 100 m^2; 2,253 records)	National	Free Request
	✓ Irish National Frog Database (Irish Peatland Conservation Council)	Various scales and resolutions (10 km^2 to 100 m^2; 3,483 records)	National	Free Request
	✓ Reptiles and Amphibians Atlas 1978 (An Foras Forbartha)	Various scales and resolutions (10 km^2 to 100 m^2; 766 records)	National (& N. Ireland)	Free Request

Data creator	Dataset	Scale/Resolution	Coverage	Access
National Parks and Wildlife Service (NPWS) http://www.npws.ie **Subject to NPWS data policy*	**Designated Areas**			
	✓ Special Protection Area (SPA)	1:5,000	National	Free* Download
	✓ Special Area of Conservation (SAC)	1:5,000	National	Free* Download
	✓ Proposed offshore marine SACs	1:5,000	National	Free* Download
	✓ Natural Heritage Area (NHA)	1:5,000	National	Free* Download
	✓ Proposed Natural Heritage Area (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
	✓ 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 European 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

Data creator	Dataset	Scale/Resolution	Coverage	Access
NPWS *contd*	✓ 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
	✓ 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 and 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

Data creator	Dataset	dataset	Coverage	Access
Teagasc **http://www.teagasc.ie**	✓ National hedgerow map	1 m minimum width	National	Free Request
	✓ Teagasc habitat indicator map (THIM95)	Minimum unit: 1 ha	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) **http://www.epa.ie** **(http://maps.epa.ie)** ***Related rivers are restricted by OSI license*	**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
	✓ 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 ha minimum mapping unit)	National	Free Download
	✓ CORINE land-cover changes 1990–2000 and 2000–2006	1:100,000 (25 ha minimum mapping unit)	National	Free Download
	✓ Forest cover (Dept. of Agriculture, Fisheries and Food)	1:40,000	National	Free Request

Data creator	Dataset	Scale/Resolution	Coverage	Access
EPA *contd*	**Soils**			
	✓ National soils database (percentages of different elements/minerals in the soil)	2,000 m 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 ha 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	1 m noise contours	National (Dublin&national routes exceeding traffic threshold)	Free Request
Geological Survey of Ireland (GSI) http://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 20/50/200/500 m depths	1:250,000	Irish waters	Free Request

Data creator	Dataset	Scale/Resolution	Coverage	Access
Irish Meteorological Service (Met Éireann) http://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
Marine Institute http://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) http://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

Data creator	Dataset	Scale/Resolution	Coverage	Access
MIDA *contd*	✓ 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) http://www.opw.ie (http://www.floodmaps.ie)	✓ Benefiting lands	1:10,560	National	Free Download
	✓ Catchment areas	1:10,560	National	Free Download
***BASELINE DATA* (Biodiversity Supporting Features and Potential Pressures/Impacts)**				
Office of Public Works (OPW) http://www.opw.ie (http://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

Data creator	Dataset	Scale/Resolution	Coverage	Access
OPW *contd*	✓ 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 http://www.teagasc.ie	✓ Agricultural land-use map	Field scale	National	Restricted Request
	✓ Forest planting potential map	Minimum unit: 1 ha	National	Restricted Request
	✓ National exposure map (TOPEX)	100 m pixel	National	Free Request
	✓ National indicative soil map (under review)	1:100,000 to 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 land-cover map (TLC95)	Minimum unit: 1 ha	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

Data creator	Dataset	Scale/Resolution	Coverage	Access
Local Authorities *contd*	✓ 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 4 Core Biodiversity Indicators

For a full list of indicators refer to the IBIA Guidance. Note that these lists are 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. Data to support assessment of many indicators listed below are provided in Appendix 3.

Table A4.1. Core biodiversity indicators.

Indicator	Description
BIOLOGICAL DIVERSITY COMPONENTS – HABITATS	
SEA and Plan/Programme AA	
Extent of affected European site	Percentage of total or area (m^2) of reclaimed/polluted/fragmented/ protected/restored land in European sites
Conservation status of habitats and species in European sites	Changes on the conservation status (as per NPWS definition) of European sites
Number of affected qualifying interests	Percentage of total number of qualifying interests affected or extent of qualifying habitat affected within a given European site 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 nature conservation 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 natural and/or semi-natural habitats (including native woodland, natural grassland, raised and blanket bog, wetlands, marshes and fens).	Percentage of total or area (m^2) of affected (removed/reclaimed/polluted/ restored) natural and/or semi-natural habitats
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*[1]**	
Extent of affected hedgerow	Percentage of total within the study area (m^2) and length (m) of removed/planted/managed hedgerow
BIOLOGICAL DIVERSITY COMPONENTS – HABITATS (LISTED IN THE HABITATS DIRECTIVE)	
Natural habitats listed in Annex I	Affected area and changes in condition (structure/function)

Indicator	Description
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 – Species (Listed In The Habitats Directive)	
Plants species listed in Annex II	Conservation status and habitat suitability
Mammal species listed in Annex II	Conservation status and habitat suitability
Fish species listed in Annex II	Conservation status and habitat suitability
Bat species listed in Annex II	Conservation status and habitat suitability
Reptile species listed in Annex II	Conservation status and habitat suitability
Amphibian species listed in Annex II	Conservation status and habitat suitability
Arthropod species listed in Annex II	Conservation status and habitat suitability
Mollusc species listed in Annex II	Conservation status and habitat suitability
Animal species listed in Annex IV	Conservation status
Plant species listed in Annex IV	Conservation status
Animal species listed in Annex V	Conservation status
Plant species listed in Annex V	Conservation status
ECOSYSTEM INTEGRITY – SUPPORTING FEATURES AND THREATS	
Biological river quality	Biological status of fresh waters (Q values) as reported by the EPA
Status of waterbodies	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

Indicator	Description
BIODIVERSITY CONSERVATION POLICIES AND INITIATIVES	
SEA and Plan/Programme AA	
Biodiversity Action Plans (BAPs)	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 habitats, flora and fauna of ecological value
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)

[1]Many of the SEA and plan/programme AA indicators may also be applicable to EIA and AA of large infrastructural projects.

An Ghníomhaireacht um Chaomhnú Comhshaoil

Is í an Gníomhaireacht 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 peitreail;
- scardadh dramhuisce;
- dumpáil mara.

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 comhordú 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 aeir agus caighdeáin aibhneacha, locha, uiscí taoide agus uiscí talaimh; leibhéil agus sruth aibhneacha a thomhas.
- Tuairisciú neamhspleách chun cabhrú le rialtais náisiúnta agus áitiúla cinntí a dhéanamh.

RIALÚ ASTUITHE GÁIS CEAPTHA TEASA NA HÉIREANN

- Cainníochtú 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 caighdéan aeir 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 Guaiseacha 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 Príomhstiúrthóir agus ceithre Stiúrthóir.

Tá obair na Gníomhaireachta 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.

ENVIRONMENTAL PROTECTION AGENCY

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