



## Kintore Hydrogen Plant

### Environmental Impact Assessment Report Chapter 4: Environmental Impact Assessment Methodology

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## Environmental Impact Assessment Report

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## Summary

This document describes the principles of the EIA process and the approach that has been taken to identify and evaluate the likely impacts and, subsequently, evaluate the significance of effects associated with Kintore Hydrogen Plant.

# 1 Introduction

## 1.1 Overview

1.1.1 This chapter of the Environmental Impact Assessment Report (EIAR) sets out the principles of the environmental assessment process. It details the approach that has been taken to identify and evaluate the likely impacts and significance of effects associated with Kintore Hydrogen Plant.

1.1.2 The EIA process that forms the basis of this EIAR has been undertaken with reference to the Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017. Further details of the topic-specific methodologies (e.g. survey methodologies) are provided in each relevant topic chapter and in the supporting appendices.

## 1.2 Environmental Impact Assessment legislation and guidance

1.2.1 The impact assessment methodology employed in this EIAR draws upon legislation, policy and guidance including:

- Council Directive 2011/92/EU of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment (the EIA Directive), as amended by Council Directive 2014/52/EU;
- The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017 (the EIA Regulations) as amended;
- Scottish Government (2017) Planning Circular 1/2017: Environmental Impact Assessment regulations<sup>1</sup>;
- Scottish Government (2013) Planning Advice Note 1/2013: Environmental Impact Assessment<sup>2</sup>;
- Scottish Natural Heritage (2013) A Handbook on Environmental Impact Assessment<sup>3</sup>;
- Planning Inspectorate (2017, 2018 and 2019) Advice Notes Seven: Environmental Impact Assessment: Preliminary Environmental Information, Screening and Scoping; Nine: Rochdale Envelope; and Seventeen: Cumulative Effects Assessment<sup>4</sup>;
- Highways England et al. (2020) Design Manual for Roads and Bridges, LA 104 Environmental assessment and monitoring, revision 1<sup>5</sup>;
- Institute of Environmental Management and Assessment (IEMA) (2004) Guidelines for Environmental Impact Assessment;

- IEMA (2015) Environmental Impact Assessment Guide to Shaping Quality Development<sup>6</sup>;
- IEMA (2016) Guide to Delivering Quality Development<sup>7</sup>;
- Mitchell, A. (ed) (2020) Demystifying Cumulative Effects, in IEMA Impact Assessment Outlook Journal Vol 7<sup>8</sup>; and
- IEMA (2023) Effective Non-Technical Summaries for Environmental Impact Assessment<sup>9</sup>.

1.2.2 Further details regarding the legislative context of the assessments undertaken in this EIAR are provided in Chapter 1: Introduction.

## 2 Impact assessment methodology

### 2.1 Assessment structure

2.1.1 The assessment for each environmental topic forms a separate topic chapter of this EIAR. For each topic chapter, the following components have been set out:

- identification of the study area for the topic specific assessments;
- description of the legislation, policy and guidance for that topic assessment;
- summary of consultation activity undertaken, including comments received in the Scoping Opinion;
- description of the approach to assessment, including details of the methodologies used;
- description of the baseline environmental conditions; and
- presentation of the impact assessment undertaken, which includes:
  - identification of the maximum design scenario for each impact assessment;
  - a description of the measures adopted as part of the design of the proposed development, including mitigation and design measures which seek to prevent, reduce or offset environmental effects or enhance beneficial effects;
  - an assessment of the likely impacts and effects associated with the proposed development;
  - identification of any further mitigation measures required in respect of likely significant effects (in addition to those measures adopted as part of the project design); and
  - identification of residual effects and any future monitoring required.

2.1.2 For each topic, an assessment of any cumulative effects with other major developments and any inter-related effects with other impact pathways is provided.

### 2.2 Geographic scope

2.2.1 The geographic scope of the EIA includes the physical extent of the proposed development, displayed as the redline boundary in Chapter 1, Figure 1.1. The assessment boundary for individual topic chapters may exceed beyond the redline boundary where necessary for the scope of the assessment. Where identified and relevant, such impacts have been assessed as part of the EIA and are set out and explained in each of the topic chapters.

2.2.2 Consideration has also been given to impacts that could occur away from the proposed development site, due for example to activities in the supply chain caused by the

proposed development or impacts from its discharges or the use of its products. This is in line with the *Finch* judgement (2024 UKSC 20), which clarifies that the impacts of a proposed development, where a causal relationship exists (whether direct or indirect), must be assessed in EIA so far as the evidence permits without straying into “speculation and conjecture”.

2.2.3 This is particularly relevant to the assessment of climate change impacts, which has been undertaken on a lifecycle basis considering both the upstream supply chain impacts of providing materials/components to construct the proposed development, the generation of electricity used by it in operation, and the downstream use of hydrogen produced by it. It is also relevant to the assessments of socio-economic and population & health impacts, which have considered indirect and multiplier economic and employment generation effects of construction and operation.

2.2.4 Topics with physical environmental impact pathways, such as air pollutant dispersion or the possible hydrological and ecological impacts of water discharge to the River Don, have assessed these with a boundary that extends beyond the application site where applicable. The shadow Habitats Regulations Assessment (Appendix 8.11) has included assessment of indirect effects on the features of European designated sites through possible disturbance to foraging geese populations outside the designated site area.

### Transboundary effects

2.2.5 Transboundary effects are those likely to have significant a significant effect on the environment of a European Economic Area (EEA) state other than the UK. Having regard to all of the potential environmental impact pathways set out in the EIAR, there is considered to be no potential for transboundary effects. On this basis, assessment of transboundary effects was agreed to be scoped out of the EIA.

### 2.3 Temporal scope

2.3.1 The EIA considers impacts arising from both the construction and operational phases of the proposed development. While elements of the proposed development will be maintained, renewed or replaced over time, the proposed development is designed to have an ongoing operational lifespan and Kintore Hydrogen does not intend to seek a time-limited planning permission. Decommissioning is therefore excluded from the assessment, as agreed through the EIA scoping process.

2.3.2 The facility is likely to be developed in a modular fashion over two or more phases, which is described further in Chapter 2: Project Description and Site Setting. The temporal scope therefore includes construction of the full scale of proposed

development as a maximum case, but with the longer potential programme of works for phased construction, as described in Chapter 2.

## 2.4 Methodology and assessment criteria

- 2.4.1 Each topic chapter provides details of the methodology for baseline data collection and the approach to the assessment of effects. Each environmental topic has been assessed by a specialist in that area.
- 2.4.2 Each topic chapter defines the scope of the assessment within the methodology section, together with details of the study area, desk study and survey work undertaken and the approach to the assessment of effects. The identification and evaluation of effects have been based on the information set out in Chapter 2: Project Description, environmental assessment good practice guidance documents and relevant topic-specific guidance were available.

## 2.5 Environmental baseline conditions

- 2.5.1 The existing and likely future environmental conditions in the absence of the proposed development are known as 'baseline conditions'. Each topic chapter in the EIAR includes a description of the current baseline environmental conditions. The baseline conditions at the site and within the study area form the basis of the assessment, enabling the likely significant effects to be identified through a comparison with the baseline conditions.
- 2.5.2 The baseline for the assessment represents the conditions that will exist in the absence of the proposed development at the time that the development is likely to be implemented, i.e. from around 2026 onwards.
- 2.5.3 Consideration has been given to any likely changes between the time of surveys or desk-based assessments and the future baseline at the time of construction and operation of the proposed development. In some cases, these changes may include the construction or operation of other planned or consented developments in the area. Where such developments are built and operational at the time of writing and data collection, these have been considered to form part of the baseline environment. In other cases, planned future developments are considered within the assessment of cumulative effects.
- 2.5.4 The characterisation of future baseline conditions in the EIAR has also taken into account the likely effects of climate change, as far as these are known at the time of writing. This has been based on information available from the Met Office Hadley Centre's UK Climate Projections project (UKCP18), which provides information on

plausible changes in climate for the UK and on published documents such as the UK Climate Change Risk Assessment published by the Climate Change Committee.

## Limitations

- 2.5.5 Each topic chapter identifies any limitations identified in the available baseline data and whether there were any difficulties encountered in compiling the information required.

## 2.6 Maximum design scenario

- 2.6.1 The assessment undertaken for Kintore Hydrogen Plant has employed a maximum design scenario (Rochdale envelope) approach. This approach allows for a proposed development to be assessed on the basis of maximum project design parameters in order to provide flexibility, while ensuring all potentially significant effects (adverse or beneficial) are assessed and reported. Those parameters include arrange of potential values. The maximum design scenario approach employed for Kintore Hydrogen Plant is consistent with the Planning Inspectorate's (PINS) Advice Note Nine: Using the Rochdale Envelope. (Although this guidance is intended for nationally significant infrastructure projects in England, rather than Scotland, it represents good practice for major infrastructure developments and is relevant to the proposed development.)
- 2.6.2 This approach has been taken for the assessment because it is not possible to provide precise final design details of the proposed development, or the way it will be built, at the Planning Permission in Principle stage prior to approvals of detailed design matters. Improvements in technology and construction methodologies occur frequently and an unnecessarily prescriptive approach could preclude the adoption of new, more cost-effective or lower-impact technology and methods, potentially affecting the viability of a project. Chapter 2: Project Description and Site Setting describes the project design and identifies the range of potential parameters for all relevant components.
- 2.6.3 For each of the impacts assessed within the topic chapters, the maximum design scenario is identified from the range of potential options for each parameter within Chapter 2. The maximum design scenario assessed is therefore the scenario which would give rise to the greatest potential impact. For example, the size of the buildings or external structures proposed would be of the maximum dimensions required. By identifying the maximum design scenario for any given impact, it can therefore be concluded that the impact (and therefore the effect) will be no greater for any other design scenario than that assessed for the maximum design scenario. By employing the maximum design scenario approach, the Applicant retains some flexibility in the final design of the plant and associated infrastructure, but within defined maximum parameters, which are assessed in this EIAR.

## 2.7 Determining significance of effects

2.7.1 A standard approach based on the guidance cited above has been used for describing impacts and forming a judgement as to the significance of effects, as follows. However, this approach may be modified or different definitions of terms used for particular topic chapters where required by professional guidance for that topic.

### Sensitivity or importance of receptors

2.7.2 Receptors are defined as the physical or biological resource or user group that would be affected by a project. For each topic, the baseline studies have informed the identification of potential environmental receptors. Some receptors will be more sensitive to certain environmental effects than others. The sensitivity or value of a receptor may depend, for example, on its frequency, extent of occurrence or conservation status at an international, national, regional or local level.

2.7.3 Receptor sensitivity is defined within each topic chapter and takes into account factors including the:

- vulnerability of the receptor;
- recoverability of the receptor; and
- value/importance of the receptor.

2.7.4 Sensitivity is normally described using the following scale:

- high;
- medium;
- low;
- negligible.

2.7.5 For some topics, a further category of very high has been used where applicable.

2.7.6 An example of the definitions for each of these categories is set out in Table 2.1. These definitions have been adapted from the Design Manual for Roads and Bridges (DMRB). Topic-specific definitions for each of these categories, where different, are provided in each of the EIA topic chapters. The value of a receptor for each topic draws upon relevant topic specific guidance and material, including specialist knowledge, which is relevant to that topic.

Table 2.1: Receptor sensitivity

Value (sensitivity of the receptor)	Description
Very high	Very high importance and rarity, international scale and very limited potential for substitution.
High	Receptors of high importance with a high susceptibility to change and limited potential for substitution or replacement.
Medium	Receptors with some sensitivity to change and medium importance. Often have relevance at a regional scale with some opportunity for substitution or replacement.
Low	Receptors with low importance and sensitivity to change, often of relevance at a local scale.
Negligible	The receptor has very low importance / is not sensitive to change.

### Magnitude of impact

2.7.7 The magnitude of impact affecting each receptor has been considered. Impacts are defined as the physical changes to the environment attributable to the project. For each topic, the likely environmental impact pathways has been identified. For each impact pathway, the likely environmental change arising from the proposed development compared with the baseline (the situation without the proposed development) has been predicted. The categorisation of the magnitude of impact is topic-specific but generally takes into account factors such as:

- extent;
- duration;
- frequency; and
- reversibility.

2.7.8 With respect to the duration of impacts, the following has been used as a guide within the EIA, unless defined otherwise within the topic assessments:

- short term: a period of months, up to one year;
- medium term: a period of more than one year, up to five years; and
- long term: a period of greater than five years.

2.7.9 The magnitude of an impact has generally be defined used the following scale:

- major;
- moderate;
- minor; or
- negligible.

- 2.7.10 Where applicable in some cases, a further category of 'neutral' or 'no change' has been used.
- 2.7.11 An example of the definitions for each of these categories is set out in Table 2.2 below. The table describes both adverse and beneficial magnitudes of impact. These definitions have been adapted from the DMRB. Topic-specific definitions for each of these categories, where different, will be provided in each of the EIAR topic chapters. The definition of these topic specific scales will draw upon relevant external policy, guidance, standards and other material, including specialist knowledge, as relevant to that topic.

**Table 2.2: Impact magnitude**

Magnitude	Description
Major	Adverse: loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements.
	Beneficial: large scale or major improvement of resource quality; extensive restoration; major improvement of attribute quality.
Moderate	Adverse: loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements.
	Beneficial: benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality.
Minor	Adverse: some measurable change in attributes, quality or vulnerability, minor loss of, or alteration to, one (maybe more) key characteristics, features or elements.
	Beneficial: minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring.
Negligible	Adverse: very minor loss or detrimental alteration to one or more characteristics, features or elements.
	Beneficial: very minor benefit to, or positive addition of one or more characteristics, features or elements.
No change	No loss or alternation of characteristics, features or elements; no observable impact in either direction.

### Significance of effects

- 2.7.12 Effect is the term used to express the consequence of an impact (expressed as the 'significance of effect'). This is identified by considering the magnitude of the impact and the sensitivity or value of the receptor. Having identified the sensitivity of the receptor and the magnitude of the impact, a matrix approach as depicted in Table 2.3 is used to evaluate the predicted level of effect, ranging from negligible to substantial. This has been adapted from the DMRB.

- 2.7.13 The magnitude of an impact does not directly translate into significance of effect. For example, a significant effect may arise as a result of a relatively modest impact on a receptor of national value, or a large impact on a receptor of local value. In broad terms, therefore, the significance of the effect can depend on both the impact magnitude and the sensitivity or importance of the receptor.
- 2.7.14 In order to ensure a transparent and consistent approach throughout the assessment, the matrix approach will be adopted as a guide. There is, however, latitude for professional judgement where deemed appropriate in the application of the matrix. Where the matrix offers a choice of significance levels, professional judgement will be used to determine the most likely outcome.

**Table 2.3: Significance of effects matrix**

	Magnitude of impact					
	No change	Negligible	Minor	Moderate	Major	
Sensitivity of receptor	Negligible	Negligible	Negligible	Negligible or minor	Negligible or minor	Minor
	Low	Negligible	Negligible or minor	Negligible or minor	Minor	Minor or moderate
	Medium	Negligible	Negligible or minor	Minor	Moderate	Moderate or major
	High	Negligible	Minor	Minor or moderate	Moderate or major	Major or substantial
	Very high	Negligible	Minor	Moderate or major	Major or substantial	Substantial

- 2.7.15 Except where otherwise set out, a significance of effect of moderate or greater is considered 'significant' in terms of the EIA Regulations.
- 2.7.16 In cases where a range is suggested for the significance of effect, there remains the possibility that this may span the significance threshold (i.e. the range is given as minor to moderate). In such cases the final significance is based upon the expert's professional judgement as to which outcome delineates the most likely effect, with an explanation as to why this is the case.
- 2.7.17 The definitions for each of the significance levels are shown in Table 2.4.



Table 2.4: Definition of significance levels

Significance	Description
Substantial	Only adverse effects are normally assigned this level of significance. They represent key factors in the decision-making process. These effects are generally, but not exclusively, associated with sites or features of international, national or regional importance that are likely to suffer a most damaging impact and loss of resource integrity. However, a major change in a site or feature of local importance may also enter this category. Effects upon human receptors may also be attributed this level of significance.
Major	These beneficial or adverse effects are considered to be very important considerations and are likely to be material in the decision-making process.
Moderate	These beneficial or adverse effects have the potential to be important and may influence the decision-making process. The cumulative effects of such factors may influence decision-making if they lead to an increase in the overall adverse or beneficial effect on a particular resource or receptor.
Minor	These beneficial or adverse effects are generally, but not exclusively, raised as local factors. They are unlikely to be critical in the decision-making process, but are important in enhancing the subsequent design of the project.
Negligible	No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.

## 2.8 Measures envisaged to prevent, reduce and where possible offset significant adverse effects

2.8.1 Regulation 5(2)(c) of the EIA Regulations requires an EIAR to include “a description of the features of the development and any measures envisaged in order to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment”. In line with good practice for EIA, measures to enhance any beneficial effects will also be considered.

2.8.2 An iterative approach to mitigation and enhancement in the EIA process has been employed for Kintore Hydrogen Plant. This involves a feedback loop during the design and impact assessment process, depicted in Figure 2.1, below. A specific impact and the significance of the resulting effect is initially assessed and, if this is predicted to be a significant adverse effect, changes are made (where practicable) to relevant parameters or design of the proposed development in order to avoid, reduce or offset the impact. The assessment will then be repeated and the process continues until the EIA practitioner is satisfied that:

- the effect has been reduced to a level that is not likely to be significant; or
- having regard to other constraints, no further changes can reasonably be made to design parameters in order to reduce the magnitude of impact (and hence

significance of effect). In such cases, an overall effect that is still significant would be reported as the residual effect in the EIAR.

2.8.3 Where there are beneficial effects, these are also iterated with a view to enhancement where possible.

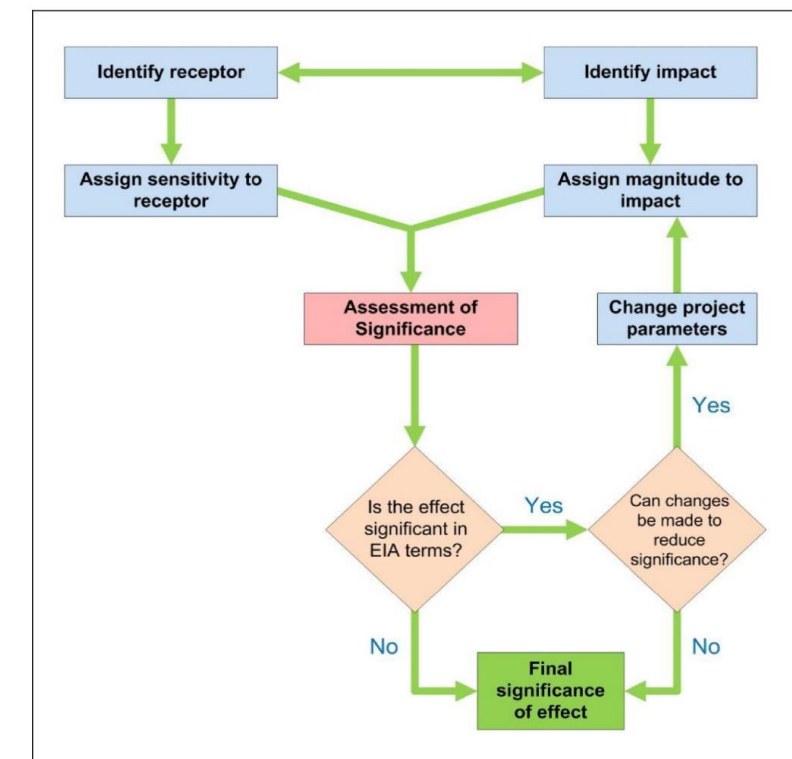


Figure 2.1: Iterative approach to mitigation

## 2.9 Further mitigation and future monitoring

2.9.1 In certain cases, further mitigation measures have been outlined after the assessment of significance within the topic chapters. These cases are where:

- an effect is considered significant in terms of the EIA Regulations, when already including designed-in mitigation measures, and there are additional mitigation measures that could further reduce the level of effect; and/or
- mitigation has been proposed but will require further detail and approval from regulators or agreement with other stakeholders subsequent to the Planning Permission in Principle stage, or is as yet unproven (i.e. the mitigation is not yet proven to be effective at reducing the residual significance of effect).

2.9.2 Where relevant and necessary, future monitoring measures have been set out within the topic chapters.

## 2.10 Residual effects

- 2.10.1 Residual effects are defined as the effects remaining once all further mitigation measures have been taken into consideration. Following the identification of further mitigation measures as described above, the assessment re-evaluates the significance of effect.

## 3 Cumulative Effects Assessment

### 3.1 Introduction

3.1.1 Cumulative effects result from multiple impacts on receptors occurring in combination, either at once or over time, from the proposed development together with other proposed (but not yet completed) development projects that are not included in the baseline environmental data gathered.

3.1.2 This section sets out the approach to the cumulative effects assessment (CEA) in this EIAR. The CEA is reported in each topic area in the EIAR and is brought together in a CEA summary in Chapter 17.

### 3.2 Legislation and guidance

#### Legislation

3.2.1 The EIA Regulations require the EIAR to consider cumulative effects. Specifically, Schedule 4, paragraph 5(e) of the EIA Regulations requires the EIAR to include a description of the likely significant effects of the development on environment resulting from “*the cumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources*”.

#### Guidance

3.2.2 A range of guidance is available on CEA but at present there is no single agreed industry standard method. Relevant guidance from the Planning Inspectorate in England for major infrastructure developments, taken into account in this assessment, is as follows:

- Advice Note 17: Cumulative effects assessment relevant to nationally significant infrastructure projects; and
- Advice Note 9: Using the Rochdale Envelope.

3.2.3 Advice Note 17 provides a clear and systematic approach to cumulative effects assessment, in particular to identifying sites for consideration in the assessment. This guidance identifies the following types of development projects to be taken into account (adapted from the guidance note):

- projects under construction;
- consented applications not yet implemented;

- submitted applications not yet determined;
- local authority planning applications where a scoping report has been submitted;
- projects on a national consenting register of projects, in this case that of the Energy Consents Unit for major energy developments;
- sites identified in the relevant Local Development Plans (and emerging Local Development Plans – with appropriate weight being given as they move closer to adoption); and
- other plans and programmes (as appropriate) which set the framework for future development consent/approval, where such development is reasonably likely to come forward.

3.2.4 The guidance acknowledges that the availability of information on different development types will depend upon the status of the development and that consequently greater weight should be applied in the CEA to those development types with the greatest level of data certainty.

3.2.5 For the purpose of this assessment, cumulative effects have been defined as ‘those that result from additive effects caused by other past, present or reasonably foreseeable actions together with the project itself and from synergistic effects which arise from the reaction between the effects of the project on different aspects of the environment’.

### 3.3 Approach to the assessment of cumulative effects

3.3.1 The approach taken for the CEA has two stages, each with a series of steps, to scope the cumulative assessment and allow for a focussed evaluation of the potentially significant effects of the proposed development in combination with other projects on sensitive environmental receptors.

3.3.2 In summary, the first stage seeks is a search exercise to create a longlist of developments with the possibility of cumulative effects and then to screen this to a short-list, removing developments where on review of the available information, no cumulative effects in any EIA topic area are considered likely.

3.3.3 In the second stage, the short-listed is refined on a topic by topic basis through identifying sensitive environmental receptors which could potentially experience a significant effect as a result of a cumulative development acting together with Kintore Hydrogen Plant. The predicted cumulative effects on these environmental receptors are then assessed for all cumulative developments (where sufficient information is available) relevant to that topic area.

**Stage 1 – identifying the long- and short-list of cumulative projects**

3.3.4 The approach to identifying the long and short-list of cumulative projects has been undertaken has followed that in Planning Inspectorate Advice Note 17, with the following key steps:

- establishing a potential zone of influence (Zoi) of the proposed development;
- undertaking a desk study of planning applications, development plan documents, relevant development frameworks and other available sources to identify a long-list of development projects that fall within the Zoi; and
- screening and shortlisting those developments with potential for cumulative effects based upon temporal scope, the scale and nature of the project, the location of the project and other relevant factors.

3.3.5 Further detail about the method and approach that was adopted to establish the long and short-list of sites is provided in Chapter 17: Summary of Cumulative Effects. The chapter provides the final short-list of projects that were taken forward for consideration in stage two.

**Stage 2 – topic by topic CEA approach**

3.3.6 Following agreement of the short-list of cumulative projects for consideration in the CEA, the approach to evaluating the projects, refining the shortlist for each of the EIA topic areas and assessing the significance of potential cumulative effects has been undertaken as follows.

**Identifying relevant cumulative impacts and receptors affected**

3.3.7 The first step involved a review of the findings of the environmental assessments completed for each of the short-listed projects, where available, or other published information indicating potential development impacts. This information has been evaluated and projects were shortlisted for the topic area CEA if significant effects of the project were predicted or if the available information, in the topic author’s professional judgement, suggested that impacts may cause significant effects in the cumulative scenario. Where sufficient information about a project to consider its potential for cumulative effects is not publicly available, the project has been discounted from further assessment.

3.3.8 For each EIA topic area, the review process also recorded information about the sensitive environmental receptors that were predicted to be affected by the cumulative projects. This review information has been collated to identify where the environmental effects from different projects have the potential to exert cumulative effects on the same environmental receptor(s).

3.3.9 The focus on environmental receptors is important since it allows for a comprehensive assessment of the potential for significant effects from contributing projects as well as from the in-combination effects of different types of impact on the same receptor group. It also focuses the assessment on key groups or types of receptors which are sensitive to cumulative effects rather than on all receptors considered within the individual project EIA topic chapters.

3.3.10 The review of effects and receptors is recorded on a topic by topic basis which allows each EIA topic specialist to consider the potential for cumulative effects by reviewing the contribution of each cumulative project in turn.

3.3.11 The findings and analysis of significant effects and receptors provides the basis for the next stage of scoping the cumulative assessment on a topic by topic basis.

**Assessment of cumulative effects**

3.3.12 The prediction and evaluation of the significance of cumulative effects has been undertaken on a topic by topic basis using the shortlist of relevant projects and affected receptors identified for each EIA topic in the previous step.

3.3.13 The assessments have considered the potential additive cumulative effects in combination with other projects (for example, the loss of two pieces of woodland of 1 ha, resulting in 2 ha cumulative woodland loss) and from potential synergistic effects arising from the interactions of the combined effects (for example, two discharges combine to have an effect on a species not affected by discharges in isolation).

3.3.14 The overall approach to evaluation of impact significance generally follows that adopted for the proposed development in isolation, where the significance of effects on receptors takes account of the magnitude of the predicted impacts and the sensitivity of the receiving environment. Significance is evaluated taking into account the mitigation measures which have already been committed as part of the EIA process for the Kintore Hydrogen Plant development, i.e. based on its residual effects.

3.3.15 In cases where only limited environmental information about other proposed developments is available, specific magnitudes of impacts and degrees of significant effect (such as moderate or major) may not be possible to predict. In such cases, the assessment still seeks to discuss where there is the potential for cumulative effects to occur and to provide details of whether cumulative effects are likely to be significant. A statement is made as to whether the cumulative effects have the potential to be more significant than the effects of the Kintore Hydrogen Plant alone and, if so, whether this direction of change would be adverse or beneficial.

3.3.16 In CEA there are receptors which are common to a number of EIA topic areas, that is their value/importance and sensitivity is influenced and characterised by a range of

physical, biological or social/cultural functions. For example, watercourses may be sensitive to cumulative effects due to their ecological, hydrological and amenity importance. Therefore, in addition to the assessment of cumulative effects from the various projects scoped into the CEA on each receptor group, an assessment has also been made of the potential for different types of impact acting in combination on the same key receptors. These inter-related effects are summarised in Chapter 16: Summary of Inter-related Effects.

- 3.3.17 Where significant cumulative effects are predicted, further mitigation has been considered where possible to avoid, reduce or offset such effects, and residual effects have been predicted.

## 4 Inter-Related Effects

### 4.1 Inter-related effects guidance

4.1.1 It is good practice to consider the inter-relationships between topics that may lead to environmental effects. For example, the separate impacts of noise and habitat loss may have a greater effect upon a single ecological receptor.

4.1.2 The Planning Inspectorate in England provides relevant advice for large infrastructure developments in Advice Note Nine: Rochdale Envelope, which states that:

*“Inter-relationships consider impacts of the proposals on the same receptor. These occur where a number of separate impacts, (e.g. noise and air quality), affect a single receptor such as fauna.”*

4.1.3 The DMRB guidance includes inter-related effects within its definition of cumulative effects. It states that:

*“environmental assessments shall assess cumulative effects which include those from a single project (e.g. numerous different effects impacting a single receptor)”* and *“cumulative effects should be assessed when the conclusions of individual environmental factor assessments have been reached and reported”*.

4.1.4 In this EIAR, cumulative effects with other developments and the cumulative ‘inter-related effects’ of Kintore Hydrogen Plant impact pathways have been summarised in two chapters (16 and 17) to avoid confusion of the causes.

### 4.2 Approach to assessment of inter-related effects

4.2.1 The assessment of potential inter-related effects has been carried out concurrently considering two levels of potential effect:

- project lifetime effects: effects that occur throughout more than one phase of the proposed development (construction and operational) interacting to potentially create a more significant effect upon a receptor than if just assessed in isolation in a single phase; and
- receptor-led effects: effects that interact spatially and/or temporally resulting in inter-related effects upon a single receptor. For example, the effect upon habitat loss or protected species disturbance may be greater when multiple sources of impact interact or combine to produce a different or greater effect upon this receptor than when single sources of impact are considered in isolation. Receptor-

led effects might be short term, temporary or transient effects, or incorporate longer term effects.

4.2.2 The assessment of inter-related effects in the Kintore Hydrogen Plant EIA process has included identifying the potential for individual effects to combine and then incorporating qualitative and, where reasonably possible, quantitative assessments, to conclude as to whether there are additional effects that may be of greater significance than the individual effects acting in isolation.

4.2.3 The term ‘receptor group’ is used to highlight the fact that the inter-relationships assessment has, in the main, not assessed every individual receptor assessed at the EIA stage, but rather potentially sensitive groups of receptors.

4.2.4 These receptor groups are explained in the relevant topic chapters and are summarised in Chapter 16: Summary of Inter-related Effects.

4.2.5 The approach for assessing the potential inter-related effects on each ‘receptor group’ is as follows.

- A review of the ES topic chapters is undertaken to identify receptor groups requiring assessment and the likely effects on each receptor group.
- An assessment is made concerning how individual effects may combine to create inter-related effects on each receptor group. This considers:
  - effects during the construction and operational phases (i.e. ‘project lifetime effects’); and
  - multiple effects on a single receptor (i.e. ‘receptor-led effects’).

4.2.6 Where the significance of an effect within the topic-specific assessment has been identified as ‘no effect’ or ‘negligible’ across all stages of the proposed development, these are considered not to contribute to any inter-related effects.

## References

<sup>1</sup> Scottish Government (2017). Planning Circular 1/2017: Environmental Impact Assessment regulations. <https://www.gov.scot/publications/planning-circular-1-2017-environmental-impact-assessment-regulations-2017/>, accessed 26/04/24.

<sup>2</sup> Scottish Government (2013). Planning Advice Note 1/2013: Environment Impact Assessment. <https://www.gov.scot/publications/planning-advice-note-1-2013-environmental-impact-assessment/pages/1/>, accessed 26/04/24.

<sup>3</sup> Scottish National Heritage (2013). A handbook on Environmental Impact Assessment. <https://digital.nls.uk/pubs/e-monographs/2020/216527997.23.pdf>, accessed 26/04/24.

<sup>4</sup> Planning Inspectorate (2024). Nationally Significant Infrastructure Projects: Advice Notes. <https://www.gov.uk/government/collections/national-infrastructure-planning-advice-notes>, accessed 26/04/24.

<sup>5</sup> Highways England, Transport Scotland, Welsh Government and Department for Infrastructure (2020). Design for Roads and Bridge, LA 104 Environmental assessment and monitoring.

<https://www.standardsforhighways.co.uk/tses/attachments/0f6e0b6a-d08e-4673-8691-cab564d4a60a?inline=true>, accessed 26/04/24.

<sup>6</sup> IEMA (2015). Environmental Impact Assessment Guide to Shaping Quality Development. <https://www.iema.net/document-download/7018>, accessed 26/04/24.

<sup>7</sup> IEMA (2016). Guide to Delivering Quality Development. <https://www.iema.net/download-document/7014>, accessed 26/04/24.

<sup>8</sup> Mitchell, A. (ed) (2020). Demystifying Cumulative Effects, in IEMA Impact Assessment Outlook Journal Vol 7. <https://www.iema.net/download-document/7014>, accessed 26/04/24.

<sup>9</sup> IEMA (2023). Effective Non-Technical Summaries for Environmental Impact Assessment. [https://s3.eu-west-2.amazonaws.com/iema.net/documents/J46585\\_IEMA\\_AdviceNoteGuide\\_V6.pdf](https://s3.eu-west-2.amazonaws.com/iema.net/documents/J46585_IEMA_AdviceNoteGuide_V6.pdf), accessed 26/04/24.