Kintore Hydrogen Plant

Environmental Impact Assessment Report
Chapter 16: Summary of Inter-related Effects

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Kintore Hydrogen
A STATERA COMPANY

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Summary

This document summarises the inter-relationships between environmental impact pathways and any greater combined effects that may result. It draws from the inter-related effects assessments in the individual topic chapters (Volume 2, Chapters 6 to 15) of this Environmental Impact Assessment Report.

1 Introduction and Approach

1.1 Purpose of this chapter

1.1.1 This chapter of the Environmental Impact Assessment Report (EIAR) presents the findings of Environmental Impact Assessment (EIA) work undertaken concerning the potential inter-related effects of the Kintore Hydrogen Plant on sensitive receptors.

1.1.2 Inter-related effects are those that may arise from the combination of more than one impact to a sensitive receptor, either simultaneously or consecutively. It is possible for effects that are non-significant individually to become significant when in combination. On this basis, this chapter considers:

- Environmental effects in combination over the lifetime of the project including the construction and operational phases ('project lifetime effects'); and
- The 'receptor-led effects' which result from a combination of multiple different environmental effects on a single receptor or receptor group.

1.1.3 The environmental impacts of the proposed development through impact pathways are assessed within chapters 6 to 15 of the EIAR, and each chapter has also identified the potential inter-related effects of relevance to it. This summary chapter draws upon the conclusions of the topic chapters.

1.2 Inter-related effects methodology

1.2.1 The approach to assessing inter-related effects follows the approach was set out in Chapter 4: Environmental Impact Assessment Methodology. 'Receptor groups', broadly categorised as follows, have been used to summarise the effects.

- Climate change
- Ecological receptors
- Heritage setting and landscape receptors
- Hydrology and ground conditions
- Residents and visitors
- Road users

1.2.2 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.

Study area

1.2.3 The study area for this chapter is the overlap between respective topic chapter Zones of Influence (ZoIs), which are identified in Chapters 6 to 15.

Impact assessment criteria

1.2.4 The assessment does not aim to assign graduated significance levels to inter-related effects. The assessment is used to identify where there is the potential for inter-related effects to occur, and then a statement is made as to whether the inter-related effects would be worse or better than the effects determined when these were considered alone in the respective topic chapter of the EIAR.

1.3 Topic chapter assessments

1.3.1 A number of the EIAR topic chapter assessments already consider multiple impact pathways for the proposed development's effects on receptors or receptor groups as part of their methodology, and as such, many of the inter-related impacts on those receptors are already inherently assessed. For instance, the effects of noise, visual disturbance, lighting and habitat loss on ecological receptors are already assessed in Chapter 8: Ecology and Biodiversity.

1.3.2 Each topic chapter has also identified further potential inter-related effects and stated either whether these are likely to be worse or better, or whether that assessment is provided through another topic chapter.

1.3.3 As such, Table 2.1 of this chapter first provides a summary of the existing topic-level assessments of inter-related effects. It then identifies where either project lifetime or receptor-led effects are predicted to be better or worse, with potential for greater or additional significant residual adverse effects highlighted in the latter case.

2 Summary of Inter-Related Effects

Table 2.1: Summary of inter-related effects

Topic area	Inter-related effects pathways affecting this topic	Inter-related effects pathways affected by this topic	Summary of project lifetime effects assessment	Summary of receptor-led effects assessment	Potential for significant inter-related effects
Landscape and Visual	• Ecology and biodiversity (landscape planting) • Transport and access	• Archaeology and cultural heritage • Ecology and biodiversity (landscape planting)	The maximum design envelope of single phase construction and then operation of the whole development was assessed and is considered worst-case. If the development is taken forward in phases, with a combination of construction and operational effects at one time, these are anticipated to be generally be less than those reported due to the lesser scale of construction works and opportunity for landscape planting to mature.	The visual and landscape character effects of traffic generation were included within the LVIA. The different habitat types required to provide biodiversity net gain have been incorporated within the landscape planting mitigation proposals and hence already considered in the LVIA.	The receptor groups 'heritage setting and landscape receptors' and 'residents and visitors' are relevant. The LVIA in Chapter 6 identified the potential for significant adverse residual effects during construction at a local scale to landscape character and to the nearest residential properties and users of the B977. During operation, residual effects were considered to be non-significant save for a single group of nearest residences. As noted, the interactions with ecology and transport have already been incorporated within the assessment and mitigation proposals, so no greater receptor-led inter-related effect is predicted. No greater project lifetime inter-related effect than already assessed is predicted.
Archaeology and Cultural Heritage	• Landscape and visual • Ecology and biodiversity (habitat creation) • Noise and vibration	• n/a	These are considered to be no greater than the construction and operational phase effects assessed individually, which were the maximum case for either direct physical impact on resources (due to construction work) or changes in heritage assets' settings (in which any long-term operational impact would be greatest, and not increased by considering short-term construction effects).	The assessment of impacts to the heritage assets has considered how landscape character, visual or noise impacts could affect their settings. Preservation of heritage assets within landscaping and habitat enhancement areas has been incorporated within those mitigation proposals.	The receptor group 'heritage setting and landscape receptors' is relevant. The assessment in Chapter 7 predicted no significant adverse residual effects on archaeology and cultural heritage. As noted, this has incorporated the assessment of inter-related effects on setting and has incorporated preservation of heritage assets in landscaping or habitat enhancement areas. No greater receptor-led inter-related effect is predicted. No greater project lifetime inter-related effect than already assessed is predicted.

Topic area	Inter-related effects pathways affecting this topic	Inter-related effects pathways affected by this topic	Summary of project lifetime effects assessment	Summary of receptor-led effects assessment	Potential for significant inter-related effects
Ecology and Biodiversity	• Landscape and visual (landscape planting) • Noise and vibration • Air quality • Climate change • Soils, geology and water environment	• Landscape and visual (landscape planting) • Archaeology and cultural heritage (habitat creation or enhancement)	Due to the localised nature and short-term duration of the majority of the potential construction phase effects, there is not considered to be potential for effects of greater significance to occur from the inter-relationship of construction and operational phase impacts.	The potential for noise or vibration, air pollutant deposition, changes in hydrology or contamination of soil or water to impact ecological receptors has formed part of the assessment. The potential for climatic changes to affect habitats and receptor sensitivity has been considered as part of the future baseline. The different habitat types required to provide biodiversity net gain have been incorporated within the landscape planting mitigation proposals. As such, all relevant receptor-led inter-related effects have already been incorporated within the assessment.	The receptor group 'ecological receptors' is relevant. The assessment in Chapter 8 predicted no long-term (operational) significant adverse residual effects. A significant adverse residual effect at a site level due to habitat loss was predicted during construction. However, this is proposed to be predicted to be addressed through habitat creation and enhancement (set out in the Outline Biodiversity Enhancement and Management Plan, BEMP) to mitigate adverse effects, which has the potential (subject to approval of details of the final BEMP) to become a beneficial residual effect in the longer term during the operational phase as habitat creation and enhancement providing biodiversity net gain establishes. As noted, all relevant receptor-led inter-related effects have already been incorporated within the assessment and mitigation proposals, so no greater receptor-led inter-related effect is predicted. No greater project lifetime inter-related effect than already assessed is predicted.
Transport and Access	• n/a	• Transport and access • Noise and vibration • Air quality • Climate change • Population and health	The maximum design envelope of single phase construction and then operation of the whole development was assessed and is considered worst-case as this would be the highest peak traffic flows at any one time.	n/a (receptor led-effects where traffic affects other impact pathways are described in the applicable rows; no other impact pathways affect traffic effects).	The receptor group 'residents and visitors' is relevant. Receptor-led effects where traffic affects other impact pathways are described in the applicable rows. No greater project lifetime inter-related effect than already assessed is predicted.
Noise and Vibration	• Transport and access	• Archaeology and cultural heritage • Ecology and biodiversity • Population and health	The maximum design envelope of single phase construction and then operation of the whole development was assessed and is considered worst-case. If the development is taken forward in phases, with a combination of construction and operational effects at one time, these are anticipated to be generally be less than those reported due to the localised nature of construction noise and the lower level of operational noise prior to full development completion.	The noise from traffic generated during construction and operation has been included within the assessment. As noted in the respective rows, noise levels have informed the ecology and biodiversity, archaeology and heritage, and population and health assessments.	The receptor groups 'residents and visitors', 'ecological receptors' and 'heritage setting and landscape receptors' are relevant. The assessment in Chapter 10 predicted no significant adverse residual effects during construction or operation. As noted, all relevant receptor-led inter-related effects have already been incorporated within the assessment, so no greater receptor-led inter-related effect is predicted. No greater project lifetime inter-related effect than already assessed is predicted.

Topic area	Inter-related effects pathways affecting this topic	Inter-related effects pathways affected by this topic	Summary of project lifetime effects assessment	Summary of receptor-led effects assessment	Potential for significant inter-related effects
Air Quality	• Transport and access	• Ecology and biodiversity • Climate change • Population and health	During construction, the air pollutant emitted would be nuisance dust. During operation, the air pollutant emitted would be oxides of nitrogen from the hydrogen flare. Due to the differing nature of these impacts and their applicable air quality standards, and the non-significant (at most minor) effects of each, no project lifetime effects of greater significance than those already assessed are predicted.	The air pollutant emissions from traffic generated during construction and operation has been considered within the assessment and determined to be below the threshold requiring assessment of effects. As noted in the respective rows, air pollutant levels have informed the ecology and biodiversity, climate change and population and health assessments.	The receptor groups 'residents and visitors', 'ecological receptors' and 'climate change' are relevant. The assessment in Chapter 11 predicted no significant adverse residual effects. As noted, the relevant receptor-led inter-related effects have already been incorporated within the assessment, so no greater receptor-led inter-related effect is predicted. No greater project lifetime inter-related effect than already assessed is predicted.
Climate Change	• Transport and access • Air quality	• Potentially all	The combined effect of construction-stage and operational stage greenhouse gas emissions has been assessed, taking into account the atmospheric residence times of these gases through use of 100-year global warming potential factors, to establish whole-life effects. No project lifetime effects of greater significance than those already assessed are predicted.	The potential greenhouse gas emissions from traffic generated by the development and the potential impact of any fugitive hydrogen releases have been screened within the assessment and not predicted to be significant. The potential for climatic changes to affect receptor sensitivity has been considered as part of the future baseline for the relevant topics in their respective assessments.	The receptor group 'climate change' is relevant. The assessment in Chapter 12 predicted a significant beneficial effect on climate change. As noted, all relevant receptor-led inter-related effects have already been incorporated within the assessment, so no different receptor-led inter-related effect is predicted. No greater project lifetime inter-related effect than already assessed is predicted.
Soils, Geology and the Water Environment	• Climate change	• Ecology and biodiversity • Population and health	Given the localised nature and short-term duration of any potential effects, there is not considered to be potential for effects of greater significance to occur from the inter-relationship of construction and operational phase impacts. This has taken into account the potentially phased nature of the proposed development, where an initial phase may be in operation while construction work occurs on further phases.	The potential increase in peak rainfall intensity has been included within the flood risk assessment using a climate change uplift in accordance with SEPA guidance. As noted in the respective rows, potential for hydrological or soil/water contamination impacts have informed the ecology and biodiversity assessment and population and health assessment.	The receptor groups 'hydrology and ground conditions', 'residents and visitors', 'ecological receptors' and 'climate change' are relevant. The assessment in Chapter 13 predicted no significant adverse residual effects. As noted, the relevant receptor-led inter-related effects have already been incorporated within the assessment, so no greater receptor-led inter-related effect is predicted. No greater project lifetime inter-related effect than already assessed is predicted.
Population and Health	• Potentially all	• Socio-economics	It is not considered that the effects reported would interact in such a way that they would create a more significant effect on a receptor than when assessed in isolation for each stage, due to the residual effects via each impact pathway being negligible or not interacting spatially to significantly affect the same receptors.	The Population and Health chapter assesses how the inter-related effects of noise, air quality, traffic generation and employment generation (informed by the evidence from those topic assessments) affect human health and wellbeing, together with changes in access, recreation and perceptions of risk from the proposed development. As such, this approach provides the receptor-led inter-related effects assessment of those impact pathways on human health.	The receptor group 'residents and visitors' is relevant. The assessment in Chapter 14 predicted no significant adverse residual effects on human health and wellbeing from the impacts of the various inter-related environmental and social impact pathways assessed. No greater project lifetime inter-related effect than already assessed is predicted.

Topic area	Inter-related effects pathways affecting this topic	Inter-related effects pathways affected by this topic	Summary of project lifetime effects assessment	Summary of receptor-led effects assessment	Potential for significant inter-related effects
Socio-Economics	• Population and health	• Population and health	The nature of jobs created during the construction and operational phases of the development will be different, and therefore likely to affect different receptors. The combined socio-economic effect of employment and investment during both phases would increase the overall beneficial effect but this is unlikely to be of greater significance than assessed individually.	The evidence of population demographics and sensitivity to socio-economic effects from the population and health assessment has informed the socio-economic assessment. The evidence of direct and indirect employment generation from the socio-economic assessment has informed the population and health assessment.	The receptor group 'residents and visitors' is relevant. The assessment in Chapter 15 predicted significant beneficial residual effects during construction and operation. As noted, the inter-related effect of this with population health and wellbeing has been assessed in Chapter 14, with no greater effect predicted. No greater project lifetime inter-related effect than already assessed is predicted.

3 Conclusion and Summary

3.1.1 Project lifetime and receptor-led inter-related effects have been assessed in the environmental impact topic chapters (6 to 15) in the EIAR. In many cases, the consideration of multiple inter-related impact pathways inherently forms part of the topic assessments; and each chapter has provided a further section identifying the potential for any additional or greater effects likely to be of significance.

3.1.2 A summary of significant residual effects for each impact pathway (topic) in the EIAR is provided in Chapter 18.

3.1.3 The summary of inter-related effects reported here in this chapter has shown that no new significant adverse residual effects or significant increases in adverse or beneficial residual effects are predicted to arise due to the inter-relationships between effects. The residual effects, with consideration of inter-related effects, are therefore considered to remain as summarised in Chapter 18 and reported in detail in the topic chapters..