# 23 IMPACT INTER-RELATIONSHIPS

## 23.1 Introduction

23.1.1 In order to address the environmental impact of the proposed scheme as a whole, this section establishes the inter-relationships between the environmental topics (and sub-topics where appropriate) considered within the ES and their potential influence on physical, environmental and human receptors. The objective is to identify where the accumulation of impacts on a single receptor, and the relationship between those impacts, may give rise to a need for additional mitigation.

23.1.2 Importantly, in addition to this section, the potential for a combination of influences to affect a single receptor is considered in individual topics sections. The Terrestrial Ecology section, for example, considers the potential influence of noise, light and dust on ecological receptors. In addition, the YPL HRA (see **Document 6.3**) considers the potential for different effects to combine in order to influence the behaviour of designated interest features (e.g. sediment transport and water levels). Hence this section should be taken to represent a summary only.

23.1.3 Cumulative impacts across the YPP and with other plans and projects are considered in the Parts 2 and 3 of the CIA (**Document 6.6**).

## 23.2 Identification of potential impact inter-relationships

23.2.1 The information presented in **Table 23-1** identifies where potential impact inter-relationships are predicted occur, and where such inter-relationships have been assessed within the ES. Where no impact inter-relationships have been identified, this is stated.

**Table 23-1 Overview of inter-relationships for each environmental topic considered in the ES**

| **Section 5 – Hydrodynamic and sedimentary regime** | | |
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| **Receptor** | **Inter-relationships** | **Section in which assessed** |
| Consideration of the influence of a project on the hydrodynamic and sedimentary regime takes account of the interactions between potential alterations to waves, tides, currents, water levels and sediment movement in order to determine if a coastal process change is likely. The implications of predicted changes to / effects on the physical regime of the estuary (e.g. sediment accretion / erosion) were then assessed in terms of the significance of the potential impact of the change or effect on other environmental parameters (e.g. marine ecology, water quality, fisheries, etc.) and the findings are set out in the appropriate sections of the ES. In this context the inter-relationships between coastal processes and ecology, water quality, fisheries and marine and coastal ornithology have been directly captured. Further inter-relationships (and the potential need for additional mitigation) in the context of these topics are considered below. | | |
| **Section 6 - Hydrology, hydrogeology and land quality** | | |
| **Receptor** | **Inter-relationships** | **Section in which assessed** |
| Aside from the obvious inter-relationships between hydrology (flood risk), hydrogeology and land quality themselves, no inter-relationships (or adverse interactions) have been identified with respect to these topics and sensitive environmental receptors (i.e. no significant effects on ecology, for example, were predicted). Best practice mitigation | | |

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| has been proposed and no additional mitigation measures are considered to be required over and above this. | | |
| **Section 7 - Marine sediment and water quality (Tees estuary)** | | |
| **Receptor** | **Inter-relationships** | **Section in which assessed** |
| Fish species | Potential reduction in the fisheries resource due to a reduction in water quality | **Section 11** |
| Water quality (offshore) | Potential reduction in offshore water quality due to offshore disposal of dredged arisings | **Section 22** |
| Land quality | Potential reduction in land quality due to the treatment of contaminated (fine) dredged arisings on land | **Section 3, Appendix 3.1** (**Waste Management**) – which includes proposals for the treatment of the contaminated material in an appropriate and licenced facility, so as to avoid the potential for a consequential impact to arise |
| No additional measures are considered to be required in order to mitigate these effects, beyond those measures that are proposed in **Sections 11 and 22** and in **Appendix 3.1**. The use of an enclosed grab to dredge the contaminated sediment would also avoid the potential for affects associated with the contaminated sediment for affect the water body (see **Appendix 4.3 WFD Compliance Assessment**). | | |
| **Section 8 - Marine ecology** | | |
| **Receptor** | **Inter-relationships** | **Section in which assessed** |
| Subtidal habitat | Loss of fish feeding resource due to loss of subtidal habitat | **Section 11** |
| Marine water quality | Potential effect of accidental spillages of fuels and chemicals from vessels on marine ecology | **Section 7** |
| No additional measures are considered to be required in order to mitigate these effects, beyond those measures that are proposed in **Sections 7 and 11**. It is considered that sufficient mitigation would be provided at source. However, a contribution to intertidal habitat creation is also proposed (see **Section 8.8**). | | |
| **Section 9 - Marine and coastal ornithology** | | |
| **Receptor** | **Inter-relationships** | **Section in which assessed** |
| Designated sites / habitats / species | Increased disturbance from noise and vibration | **Section 14** |
| | Reduced air quality (dust) | **Section 13** |

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| | Increased disturbance due to changes in the existing visual environment | **Section 9** and **Appendix 20.4** (**Lighting**) |
| | Loss of feeding habitat | **Section 8** |
| The potential exists for multiple effects on marine and coastal ornithology to arise from the construction and operation of the proposed scheme. However, it is considered that additional mitigation measures, beyond those outlined within the respective sections detailed above are not required, as the combined effect is not predicted to be greater than the individual impacts with mitigation in place (e.g. the screening proposed during the construction phase would provide mitigation for both noise and visual effects). Moreover, the project includes habitat enhancement proposals designed to significantly enhance the feeding, wading and loafing opportunities available to the water birds that currently use the foreshore, lagoon and gut (see **Section 3**) and form part of the Teesmouth and Cleveland Coast SPA water bird assemblage. | | |
| **Section 10 - Terrestrial ecology** | | |
| **Receptor** | **Inter-relationships** | **Section in which assessed** |
| Protected species / habitats | Increased disturbance from noise and vibration | **Section 14** |
| | Reduced air quality | **Section 13** |
| | Increased disturbance due to visual impacts | **Section 20** and **Appendix 20.4** |
| The potential exists for multiple effects on the same terrestrial ecological receptor to arise from the construction and operation of the proposed scheme. However, with the mitigation proposed in the respective sections listed above in place, no significant impacts on terrestrial ecology are predicted; and, in this context, no additive effects are predicted to arise. Hence, additional mitigation is not considered to be required. | | |
| **Section 11 - Fisheries and fishing activity** | | |
| **Receptor** | **Inter-relationships** | **Section in which assessed** |
| Water quality | Reduction in water quality due to spillages or leakages of product or construction materials resulting in an impact on the fisheries resource | **Section 7** (best practice measures to reduce risk) |
| | Reduction in water quality due to sediment re-suspension from dredging and piling resulting in an impact on the fisheries resource | **Sections 5** and **7** |
| Habitats | Loss of / disturbance to intertidal and subtidal habitat (potential fish feeding resource) | **Section 8** |
| The potential inter-relationships presented above have been discussed and fully assessed within **Section 11**. No | | |

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| additional measures are required (above those presented in Section 11) to mitigate for these possible inter-relationships, as the combined impact on fisheries resource is not considered to be greater than the individual impacts. Beyond this, a contribution to intertidal habitat creation is proposed (see **Section 8.8**) | | |
| **Section 12 - Traffic and transport** | | |
| **Receptor** | **Inter-relationships** | **Section in which assessed** |
| Local residents | The relationship between driver delay, severance, pedestrian fear and intimidation, traffic noise and traffic related air quality effects upon local residents in the construction phase | **Sections 13** and **14** |
| Recreational users | The relationship between works to the A1085 roundabout and traffic related impacts on recreational users | **Section 21** |
| Significantly, the predicted increase in traffic on the agreed road junctions was below the threshold for predicted effects on air quality and noise. Hence, neither interactive nor additive effects are predicted to arise in this context. Moreover, the various transport related effects act independently of each other.<br><br>No additional measures are considered to be required in order to mitigate for these effects. It is considered that sufficient mitigation would be provided at source. | | |
| **Section 13 - Air quality** | | |
| **Receptor** | **Inter-relationships** | **Section in which assessed** |
| Designated sites and residential receptors | Potential pollution due to traffic and transport | **Section 12** |
| | Disturbance due to noise and vibration | **Section 14** |
| | Reduction in air quality affecting terrestrial ecology | **Section 10** |
| | Reduction in air quality affecting marine ecology | **Section 8** |
| | Reduction in air quality affecting marine and coastal ornithology | **Section 9** |
| The transport assessment and the air quality and noise & vibration assessments considered the same road links and construction and operational phase scenarios in order to ensure consistency between these assessments (and allow an assessment of interactive effects). Mitigation measures which are aimed at traffic management, reducing traffic flows and minimising congestion, would have a neutral or beneficial air quality and noise/vibration effect on the surrounding highway network. Moreover, as set out above, the threshold for traffic related noise and air quality effects | | |

was not breached.

The potential impact of air pollutant emissions on sensitive ecological receptors and ecological designated sites in the vicinity of the proposed Harbour facilities was also considered and assessed in **Section 13**.

It is notable that the existing receptor locations identified and considered within the air quality assessment could also experience noise impacts as a result of the proposed works. However, implementation of the measures recommended in the air quality assessment and noise assessment would ensure that any in-combination impacts are adequately mitigated (without the requirement for further mitigation).

| **Section 14 - Noise and vibration** | | |
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| **Receptor** | **Inter-relationships** | **Section in which assessed** |
| Residential and ecological receptors | Noise disturbance due to traffic and transport (see Section 13 above) | **Section 12** |
| | Disruption to recreation and access | **Section 21** |
| | Reduction in air quality | **Section 13** |
| | Noise affecting terrestrial ecology | **Section 10** |
| | Noise and vibration affecting marine ecology | **Section 8** |
| | Effects on the landscape and visual environment | **Section 20** |
| | The influence of vibration on underwater acoustics | **Sections 8** and **11** |

Mitigation measures which are aimed at traffic management, reducing total flows and minimising congestion would have a neutral or beneficial effect on the noise environment surrounding the network. Similarly, controls on construction activities to minimise dust releases would not materially affect and could benefit the noise environment. Other mitigation measures targeted at noise reduction would also have a benefit on the ecological environment.

The effects of construction noise on the recreation of residential receptors would be transitory, if of significance in the first instance. Moreover, recreation and access is very limited to the Harbour facilities site.

Thus, it is predicted that the combination of noise and other environmental effects at any one receptor location would not be so significant as to require mitigation beyond that which is proposed in the individual sections listed above.

| **Section 15 - Archaeology and heritage** | | |
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| **Receptor** | **Inter-relationships** | **Section in which assessed** |
| Hydrology and land quality | Disturbance to archaeological remains due to the excavation of soils / advancement of piles | **Section 6** |

The relationship between site excavation and archaeology is directly taken into account in archaeological assessment.

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| By the same measure, excavation needs to take account of land quality and hydrological issues.<br><br>No additional measures are considered to be required in order to mitigate this effect. It is considered that sufficient mitigation would be provided at source (see **Section 15**). | | |
| **Section 16 - Commercial navigation** | | |
| **Receptor** | **Inter-relationships** | **Section in which assessed** |
| Marine water quality | Risk of a navigation incident resulting in a spill | **Sections 6** and **16** (spill and navigation controls) |
| No additional measures are considered to be required in order to mitigate this effect. It is considered that sufficient mitigation would be provided at source. | | |
| **Section 17 - Coastal protection and flood defence** | | |
| **Receptor** | **Inter-relationships** | **Section in which assessed** |
| No significant inter-relationships with other environmental topics (aside from coastal hydrodynamics and hydrology, **Sections 5** and **6** – which can drive changes in flood defence) have been identified with regard to coastal protection and flood defence. No mitigation measures beyond those set out in **Section 17** are required. | | |
| **Section 18 - Infrastructure** | | |
| **Receptor** | **Inter-relationships** | **Section in which assessed** |
| No significant inter-relationships with other environmental topics have been identified with regard to existing infrastructure. No mitigation measures beyond those set out in **Section 18** are required. | | |
| **Section 19 - Socio-economics** | | |
| **Receptor** | **Inter-relationships** | **Section in which assessed** |
| Socio-economic effects are influenced by all other environmental effects and by the proposed works themselves (in terms of the social benefits and potential dis-benefits). These interactions are considered directly in **Section 19**. | | |
| **Section 20 - Landscape and visual environment** | | |
| **Receptor** | **Inter-relationships** | **Section in which assessed** |
| No significant inter-relationships with other environmental topics have been identified with regard to the landscape and visual environment. However, the influence of lighting is considered with respect to ecology in **Sections 8, 9, 10** and **11** above. See also Recreation and Access below. | | |
| **Section 21 - Recreation and access** | | |
| **Receptor** | **Inter-relationships** | **Section in which assessed** |

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| Residential receptors (amenity resource) | Disruption to the amenity resource due to increased noise disturbance during | **Section 14** |
| | Disruption to the amenity resource due to reduced air quality | **Section 13** |
| | Disruption to the amenity resource due to change in landscape and visual environment | **Section 20** |
| No additional measures are considered to be required in order to mitigate noise and air quality effects, beyond those set out in Sections 13 and 14. The influence of alteration to the visual environment to residential receptors should be addressed through good design, as far as possible (see **Section 3**). Pedestrian fair and intimidation is considered as an integral part of the traffic and transport assessment (**Section 12**). | | |
| **Section 22 - Offshore disposal of dredged material** | | |
| **Receptor** | **Inter-relationships** | **Section in which assessed** |
| No significant inter-relationships with other environmental topics have been identified with regard to the offshore disposal of dredged material (however, see Fisheries above). No additional mitigation measures are considered to be required. | | |

## 23.3 Summary of impact inter-relationships

23.3.1 As presented above in **Table 23-1**, a number of potential impact inter-relationships have been identified for particular environmental topics assessed within the ES (and a number have been assessed as an integral part of the ES). However, it is considered that where potential inter-relationships are likely to exist, no additional mitigation measures are required over and above those measures outlined within the relevant sections of the ES.

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