

6.1 INTRODUCTION

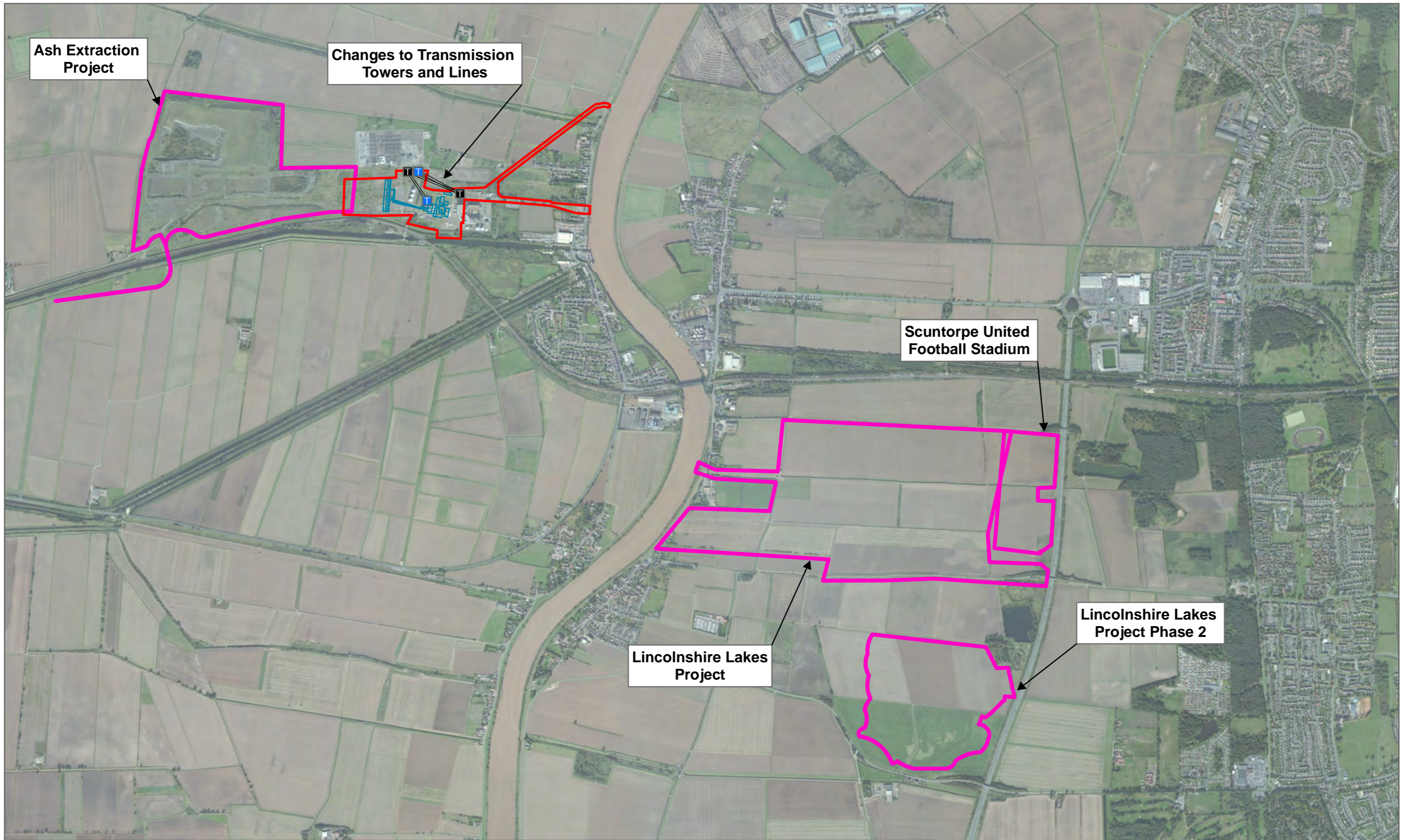
Cumulative and indirect effects result from the combined impacts of multiple projects / plans. Their consideration is important as the impacts of a development in isolation may not be significant but when combined with other projects they may be. The following definitions underpin this assessment.






- Indirect effects are defined as effects that arise from the impact of activities not explicitly forming part of the Proposed Development. In the context of the Proposed Development, the indirect effects arise from the overhead lines connection to the transmission grid, which is not part of the Proposed Development (and therefore the s36 variation application) but are necessary to facilitate operation.
- Cumulative effects are defined as effects that result from incremental changes caused by other past, present or reasonably foreseeable development together with those from the Proposed Development. In this instance the potential cumulative effects arise chiefly from the abovementioned overhead lines, two large residential developments, and a football stadium within the area of influence ⁽¹⁾ of the Proposed Development.

Cumulative and indirect effects have been considered and, where appropriate, assessed under all the subject areas considered in the EIA. Other plans and projects screened into the assessment for this EIA Report were confirmed by North Lincolnshire Council in July 2017 and these are described in *Section 3.7*. Their approximate locations in relation to the Proposed Development are shown on *Figure 6.1*.

In addition to these schemes the Company is considering a project to commercially extract ash material that formed a waste produced by the former Keadby coal-fired power station. The ash is stored on land entirely within the Company's ownership. Although a planning application has not yet been submitted and consent has not been granted, in theory the ash extraction has the potential to have cumulative effects (e.g. construction disturbance, traffic), especially during the construction phase of the Proposed Development. Cumulative effects with the Proposed Development will be considered as part of the application for the ash extraction project and the Company will ensure that the ash extraction activities, should they proceed, are phased to avoid any overlap with construction of the Proposed Development. The potential for cumulative effects is therefore deemed to be very small and is not considered further in this EIA Report.

(1) Area of influence varies according to the type of impact being considered: e.g. 15 km for air quality effects on ecology, in the order of 1 km for noise effects on people.



-  Site Layout (Multishaft)
-  Proposed Development Boundary
-  Current Transmission Tower
-  Proposed Proposed Transmission Tower
-  Transmission Line

 Cumulative Schemes Considered in this EIA

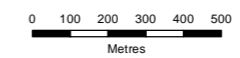


Figure 6.1
Developments Considered in the Cumulative and Indirect Effects Assessment

SCALE: As scale bar

VERSION: A05

SIZE: A3

DRAWN: RC

PROJECT: 0280278

CHECKED: WB

DATE: 21/07/2017

APPROVED: KM



In the assessment of the above potential environmental effects, it is important to include projects / plans that may begin construction or operation within the same period although decommissioning is not considered due to the uncertainty of what activities have the potential for cumulative / indirect effects that far into the future. The cumulative and indirect effects assessment seeks to:

- determine the effect of the Proposed Development together with the other planned changes within defined areas of influence;
- provide an assessment of the likely significance of any changes; and
- suggest mitigation if tenable / deliverable.

6.2 CUMULATIVE EFFECTS

6.2.1 General Considerations

Section 3.7 describes the approach taken to the assessment of cumulative effects and *Table 3.3* sets out the other projects that were screened into the assessment of cumulative effects, together with their relevance for each EIA topic.

The updated assessments in *Chapters 4* and *5* assess cumulative effects as an integral part of their topic assessments. For some topics, such as air quality, existing development such as Keadby I is considered in a cumulative context.

6.2.2 Land and Water

The Lincolnshire Lakes and Lincolnshire Lakes Phase 2 developments on the opposite side of the River Trent are the only schemes identified as having the potential for cumulative effects on the water environment with the Proposed Development within their shared area of influence. Potential cumulative effects could occur in regard to flood plain storage capacity and surface water run-off. The Proposed Development is not likely to increase flood risk at either of the Lincolnshire Lakes sites. Both developments include substantial flood defence works and mitigation for loss of flood plain storage, so there will be no significant cumulative effects in regard to flood plain storage capacity. In addition, both the Lincolnshire Lakes developments and Keadby II will have surface water run-off management systems such that flows will be managed and attenuated to avoid effects on downstream levels and flows, and therefore there will be no cumulative effects.

Abstraction of surface water for operational processes from the Stainforth and Keadby Canal, together with existing demand in the catchment has the potential for long-term effects on water availability, potentially affecting other local abstraction users (such as agricultural use). Discussions with the Environment Agency and the Canal and River Trust around provision of additional water via the canal indicate adequate water availability. Abstraction levels will be controlled through the licence that has now been agreed with the Environment Agency for the Proposed Development. On the basis of the

application of control mechanisms within this regulatory regime, that include consideration of the cumulative effects of all abstractions on other users and the environment, significant cumulative effects are not considered probable.

Discharges to water are discussed in the context of ecological effects in *Section 6.2.3* below.

Comparison of Consented Development with Proposed Development: Cumulative Effects on Land and Water

There are no material changes to cumulative effects on land and water in this EIA Report compared to the ES for the Consented Development.

6.2.3 Ecology and Nature Conservation

Lincolnshire Lakes, Lincolnshire Lakes Phase 2 and Scunthorpe United Stadium

These three planned developments do not have the potential to generate significant effects on the same sensitive ecological receptors as the Proposed Development; therefore there will be no cumulative effects.

Overhead Lines

The overhead lines will not result in significant effects on ecology receptors and will not have cumulative effects on the same sensitive receptors as the Proposed Development.

Potential Significant Cumulative Effects from Emissions to Atmosphere and Cooling Water Abstraction and Discharge

The Information to Inform the Habitats Regulation Assessment (which is attached at *Annex C*) considered European sites which could be affected by the Proposed Development within the maximum area of influence, based on the Proposed Development footprint, air quality modelling, water abstraction and outflow points and range of mobile qualifying species. The area of influence for emissions on protected sites comprised a radius of 15 km of the Site, adopting the worst case distance for effects on the basis of the Proposed Development being a gas fired power plant, as defined by Environment Agency Guidance Note H1⁽¹⁾. Considered sites included:

- Thorne Moor Special Area of Conservation;
- Humber Estuary Special Area of Conservation, Special Protection Area and Ramsar Site; and
- Thorne and Hatfield Moor Special Protection Area;

The potential effects considered and any probable significant cumulative effects are tabulated below.

(1) The Environment Agency for England and Wales (2010) Horizontal Guidance Note H1: Annex F

Table 6.1 Summary of Cumulative Effects on Ecology

Aspect	Potential effects	Probability of Significant effects
The Proposed Development will discharge cooling water via the existing Keadby I pipeline to a sluice adjacent to the River Trent, part of the Humber SAC, and will require a new pumping station abstracting water from the Stainforth and Keadby Canal.	<p>The Humber Estuary SAC supports two mobile qualifying interest features which could occur in the River Trent and the Stainforth and Keadby Canal, (river lamprey and sea lamprey).</p> <p>Numbers of river lamprey and sea lamprey within the River Trent and Stainforth and Keadby Canal are not well known.</p>	<p>It is assumed that limited numbers of lamprey enter the canal due to the physical barrier of the Keadby lock. In addition the intake will be screened for the protection of eels; lamprey will also benefit from this and are physically robust to impingement on intake screens, having good long term survival rates. Cumulative effects with the Keadby I intake screen in the River Trent are not expected to occur.</p> <p>The discharge will be very small compared with the Keadby I discharge (less than approximately 1% of its volume) and the cumulative impacts of the two discharges will not have any significant effects on the ecology of the River Trent or prevent the qualifying interest features of the Humber Estuary SAC from moving along the River Trent.</p>
The effects of the Proposed Development's emissions to atmosphere cumulatively with Keadby 1.	Effects on Natura 2000 sites from oxides of nitrogen (NOx) and deposition of nitrogen and acid, cumulatively with depositions from Keadby 1.	<p>Impacts on air quality and acid and nitrogen deposition to soils from both Keadby I and the Proposed Development operating together have been modelled to assess the worst case scenario.</p> <p>The only pathways for a likely significant effect identified related to elevated long and short term NOx levels acting on habitats / species that are qualifying features in the upper reaches / inner estuary of the Humber Estuary SAC and Ramsar site. The habitats which are likely to be affected are either not sensitive to NOx, or are ones which are influenced more by water based nitrogen loadings as they comprise water habitats, or intertidal habitats which are subject to regular tidal inundation and flushing.</p>

In the unlikely event that the Proposed Development and Keadby I operate simultaneously at full load, under some meteorological conditions criteria for short-term nitrogen oxides concentrations in air and could be exceeded at some local nature conservation sites. However, the active management of the sites is still likely to be the key factor in maintaining the favourable conservation status of the sites. By way of mitigation the Company proposes to actively assist in management of the sites.

Comparison of Consented Development with Proposed Development: Cumulative Effects on Ecology

There are changes to cumulative effects on ecology in this EIA Report compared to the ES for the Consented Development; however, this is mainly due to using the updated version of the ADMS model to predict air quality impacts. A direct comparison of the cumulative effects with Keadby I of the Proposed Development and the Consented Development using the same modelling system for both shows the difference are small and addressed by the original mitigation agreed for the Consented Development.

6.2.4 **Noise and Vibration**

Lincolnshire Lakes, Lincolnshire Lakes Phase 2 and Scunthorpe United Stadium

All of these planned developments are located over 2 km from the Proposed Development and will not have noise effects on the same sensitive receptors as the Proposed Development; therefore there will be no cumulative effects.

Overhead Lines

Noise will primarily derive from the temporary construction period and will not have significant cumulative effects on the same sensitive receptors as the Proposed Development.

Consideration of Keadby I

The cumulative noise levels from the Proposed Development operating together with Keadby I will meet the limits set for the Consented Development at nearby sensitive receptors and will not result in significant effects.

Comparison of Consented Development with Proposed Development: Cumulative Noise and Vibration Effects

There are no material changes to cumulative noise and vibration effects in this EIA Report compared to the ES for the Consented Development.

6.2.5 **Air Quality**

Lincolnshire Lakes, Lincolnshire Lakes Phase 2 and Scunthorpe United Stadium

All of these planned developments are located over 2 km from the Proposed Development and will not have effects on the same sensitive receptors; therefore there will be no cumulative effects.

Overhead Lines

Potential cumulative effects on air quality due to construction traffic associated with the Proposed Development, the two Lincolnshire Lakes schemes and Scunthorpe United Stadium have been scoped out.

Consideration of Keadby I

In assessing the air quality impacts it was assumed that the Proposed Development and the existing plant (Keadby I) will be operating at maximum capacity for 8,760 hours per annum. This approach is the most conservative approach, as in practice the plants will neither operate at full capacity nor continuously. This approach fully addresses potential cumulative impacts on air quality. The assessment concludes that both power stations can operate without causing a breach of any air quality standards designed for the protection of human health.

The potential for cumulative effects on protected sites due to emissions from the Proposed Development and Keadby I on sensitive ecological receptors is summarised in *Table 6.1* above.

**Comparison of Consented Development with Proposed Development:
Cumulative Effects on Air Quality**

There are no changes to the significance of cumulative effects on land and water in this EIA Report compared to the ES for the Consented Development.

6.2.6 *Archaeology and Cultural Heritage*

Lincolnshire Lakes, Lincolnshire Lakes Phase 2 and Scunthorpe United Stadium

All of these planned developments are located over 2 km from the Proposed Development and will not have effects on the same sensitive receptors, including the Isle of Axholme Special Historic Landscape; therefore there will be no cumulative effects.

Overhead Lines

No known features of cultural heritage value will be affected by construction of the overhead lines so there will be no direct cumulative effects. Given the presence of numerous overhead lines in the area, coupled with the industrial use at the site and its surroundings (i.e. the windfarm), the overhead lines will not result in cumulative effects on setting of the same sensitive receptors as the Proposed Development.

**Comparison of Consented Development with Proposed Development:
Cumulative Effects on Cultural Heritage**

There are no material changes to cumulative effects on cultural heritage in this EIA Report compared to the ES for the Consented Development.

6.2.7 *Traffic and Travel*

Lincolnshire Lakes, Lincolnshire Lakes Phase 2 and Scunthorpe United Stadium

The Transport Assessment for the ES made allowances for committed development in the area of influence, including the Lincolnshire Lakes project and the Scunthorpe United Football Club relocation to the Lincolnshire Lakes site.

The Transport Assessment for the Consented Development assessed the potential for cumulative effects by the inclusion of traffic from the other projects (as derived from Transport Assessments conducted for the two developments) within the baseline assumptions of the model. This approach allowed the capacity of the road network to be tested and concluded that significant cumulative effects related to congestion and safety were not

probable. The relocation of the football stadium to the Lincolnshire Lakes Phase 2 site is not expected to affect the outcome of the assessment, as the sites are very close to each other and traffic from the stadium will use the same road network as previously considered.

The Lincolnshire Lakes Phase 2 development will represent another source of construction traffic in the area. The scale of the development is slightly smaller than that of the Phase 1 development, and it is likely to generate a similar or lower level of construction traffic. Construction traffic from the Proposed Development will primarily use the road network to the west of the River Trent, while traffic from the Lincolnshire Lakes Phase 2 development will be mainly to the east of the river. It is not likely that there will be significant cumulative effects with the Proposed Development.

Overhead Lines

The construction traffic associated with the overhead lines is unlikely to result in significant cumulative effects with the Proposed Development.

Comparison of Consented Development with Proposed Development: Cumulative Effects on Traffic and Travel

There are no material changes to cumulative effects on traffic and travel in this EIA Report compared to the ES for the Consented Development.

6.2.8 Socio-economic Characteristics

Both the Lincolnshire Lakes developments and the Scunthorpe United stadium have the potential for cumulative effects with the Proposed Development. These proposed housing and commercial developments, with associated commercial and community land uses, are anticipated to create a total of approximately 1,000 jobs during their initial construction phases. Many of the skills required of construction contractors for these developments will be different to those skills required for construction of Keadby II. Significant effects from the Proposed Development are not anticipated in relation to pressure on local services, accommodation provision or bed space demand; therefore cumulative effects are also not anticipated.

Comparison of Consented Development with Proposed Development: Cumulative Effects on Socio-economic Characteristics

There are no material changes to cumulative socio-economic effects in this EIA Report compared to the ES for the Consented Development.

6.2.9 Landscape and Visual

The Guidelines to Landscape and Visual Impact Assessment, Third Edition stresses that the assessment of cumulative effects should be proportional and reasonable to the nature of the Proposed Development and that it is important to remember that the emphasis in EIA is on describing the likely significant effects rather than a comprehensive cataloguing of every conceivable effect.

In terms of incremental change it should be noted there has been power generation development on this site since 1952; the initial development took the form of the much larger coal-fired power station with a bigger footprint. The wider area now contains the Keadby I Power Station, multiple overhead lines and associated pylons and a significant number of wind turbines in the immediate area. The Proposed Development is unlikely to make any material contribution to overall cumulative effects on landscape and will only have a small cumulative effect on views from some close viewpoints to the north and south.

Lincolnshire Lakes, Lincolnshire Lakes Phase 2 and Scunthorpe United Stadium are all located more than 2 km to the east (and slightly south) of the Proposed Development at its closest point. Considering the location of the Proposed Development and surrounding infrastructure in its vicinity, it is unlikely that the Proposed Development will have significant cumulative visual effects with any of these schemes in terms of (a) affecting the same Landscape Character Area; (b) both being seen prominently in the same views by receptors.

Given the presence of numerous overhead lines in the area, coupled with the industrial use at the site and its surroundings (i.e. the windfarm), the overhead lines will not result in cumulative effects on the same sensitive receptors as the Proposed Development.

**Comparison of Consented Development with Proposed Development:
Cumulative Landscape and Visual Effects**

There are no material changes to cumulative landscape and visual effects in this EIA Report compared to the ES for the Consented Development.

6.3

INDIRECT EFFECTS

In order to operate, the Proposed Development will require connection to the National Grid Electricity Transmission System, directly to the north of the Site. This will involve realignment of one of Keadby I's existing overhead lines to allow connection of the Keadby II power station to the main Keadby 400kV NG substation. These works have received consent under Section 37 of the Electricity Act 1989. The overhead lines can be regarded as an indirect (or induced) result of the Proposed Development, as the need for the lines is a direct result of the Proposed Development and leads to their own specific impacts.

The induced development will involve the following main activities:

- construction of a new transmission tower approximately 95 m to the east of the existing transmission tower, realignment of the existing Keadby I power line and connection to the new tower;
- construction of a new transmission tower to the immediate north of the Keadby II power station; and connection of a new section of overhead power line from the tower to the existing transmission tower currently used for Keadby I.

It will take place on land owned by either the Company or National Grid, with no existing sensitive land use or nature conservation value. The closest residential receptor is a single building (Red House, owned by the Company) located approximately 130 m to the northeast of the Site.

In terms of likely significant effects, the following were the main conclusions of the environmental screening exercise undertaken by the Company to support the application for Section 37 consent.

- Only small physical changes will occur and will be confined to land owned by either the Company or National Grid.
- The construction and operation of the overhead lines will not consume significant quantities of natural resources that are not already in the supply chain or which are in short supply.
- No significant effects arising from use of resources by the construction and operation of the overhead lines are anticipated to occur.
- There will be no substances that can result in a risk to human health used in the construction or operation of the overhead lines.
- During construction small quantities of waste will be generated that will be recycled or disposed of using standard waste management practices. No significant effects arising from waste management are anticipated to occur.
- No significant effects from emissions to air are anticipated to occur.
- The construction will be carried out within the existing legislative requirements of the Control of Pollution Act 1974 and apply best practicable means to minimise noise and vibration.
- Given the location of the construction works within and adjacent to the existing Keadby I site, noise and lighting from the works are unlikely to represent a significant change within the context of existing and other proposed activities at the site.
- Adherence to Environment Agency guidance and good site construction practices will ensure that no significant effects on land or water resources will occur during construction.
- There will be no significant economic or demographic changes as a result of the proposed development.
- The proposed development is confined within and adjacent to the existing Keadby I site. Given the low level of construction activity required, it is not anticipated that designated sites located away from the development will be affected.
- No significant effects on hydrology and surface water and to ecological populations reliant upon them are likely due to their distance from the construction activities and control measures in place.

- The activities being undertaken as part of the proposed development are not anticipated to significantly affect any protected, important or sensitive species of fauna or flora.
- No significant effects on surface or groundwater resources are likely due to the distance from the construction activities and control measures in place.
- Existing large infrastructural elements (including the Keadby I power station, and nearby wind turbines) contribute to visual clutter and reduce the sensitivity of the area. Within the context of the existing Keadby I power station to the southeast, the National Grid facility to the north, and the Proposed Development to the south, it is not anticipated that the visual impact of the construction and operation of the overhead lines will be significant. Due to the location of the proposed overhead lines, they will cause little to no visual impact.
- The construction activities for the proposed overhead lines and any associated traffic will not result in any significant changes to the accessibility of the road passing through the Keadby I site. The proposed overhead lines will generate very low levels of traffic during construction, and there will be no change in traffic levels during operation.
- Construction of the proposed overhead lines will involve relatively minimal ground works. Prior to construction, site investigation work will be conducted within planned locations of groundworks that will include an archaeological watching brief. If evidence of buried archaeology is discovered, construction work will be stopped while a plan for the preservation of the remains, if required, is developed.
- Prior to construction of the proposed overhead lines, soil investigation works will be carried out at the location of any planned ground disturbance. Contaminated soils uncovered during this process or during construction will be isolated, removed and disposed of appropriately.
- The nature of the proposed overhead lines means there is limited risk from flooding. If flooding were to affect the Keadby I area, it is anticipated that the water would flow around the bases of the transmission towers with little impact on the structures and no contact with critical elements, and no significant environmental effects.

In conclusion there will be no significant indirect effects as a result of the Proposed Development.

Comparison of Consented Development with Proposed Development: Indirect Effects

There are no material changes to indirect effects in this EIA Report compared to the ES for the Consented Development.