

Environmental Statement: Volume I

Chapter 17: Cumulative & Combined Effects

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17.0 CUMULATIVE AND COMBINED EFFECTS

17.1 Introduction

17.1.1 This chapter of the Environmental Statement (ES) addresses the potential for combined or cumulative effects to occur as a result of the Proposed Development. It draws on the assessment of impacts provided in Chapters 6 to 16 of ES Volume I, and information relating to other known developments that are proposed within the 15km study area, as outlined in Table 17.1 below. This assessment does not consider developments that are already constructed and operating for the assessment of cumulative effects, as existing operational facilities are accounted for in the baseline conditions established for the main assessments referred to above.

17.1.2 Within this Chapter, the following terms have their associated definitions:

- **Combined effects** may arise where several different effects resulting from the Proposed Development (e.g. decrease in air quality, increase in noise disturbance) have the potential to affect a single receptor.
- **Cumulative effects** have the potential to arise where two or more developments are proposed within close enough proximity to lead to effects of the same type (e.g. air quality) accruing over time and space on the same receptor.

17.1.3 The cumulative effects assessment therefore considers other proposed developments that are in the public domain, such as planning applications registered with the local planning authorities and already consented developments, but which are not yet constructed or operational. It has been produced in accordance with PINS Advice Note 17 Cumulative Effects Assessment (December 2015).

17.1.4 The chapter is supported by Figure 17.1 (ES Volume II, Application Document Ref. 6.3).

17.2 Legislation and Planning Policy Context

17.2.1 The requirement for cumulative and combined impact assessments is clearly stated in the relevant European Directive and domestic legislation as detailed below:

- European Directive 2011/92/EU on the assessments of effects of certain public and private projects on the environment requires an assessment of; *“the direct effects and any indirect, secondary, cumulative, short, medium and long term, permanent or temporary, positive and negative effects of the project”*; and
- Paragraph 5 of Schedule 4 to the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (‘the EIA Regulations’) requires:

“A description of the likely significant effects of the development on the environment resulting from [...] –

(e) 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”

17.2.2 In addition, the National Policy Statements (NPS) are the primary basis for the assessment and determination of applications for nationally significant infrastructure projects (NSIPs), such as the Proposed Development. The Overarching National Policy Statement on Energy EN-1 (NPS EN-1) states that:

“In considering any proposed development, and in particular when weighing its adverse impacts against its benefits, the [Secretary of State] should take into account:

- *its potential benefits including its contribution to meeting the need for energy infrastructure, job creation and any long-term or wider benefits; and*
- *its potential adverse impacts, including any long-term and cumulative adverse impacts, as well as any measures to avoid, reduce or compensate for any adverse impacts.”*

17.2.3 Section 4.2 of NPS EN-1 continues:

“When considering cumulative effects, the ES should provide information on how the effects of the applicant’s proposal would combine and interact with the effects of other development (including projects for which consent has been sought or granted, as well as those already in existence). [...]

The [Secretary of State] should consider how the accumulation of, and interrelationship between, effects might affect the environment, economy or community as a whole, even though they may be acceptable when considered on an individual basis with mitigation measures in place.”

17.2.4 Further guidance on the process for the cumulative effects assessment (CEA) for NSIPs is provided by; “*Advice Note 17: Cumulative effects assessment relevant to nationally significant infrastructure projects*” (December 2015).

17.3 Assessment Methodology and Significance Criteria

Impact Assessment and Significance Criteria

17.3.1 There is no standard methodology for assessing cumulative and combined effects and the extent to which the effects of other developments can be assessed quantitatively depends on the level of information available about the other developments. Such effects are, therefore, assessed by professional opinion, although matrices and modelling are used where appropriate and where enough information regarding the other developments exists. Where environmental assessment information regarding other developments is not available or uncertain, the assessment is necessarily qualitative.

17.3.2 When considering cumulative and combined effects, the mitigation measures as set out in Chapters 6 to 16, ES Volume I have been taken into account, i.e. only residual (after mitigation) effects are discussed in this Chapter.

17.3.3 Cumulative and combined effects are assessed to be neutral, minor, moderate or major. Moderate or major effects are considered to be significant, using the methodologies outlined in each technical Chapter.

Cumulative Effects

17.3.4 Cumulative effects are those that have the potential to arise where two or more developments are proposed within close enough proximity to cause effects of the same type to accrue over time and space..

- 17.3.5 The Planning Inspectorate Advice Note 17 'Cumulative effects assessment relevant to nationally significant infrastructure projects' (Ref 17-1) sets out a four stage approach to assessment of cumulative effects:
- Stage 1: identify the Zone of Influence and identify long list of other developments;
 - Stage 2: identify and short list other developments for cumulative assessment;
 - Stage 3: undertake information gathering; and
 - Stage 4: assessment.
- 17.3.6 This approach has been followed in undertaking the cumulative effects assessment presented in this chapter.
- 17.3.7 In order to assess the potential for cumulative effects to arise in relation to these developments, where a planning application has been made, information presented within the ES or environmental reports for the development has been gathered and reviewed. For developments that are known to be proposed (either via screening or scoping opinion requests submitted to the local authority/ Planning Inspectorate or following presentation of information in the public domain) but where an ES (or other environmental reports) has not yet been prepared or submitted, any readily available information has been utilised. This includes communication with local authorities, public consultation material and material available via the internet.
- 17.3.8 Following information gathering from available sources, the effects of the Proposed Development have been considered in conjunction with the potential effects from other projects or activities that are both reasonably foreseeable in terms of delivery (e.g. have planning consent or are in the planning process) and are geographically located in a position where environmental impacts could act together to create an effect that is more (or less) significant overall than the effect of individual developments alone.
- 17.3.9 Operational impacts are generally long-term, and whilst construction impacts are often short term and temporary, they can potentially be of a large magnitude. Consequently, when cumulative effects that could be associated with construction at one site and operation at another are considered, the difference in duration and reversibility is considered within the assessment.
- 17.3.10 In assessing cumulative effects, it is appropriate to also acknowledge the relative contributions that different projects make to a cumulative effect, and carefully consider whether a cumulative effect occurs at all. For example, effects associated with a large scale project may be significant, and whilst a smaller project may contribute to this effect, the cumulative effect of the smaller project and the larger project is only considered to be significant if it is of greater significance than the effect of either project in isolation.
- 17.3.11 Where applicable, the assessment considers all other known developments that have potential for cumulative effects with the Proposed Development together, as a worst case.

Study Area

- 17.3.12 Cumulative effects are generally unlikely to arise unless the other development sites are in close proximity to the site in question, recognising that the appropriate distance varies with the nature of the potential effect and the nature of the receptor, e.g. cumulative air quality effects could occur for developments a greater distance apart than noise effects. Construction projects are, as a matter of routine, required to employ regulatory and

managerial controls and employ good practice to mitigate construction impacts wherever possible. Nevertheless, consideration has been given to the presence of common pathways from nearby developments to a single receptor, and whether there is potential for impacts of a sufficient magnitude whereby a particular receptor could experience cumulative effects.

17.3.13 The study area for the consideration of cumulative and combined effects has been developed taking into account the predicted extent of impacts associated with the Proposed Development, and with the point at which the associated effects become insufficient to contribute in any meaningful way to those of another development.

17.3.14 The study area for each environmental assessment topic is defined in the relevant technical Chapter (Chapters 6 – 16). Information on the likely extent of impacts associated with other developments in the area has also been considered. The Zones of Influence (ZOIs) adopted for the purposes of the Chapter are shown in Table 17.1 below.

Table 17.1: Zone of Influence Table

Environmental Topic	Zone of Influence
Air Quality	Construction: 350m ZOI for emissions and construction dust (and 500m along roads from the site entrance, for dust trackout). Operation: 15km ZOI for international statutory designated ecology sites 2km for non-statutory designations Refer to Chapter 6: Air Quality for more information.
Noise and Vibration	Construction and Operation: 1km ZOI Refer to Chapter 8: Noise and Vibration for more information.
Traffic and Transport	The ZOI for Construction and operation is related to the road network in direct connectivity to the site rather than a set distance from the site. Specifically the road links and junctions listed below. Refer to Chapter 7: Traffic and Transport for more information. <ul style="list-style-type: none"> ● Rosper Road; ● Humber Road; ● Marsh Lane; ● A160 Humber Road; and ● A160 / A180 interchange. ● Rosper Road/ Marsh Road ● Humber Road/ Manby Road/ A160 roundabout ● A160/ Habrough Road roundabout
Ecology and Nature Conservation	Construction and Operation: A maximum ZOI of 15km has been applied: 15km for air quality impacts to international statutory designated sites; 2km ZOI for national and locally designated sites; and 500m for ponds. Refer to Chapter 9: Ecology for more information.
Landscape and Visual Amenity	Construction and Operation: 2km (landscape) and 5km (visual amenity) Refer to Chapter 9: Landscape and Visual Amenity for more information.
Cultural Heritage	Construction and Operation: 3km Refer to Chapter 11: Cultural Heritage for more information
Ground Conditions and Hydrogeology	Construction and Operation: 2km ZOI Refer to Chapter 12: Ground Conditions and Hydrogeology for more information.
Water Resources, Flood risk and Drainage	Construction and Operation: 2km ZOI Refer to Chapter 13 Surface Water, Flood Risk and Drainage for more information

- 17.3.15 The largest study area, for the air quality and ecology assessments, has defined the ZOI within which the search for other developments has been undertaken for the cumulative assessment. In accordance with the approach discussed in that Chapter; other developments that could impact on receptors identified within a 15km ZOI of the Proposed Development Site have been identified (as appropriate to the environmental aspects listed above).
- 17.3.16 Regarding climate change, Paragraph 5(f) of Schedule 4 to the EIA Regulations, requires a description of the likely significant effects resulting from the “*nature and magnitude of greenhouse gas emissions...*” Chapter 15: Sustainability and Climate Change of this ES provides details of the initial lifecycle assessment of the greenhouse gas emissions for the construction and operation of the Proposed Development. Cumulative impacts in this regard (i.e. the consequences of the emissions of greenhouse gases from multiple projects) are well-documented, are considered at a macro level by the Government (including through the Climate Change Act 2008 and its related emissions targets) and are thus not considered within this Chapter.
- 17.3.17 Cumulative impacts relating to “*the vulnerability of the project to climate change*” are similarly not considered here. Chapter 15: Sustainability and Climate Change of this ES outlines the measures undertaken to ensure the climate change resilience of the Proposed Development. There are no other developments that are considered to have the potential to impact on the resilience of the Proposed Development, which has been designed (to date) with allowances for climate change built in to the relevant assumptions (e.g. flood risk assessment). Similarly, it is not considered that the Proposed Development has the potential to impact on the resilience of other developments. Such allowances are guided by the relevant authorities (e.g. Environment Agency) and therefore it can reasonably be assumed that any other development will also be required to make appropriate provisions such that the potential for cumulative effects will be negligible.

17.4 Consultation

17.4.1 A summary of consultation relevant to the cumulative and combined effects assessment is provided in Table 17.2 below.

Table 17.2: Consultation Summary

Consultee	Date	Summary of Response	Addressed
Secretary of State	Scoping Opinion (July 2018)	<p>The Applicant's attention is drawn to the Inspectorate's Advice Note 17: Cumulative Effects Assessment, which sets out the recommended approach to such assessments.</p> <p>The Scoping Report does not explain or justify the method used to identify other projects for consideration in the cumulative assessment. The Inspectorate notes that the Applicant has only included other generating stations in this list, suggesting it has not considered other types of development for the assessment.</p> <p>For example, Able Marine Energy Park Development Consent Order (DCO), the Able Logistics Park and a planning application for a car storage facility on land north of Marsh Lane (PA/2017/2141) are developments which are likely to generate HGV traffic and should be included.</p>	<p>Used as the basis for this assessment.</p> <p>Methodology included as part of this Chapter.</p> <p>These developments have been included as part of the cumulative assessment.</p>
Secretary of State	Scoping Opinion July 2018	<p>In order to determine whether the Proposed Development shares common sensitive receptors with other projects, it is recommended that the ES establishes zones of influence for each aspect considered in the ES.</p> <p>The Inspectorate recommends that the list of plans and other development to be considered within the assessment is agreed with the local authority.</p> <p>The Applicant intends to mitigate the cumulative effects arising from the construction of the VPI Energy Park 'A' through construction scheduling. The ES should include a full description and assessment of efficacy of the mitigation measures, and any plans should be sufficiently developed and secured in order to provide confidence in the assessment conclusions in the ES.</p>	<p>The Zones of Influence are included within each chapter where cumulative effects have been considered.</p> <p>Consultation with the local authority has been undertaken (see further below). The list of projects referred to in this section, and the potential for cumulative effects, have been reviewed and the relevant assessments updated.</p> <p>While the construction schedules for VPI Immingham Energy Park A and the Proposed Development are not anticipated to overlap, consideration has been given in this chapter to the efficacy of mitigation measures in the unlikely event that overlap does occur.</p>

Consultee	Date	Summary of Response	Addressed
SoS	July 2018	It is important that the effects of construction traffic for the proposed development are properly assessed given existing HGV traffic in the area. Aside from impacts on existing road users (particularly given high numbers of HGV movements), there is the potential for cumulative impacts as development is carried out on sites in the area which have consent or are pending determination, and which could be built out concurrently.	C.GEN Killingholme has been included as a cumulative scheme.
North East Lincolnshire Council	October 2018	North East Lincolnshire Council provided a further list of schemes to be assessed.	The list of additional schemes provided has been assessed for inclusion.
North Lincolnshire Council	October 2018	North Lincolnshire Council have confirmed that there are no further schemes that they are aware of beyond those already identified.	No action required.

17.5 Cumulative Effects Assessment (Stages 1-3)

17.5.1 An initial screening exercise (Stage 1 of the cumulative effects assessment) was undertaken to identify potential major developments within the vicinity of the Proposed Development for consideration within the cumulative effects assessment. This process identified potential major developments that have the potential to impact on receptors within a 15km radius of the Proposed Development to create an initial long list for consideration. The long list was subsequently screened based on the potential for impact and a refined short list was developed for further, more detailed consideration (Stage 2 of the cumulative effects assessment). The short list was presented in the Scoping Report (Appendix 1A in ES Volume III, Application Document Ref. 6.4.1) and has been updated for this ES following consultation with host local authorities. This consultation outlined the latest information available and led to the identification of the following new schemes for inclusion in the short list:

- CPL Pilot Charcoal Plant;
- Stallingborough Interchange;
- South Humber Bank Energy Centre;
- Brocklesby Estate;
- Engie NEL Energy Park;
- 20MW Flexible Gas Generation Plant;
- KBC Logistics Ltd;
- Hornsea Offshore Wind Farm Project One Lagoons;
- Hornsea Offshore Wind Farm Project One (Zone 4) DCO;
- Kiln Lane Tyre Recycling Facility;

- South Killingholme Car Storage and Distribution Facility; and
- Stallingborough CHP.

17.5.2 The short list of other developments identified at Stage 2 of the cumulative effects assessment, as included in the Scoping Report (Appendix 1A in ES Volume III, Application Document Ref 6.4), and updated based on comments received to date, are presented in Table 17.3 below, with details of their current status and comments regarding their temporal scope in relation to the temporal scope of the Proposed Development.

Table 17.3: Cumulative Scheme Short list

Ref number	Scheme	Distance from Site	Status	Description
1	VPI Energy Park 'A'	Adjacent	Consented	Gas-fired power station of up to 49.9MW
2	Able Marine Energy Park DCO	Adjacent	Under construction	Port development
3	Marsh Lane Car Storage	Adjacent	Pending decision	Car storage facility
4	Killingholme PS	1.5km	Consented	14 gas reciprocating engine generators and ancillary equipment
5	North Killingholme Power Project DCO	2km	Consented	470MW power station
6	Able Logistics Park	2.5km	Consented	Site for warehousing, external storage
7	AMP Generator	5km	Consented	Standing reserve power plant
8	North Beck Energy Centre	5km	Consented	Energy recovery facility
9	CPL Pilot Charcoal Plant	2.5 km	Consented	Erection of a pilot charcoal manufacturing plant
10	Stallingborough Interchange	5 km	Consented	Development of 62ha Business Park at Stallingborough.
11	South Humber Bank Energy Centre	7 km	Pending consideration	Energy from waste facility
12	Brocklesby Estate	3.4 km	Pending consideration	Proposed residential development
13	Engie NEL Energy Park	4.5 km	Pending consideration	Energy Park including 32ha solar farm (18mw) and batter storage (24mw)
14	20MW Flexible Gas Generation Plant	5 km	Pending consideration	10 x 2 MW flexible gas generation plant (total of 20MW) at disused Immingham Railfreight Terminal
15	KBC Logistics Ltd	2.5km	Pending decision	Workshop, offices and lorry park.
16	Hornsea Offshore Wind	1.6km	Consented	9 lagoons for storage of water for the

Ref number	Scheme	Distance from Site	Status	Description
	Farm Project One Lagoons			Hornsea Project One Offshore Windfarm.
17	Hornsea Offshore Wind Farm (Zone 4) Project One DCO	Adjacent	Consented	Three offshore wind generating stations with a total capacity of up to 1,200 MW.
18	Kiln Lane Tyre Recycling Facility	5 km	Consented	Waste tyre to energy pyrolysis plant at disused Immingham Railfreight Terminal.
19	South Killingholme Car Storage and Distribution Facility	370m	Pending decision	Car storage and distribution facility.
20	Stallingborough CHP	5 km	Consented	Installation of 4 CHP boilers and erection of associate flues at Selvic Shipping Warehouse in Stallingborough.

17.5.3 All the developments identified in Table 17.3 are considered to be of a nature and proximity to the Site to have the potential to generate significant cumulative effects when considered in context with the Proposed Development and the ZOIs defined in Table 17.1. The location of the other developments in relation to the Site is shown in Figure 17.1 (ES Volume II, Application Document Ref. 6.3).

17.5.4 The developments identified above have been assessed for potential cumulative effects in conjunction with the Proposed Development.

17.6 Cumulative Effects Assessment (Stage 4)

Air Quality

Construction Effects

17.6.1 The assessment of construction air quality effects at sensitive receptors has considered the emissions associated with the Proposed Development together with construction of the other proposed developments listed in Table 17.3 including:

- The emissions from dust generated by demolition and construction activities;
- The emissions from construction Non Road Mobile Machinery (NRMM); and
- The emissions from construction road traffic.

17.6.2 The ZOI for construction dust and NRMM is limited to within 350m of the Proposed Development.

17.6.3 The following committed developments have been identified as having the potential to affect air quality:

- VPI Energy Park A;
- Killingholme Power Station; and

17.6.4 North Killingholme Power Project DCO. The construction phases of the VPI Immingham Energy Park A and the Proposed Development are unlikely to occur concurrently, and both are controlled by the same parent company entity that can manage the timings of the two developments. Even if the construction phases were to overlap, similar Construction Environmental Management Plans (CEMP) would be utilised to manage and control air emissions during construction such that the potential cumulative effects would be not significant.

17.6.5 Given the distances from the Proposed Development to the other developments identified in Table 17.3, and the distances to identified sensitive receptors, there are no planned developments which could have cumulative effects as a result of construction.

17.6.6 The impacts of construction traffic emissions to air from the Proposed Development have been assessed and concluded to be imperceptible with a negligible adverse effect. Given the magnitude of the predicted impacts, it is therefore considered that the cumulative impacts with other developments would be minimal.

Operational Effects

17.6.7 The impacts of the Proposed Development have been assessed through dispersion modelling, together with the impacts of the adjacent VPI Immingham Energy Park A in order to determine the overall impacts of both developments.

17.6.8 Receptors R1 to R11 (identified in Chapter 6: Air Quality of the ES) are common between the air quality assessments carried out separately for each of the Proposed Development and the VPI Immingham Energy Park A. The scope of this cumulative effects assessment has therefore considered the potential impacts to these receptors.

17.6.9 The potential short term cumulative effects, at all receptors, are dominated by the emissions from the gas engine sources of the VPI Immingham Energy Park A, due to their lower stack heights, lower emission temperature and higher NO_x emission concentration. For example, the maximum predicted short term process contribution of NO₂ for the Proposed Development is 4.4µg/m³ (at R3, Station House) compared with the equivalent prediction of 20.9µg/m³ from the worst case operation of the VPI Immingham Energy Park A.

17.6.10 The short term impacts of the gas engines resulted in a minor adverse effect at the worst case human health receptor, based on the effect descriptors used in the ES for the VPI Immingham Energy Park A¹, however in combination with background concentrations there was no exceedance of the short-term NAQS objective predicted and it was considered that the effects were not significant.

¹ Identical effects descriptors have been used for the air quality assessment for the Proposed Development, as presented in Chapter 6: Air Quality of this ES.

- 17.6.11 Whilst, given the differing dispersion parameters (e.g. temperature, volume) of the emissions from each of the Proposed Development and the VPI Immingham Energy Park A, it is unlikely that the maximum process contribution from each development would occur at any receptor simultaneously, a worst case assessment of the addition of the two predicted maximum contributions can be undertaken through the addition of the individual predicted process contributions at each common receptor.
- 17.6.12 For all common receptors (both human health and ecological), the effect descriptor will not change from those determined for the VPI Immingham Energy Park A through the addition of the process contribution from the Proposed Development. Therefore, the cumulative effect of the operation of the two developments will result in no additional impact over that described in the ES submitted for the VPI Immingham Energy Park A is predicted for the Proposed Development.
- 17.6.13 The long term impacts show an imperceptible increase over the results predicted for the Proposed Development, in isolation, and there is no overall increase in the Predicted Environmental Concentration over that predicted for the VPI Immingham Energy Park A, in isolation, which is a negligible effect that is considered to be not significant.
- 17.6.14 An assessment has been made of the operational Proposed Development air quality effects at sensitive receptors in combination with other proposed developments, through consideration of the nature, location and scale of these other developments.
- 17.6.15 The Killingholme Power Station gas engines are located approximately 1.5km to the North of the Site and are anticipated to run for a maximum of 1,500 hours per year.
- 17.6.16 Due to the prevailing wind coming from a south-westerly direction, the separation of the two sites and the proposed stack heights for each development, the area of peak impact from both developments will not occur at the same location. The dispersion pattern from the stack of the Proposed Development, as shown in Figures 6.3 and 6.4 in Volume II of the ES (Application Document Ref. 6.3), shows that the impacts from the Proposed Development are negligible at the point of maximum impact from the Site and therefore will not coincide with impacts from the Killingholme Power Station.
- 17.6.17 In terms of the potential human health impacts, the Old Vicarage Receptor (R4) was also included in the Killingholme Power Station gas engines Air Quality Assessment. Predicted long term NO₂ concentrations arising from the Killingholme Power Station at this receptor were 0.08µg/m³, with impacts from the Proposed Development predicted to be 0.003µg/m³. The cumulative concentration would therefore be 0.083µg/m³, which represents 0.2% of the relevant AQS, and therefore would be considered to be imperceptible.
- 17.6.18 In terms of the ecological impacts, as with the Proposed Development, the impacts from the Killingholme Power Station gas engines were predicted to be insignificant at all ecological receptors (and well below the 1% threshold for insignificance); therefore it is considered that the cumulative impacts with the Proposed Development would not be significant.
- 17.6.19 The consented North Killingholme Power Project is located approximately 2km north of the Proposed Development Site and comprises a 470MWe CCGT. Again due to the location of this plant, the prevailing wind direction and the much higher stack, it is considered that cumulative impacts with the Proposed Development would be minimal. The ES submitted for the North Killingholme Power Project states that the maximum

predicted annual average concentration of NO₂ is 0.2µg/m³. This was predicted to occur approximately 1.5km to the northeast of the stack. Concentrations in the vicinity of the Proposed Development area of influence would be considerably lower and therefore it is again considered that the cumulative impact would be insignificant.

- 17.6.20 The CPL Industries Ltd Pilot Charcoal Manufacturing Plant will operate with a maximum NO₂ emission limit value of 350mg/m³ and will adhere to any conditions to control levels.
- 17.6.21 It should be noted that in terms of the N-depositional impacts on the Humber Estuary receptor, the habitat type closest to the Proposed Development is saltmarsh, which is located approximately 1.5km from the Proposed Development. The existing nitrogen deposition rate at the closest area of saltmarsh is 15.0kgN/ha/yr, and the process contribution from the Proposed Development represents <0.1% of the lower end of the critical load at the worst case location. Given that the sizes of the Queens Road developments are of a similar scale, and therefore are likely to have a similar level of impact at their worst case points, it is considered highly unlikely that the cumulative increase in nitrogen deposition would be significant. Also considering the locations of the other developments, and the prevailing wind direction, the worst case impacts for all the developments will occur at different locations and therefore the in combination impacts of the other developments would be lower at the point of worst case impact for the Proposed Development. Moreover, twice daily tidal inundation will bring much more nitrogen than would ever deposit from atmosphere, therefore the process of tidal inundation will have a much greater role influencing vegetation composition.
- 17.6.22 The other developments listed in Table 17.3 have not been considered in this assessment because to their nature and distance would mean that cumulative air quality impacts would be insignificant.

Traffic and Transportation

Construction Effects

- 17.6.23 There are committed developments identified along Rosper Road which are likely to affect traffic flows on Rosper Road. These are :-
- The North Killingholme Power Project DCO (C.GEN Killingholme Limited);
 - Able Marine Energy Park (AMEP); Marsh Lane Car Storage and Distribution Facility; and
 - Able Logistics Park.
- 17.6.24 The proposed Marsh Lane Car Storage is on the east side of Rosper Road close to the site. If consented, this development is forecast to be operational by 2021 and access will be taken from an improved Marsh Lane. As part of the development proposals the Marsh Lane / Rosper Road junction will be improved to provide a dedicated ghost island right turning lane for vehicles turning right into Marsh Lane from Rosper Road. It is anticipated that the proposed Marsh Lane Car Storage will increase the daily number of vehicle movements on Rosper Road. The forecast daily increase in traffic flows associated with this car storage development were included in the development's ES Report and are summarised below in Table 17.4.

Table 17.4: Committed Development Traffic Flows – Car Storage

Link	Development Traffic (Total Vehicles)	Development Traffic (HGV)
Rosper Road (North of Marsh Lane)	1400	0
Rosper Road (South of Marsh Lane)	1710	50

17.6.25 An application for the South Killingholme car storage and distribution facility, a new car storage and distribution facility on land located north of Marsh Lane, is also currently pending. From information provided in the Scoping Opinion Request, the proposed development is calculated to generate peak one way flows of 96 vehicles/hour. There is insufficient information available to determine exact flows during the construction and operational periods, however, increases in traffic flow are unlikely to be significant.

17.6.26 In terms of the North Killingholme Power Project proposed by C.GEN Killingholme Ltd which is located further north on Rosper Road; from information provided in the Environmental Statement and Transport Assessment reports, the worst case scenario for the peak of construction in 2016 (Scenario C) would result in the following additional traffic flows, as outlined in Table 17.5 below..

Table 17.5: Committed Development Traffic Flows – North Killingholme Power Project

Link	Development Traffic (Vehicles)	Development Traffic (HGVs)
Additional daily traffic flows from C.Gen	2100	500

17.6.27 The Able Marine Energy Park is currently under construction. An application for a DCO was been submitted and approved in 2013, and is currently being modified. Based on the consultation advice of NLC it is assumed that there could be an overlap between the construction of the Able Marine Energy Park and construction of the Proposed Development. This is what has been assumed in this Chapter. Table 17.6 outlines the increased daily number of two-way traffic on Rosper Road as a result of the Able Marine Energy Park.

Table 17.6: Committed Development Traffic Flows – AMEP

Link	Development Traffic (2-way Total Vehicles)
Additional daily traffic flows from AMEP on Rosper Road.	2,398

17.6.28 If traffic associated with the above committed developments is distributed in the same way as stated in the ES and TA Report supporting this chapter, the resulting cumulative traffic flows would be as shown in Table 17.7 below.

Table 17.7 Percentage Impact on surrounding roads due to additional construction traffic (all 2-way flows – AAWT and daily HGV)

Link description	2021 with all comm. AAWT Traffic	2021 with all comm. HGVs	2021 + comm. + CCGT Const. Traffic AAWT	2021 + comm. + CCGT Const. Traffic HGV	Diff. Total Veh.	% Impact Total vehs.	Diff HGV	% Impact HGV
Rosper Road North of Marsh Lane	9,988	3,446	10,184	3,498	196	1.96%	52	1.51%
Rosper Road South of Marsh Lane	10,449	3,502	10,645	3,554	196	1.87%	52	1.48%
Marsh Lane	3,337	59	3,337	59	0	0.0%	0	0.00%
A160 just West of Manby Roundabout	14,454	6,974	14,546	7,006	92	0.64%	31	0.45%
A180 - west of A160 Interchange	38,965	13,071	39,057	13,102	92	0.24%	31	0.24%
Manby Road - SE of Manby Roundabout	11,776	2,979	11,880	3,000	103	0.88%	21	0.70%

- 17.6.29 The committed developments add significant traffic to Rosper Road. As shown in Table 17.7 above the forecast 2021 daily flow with all committed developments is 10,449 total vehicles with 3,502 HGVs (34%). This compares with current 2018 flows of around 6,200. Typical capacities for a variety of road types are provided within the Department for Transport's (DfT) Technical Advice Note (TA) 79/99 'Determination of Urban Road Capacity' (Ref 17-2). The assumed capacities, which are quoted in the TA as one-way flows, are typically between 1,110 to 1,470 vehicles per hour in each direction (depending on road width and road type). This is equivalent to between 1850 and 2450 vehicles two-way per hour based on the 60/40 directional split used in TA 79/99. Scaling this up for 12 hours per working day in two directions for single carriageway roads gives a theoretical range of between 22,200 and 29,400 vehicles for single carriageway roads.
- 17.6.30 For dual carriageways (i.e. the A160 and A180) the road class is slightly higher due to fewer side roads, no waiting or parking etc and the capacities are correspondingly higher. The hourly capacity in TA 79/99 for the A160 and A180 would be around 3,600 vehicles per hour in each direction which is equivalent to 7,200 veh/hr two-way. The corresponding theoretical 12-hour two-way capacity is therefore around 86,400 vehicles.
- 17.6.31 By comparing the forecast daily flows in columns 2 and 4 of Table 17.8 with the capacity limits indicated above, it is apparent that the roads within the vicinity of the Site would still be operating below the TA79/99 capacity limits, even at peak times.
- 17.6.32 Given that the committed developments are now consented, the forecast baseline flows with committed developments have been accepted by the highway authorities. The resulting percentage traffic impacts resulting from the Proposed Development construction traffic are therefore further reduced after adding these committed developments, becoming less than 2% on all links which remains negligible. Therefore no significant cumulative effects are predicted for traffic.

Operational Effects

- 17.6.33 The levels of traffic generated, as outlined above, are mostly due to construction vehicle movements and therefore operational effects are not anticipated to be significant.
- 17.6.34 The operation of Able Logistics Park is only intended to be temporary in nature, for a period of up to five years. It is anticipated that total vehicle trip generation (staff, car delivery and transport HGVs) will be 1,426 per day. The Pilot Charcoal Plant, located 2.5 km away, will generate 50 HGV movements per week, whilst the site it is to be located on currently generates over 200 vehicles per week. Operational effects are therefore not considered to be significant.

Noise and Vibration**Construction Effects**

- 17.6.35 Of the other developments identified in Table 17.3, only the proposed VPI Immingham Energy Park A is located within the ZOI of the Proposed Development for noise and vibration. The construction of the two developments will not run concurrently, and both are ultimately under the control of the same Applicant parent company entity that can manage the timings of the two developments. Even if the construction phases were to overlap, the same (or similar) CEMPs would be utilised to manage and control noise emissions during construction, so as to maintain noise effects on identified sensitive receptors that are not significant.
- 17.6.36 The operation of the VPI Immingham Energy Park A may occur during the construction of the Proposed Development. The predicted construction sound level (as a result of the construction of the Proposed Development) at the noise sensitive receptor (NSR) at Hazledene (as per the associated ES) is 47dB, L_{Aeq} .
- 17.6.37 The worst case predicted operational noise level of the VPI Immingham Energy Park A at the noise sensitive receptor (NSR) at Hazledene (as per the associated ES) is 47dB, L_{Aeq} .
- 17.6.38 Therefore, should operation of the VPI Immingham Energy Park A coincide with the worst case predicted construction noise levels of the Proposed Development (i.e. during the construction of the power generation plant), the total sound level at Hazledene would be less than 49dB, L_{Aeq} .
- 17.6.39 Chapter 8: Noise and Vibration identifies that the ambient (night time) sound level at Hazledene is 53dB, L_{Aeq} . In accordance with the relevant criteria, the resultant, worst case, cumulative impact would be minor and thus not significant.
- 17.6.40 In addition, the VPI Immingham Energy Park A is intended to run intermittently and occasionally in response to peak load demand. Therefore, whilst there is the potential for cumulative effects during the construction of the Proposed Development, this is short-term only and, in any event, is not considered to be significant.

Operational Effects

- 17.6.41 There is potential for cumulative effects to be generated by the operational phase of the Proposed Development in combination with the VPI Immingham Energy Park A.
- 17.6.42 A cumulative BS 4142 assessment has been carried out using the predicted operating scenarios from each development that result in the highest operational sound levels, in

order to assess a worst case cumulative scenario. The assessment has considered the NSR at Hazeldene identified in Chapter 8: Noise and Vibration of this ES.

17.6.43 Table 17.8 presents the results of the BS 4142 cumulative assessment.

Table 17.8: BS 4142 Assessment Results for the Proposed Development operating at the same time as the VPI Immingham Energy Park A

Parameter	Value
OCGT Site 'worst case' Specific Sound Level, Ls (LAeq,Tr), dB	47
VPI Immingham Energy Park A 'worst case' Specific Sound Level, Ls (LAeq,Tr), dB	44
Cumulative Specific Sound Level, Ls (LAeq,Tr), dB	49
Acoustic feature correction, dB	+5
Rating Level (LAR,Tr), dB	54
Representative Background Sound Level, (LA90,T), dB	49
Excess of rating level over background sound level, (LAR,Tr - LA90,T), dB	+5
Magnitude of impact (from Chapter 8: Noise and Vibration)	Low
Classification of effect (from Chapter 8: Noise and Vibration)	Minor

17.6.44 BS 4142 states that a difference of around +5dB or higher is likely to be an indication of an adverse impact, depending on the context; a +5dB is considered to be minor adverse based on the EIA assessment criteria outlined in Chapter 8: Noise and Vibration of this ES. The operational noise assessment was undertaken based on the 'worst case' scenario, with the Proposed Development operating continually at full load, 24 hours per day. There is only one NSR, Hazeldene, and the result presented is the highest predicted.

17.6.45 This level of effect meets the local authority agreed criterion for minor adverse (not significant) effects (+5dB) even when based on worst case assumptions.

Ecology

Construction Effects

17.6.46 Chapter 9: Ecology of this ES states that the potential effects of the Proposed Development to ecological receptors, during construction, will be limited to the potential for direct, on-site, habitat loss and off-site disturbance (due to increased noise, vibration, lighting). Air quality impacts on statutory and non-statutory designated sites arising from dust deposition were scoped out because all such sites are beyond the ZOI in which dust deposits during construction.

17.6.47 Habitat loss would result from on-site construction activities only; therefore none of the other developments identified in Table 17.3 would result in a cumulative effect in this regard.

17.6.48 Potential disturbance effects to ecological receptors as a result of the construction of the Proposed Development are assessed in Chapter 9: Ecology of this ES. That Chapter concludes that the potential for noise and visual disturbance from the construction works would have a neutral effect, given the existing soundscape, landscape and land use in the vicinity of the Proposed Development. As defined in Chapter 9: Ecology of this ES, a neutral effect is one that will have no effect on the structure/function or conservation status of an ecological receptor.

17.6.49 It is therefore considered that, during construction, there is no potential for significant cumulative effects of the Proposed Development and any of the other developments identified in Table 17.3.

Operational Effects

17.6.50 Potential effects of the operation of the Proposed Development on ecological receptors are identified from emission to air potentially leading to adverse effects on sensitive habitats, through increased nitrogen and acid deposition, and increased levels of disturbance (noise, vibration, artificial lighting), potentially resulting in adverse effects on ecological features.

17.6.51 The potential cumulative effects on ecological receptors of the emissions to air from the Proposed Development are considered above (Air Quality). Given the locations of the other developments, their distance from the site, and that the associated locations of maximum impacts are unlikely to coincide, no significant cumulative effects are anticipated.

17.6.52 There is the potential for noise/ visual disturbance during the operation of the Proposed Development. However, given the industrial nature of the surrounding land use, it is reasonable to assume that the potentially relevant species identified in Chapter 9 (e.g. birds) that use the land in and around the Proposed Development are habituated to the type of development and that the operation of the Proposed Development is likely to result in a neutral effect.

17.6.53 It is therefore considered that, during operation, there is no potential for significant cumulative disturbance effects.

Water Resources, Flood Risk and Drainage

Construction Effects

17.6.54 With the exception of the VPI Immingham Energy Park A, there is a lack of hydrological connectivity between the schemes listed in Table 17-2 and the Site. The construction phases of the VPI Immingham Energy Park A and the Proposed Development will not occur concurrently and both are controlled by the same parent company entity that can manage the timings of the two developments. Even if the construction phases were to overlap, the same (or similar) CEMPs would be utilised to manage and control the potential water resource and flood risk/drainage impacts arising from the two developments, during construction. Therefore no significant cumulative impact on surface water, flood risk and drainage receptors would occur.

Operational Effects

17.6.55 With the exception of the VPI Immingham Energy Park A, there is a lack of hydrological connectivity between the schemes listed in Table 17-2 and the Site therefore the potential for cumulative effects on surface water, flood risk and drainage receptors are limited.

17.6.56 The Proposed Development would discharge only clean site and surface water runoff to the existing land drain between the Proposed Development and the Existing VPI Combined Heat and Power (CHP) Plant. Surface water would drain from the Site at a restricted greenfield rate, with excess runoff above this rate stored within the Site boundary. The potential impacts of this discharge are, for all receptors, considered to be of very low magnitude and therefore negligible significance.

- 17.6.57 Minimal contaminated wastewater is anticipated to be generated from the Proposed Development during operation and this would be managed through on-site storage prior to being tankered off-site for treatment, or the use of a septic tank, as appropriate. Therefore there will be no direct discharge of contaminated water from the Proposed Development. Chapter 12: Surface Water, Flood Risk and Drainage of this ES considers the potential impacts of leaks etc. as a worst case and concludes that, for all receptors, that such impacts would be localised, and of very low magnitude/ negligible significance.
- 17.6.58 Therefore, as only clean site or surface water will be discharged from the Proposed Development, there is no potential for cumulative effects. Where leaks etc. do occur, these will be localised and of very low magnitude/negligible significance, with no potential for the production of any significant cumulative effect.

Ground Conditions and Hydrogeology

Construction Effects

- 17.6.59 With the exception of the VPI Immingham Energy Park A, none of the other developments identified in Table 17.3, have the potential to affect ground conditions on the Site and there is no hydrogeological connectivity between these and the Proposed Development.
- 17.6.60 The construction phases of the VPI Immingham Energy Park A and the Proposed Development are unlikely to occur concurrently and both are controlled by the same parent company entity that can manage the timings of the two developments. Even if the construction phases were to overlap, the same (or similar) CEMPs would be utilised to manage and control the potential impacts to the local ground conditions or hydrogeology arising from the two developments, during construction.
- 17.6.61 Therefore no significant cumulative effects on groundwater would occur during the construction of the Proposed Development.

Operational Effects

- 17.6.62 With the exception of the VPI Immingham Energy Park A, there is a lack of hydrological connectivity between the schemes listed in Table 17.3 and the Site therefore the potential for cumulative effects on groundwater is limited. Both the Proposed Development and the VPI Immingham Energy Park A will incorporate suitable impermeable site surfacing, surface water design and management and appropriate bunding in accordance with the requirements of the respective environmental permits in order avoid direct discharges to the land beneath either site.
- 17.6.63 Therefore it is considered that no significant cumulative effects on groundwater would occur from operation of the Proposed Development.

Cultural Heritage

Construction Effects

- 17.6.64 The potential impacts to archaeology as a result of construction of the Proposed Development could only occur within the area used for the construction works (i.e. the Site). No cumulative effects to archaeology from other developments are therefore considered possible.

Operational Effects

- 17.6.65 The presence of the Proposed Development would increase the number of built structures which are similar in scale and form to existing structures in the area. It is not anticipated that the operation and maintenance of the Proposed Development will result in any adverse effect on cultural heritage assets.
- 17.6.66 Therefore it is considered that no cumulative effects on cultural heritage assets would occur from operation of the Proposed Development.

Landscape and Visual Amenity

- 17.6.67 The potential landscape impacts of the Proposed Development relate to the loss of existing landscape features and the visibility of new landscape features (temporary and permanent). The topography of the land within the ZOI is a considerable factor in defining the character of the area with the relatively flat landscape enabling wide, open and often long distance views.
- 17.6.68 However, as assessed in Chapter 10: Landscape and Visual of this ES, the magnitude of the effects on the local landscape from the Proposed Development is 'very low' due to the industrial nature of the local landscape and that the Proposed Development is of a similarly industrial nature. The significance of all the potential effects is expected to be negligible.
- 17.6.69 Similarly, the low/ very low visual effects assessed for views of the Proposed Development from indicative viewpoints will be minor/ negligible.
- 17.6.70 Therefore, whilst a cumulative effect may be possible for any of the other developments identified in Table 17.3, this will be subject to the location and direction of the receptor in relation to these developments. Nevertheless, the contribution of the Proposed Development to any cumulative effect will be negligible and thus not significant. This analysis and conclusion apply to both the construction and operational stages.

17.7 Combined Effects Assessment

- 17.7.1 Combined effects may arise where several different effects resulting from the construction works or operation of the Proposed Development, which might in themselves be non-significant, together have the potential to affect a receptor significantly. I
- 17.7.2 The potential environmental aspects that are considered to have the potential to result in combined effects, and thus considered within the combined effects assessment are:
- Air quality;
 - Traffic and transport;
 - Noise and vibration; and
 - Landscape and Visual.
- 17.7.3 Combined effects from the Proposed Development can only occur where there are receptors that are sensitive to changes in more than one of the above environmental aspects. Therefore, the combined effects assessment has reviewed each of the relevant chapters in this ES in order to determine common receptors.

Identification of Receptors with potential for Combined Effects***Air Quality***

- 17.7.4 For both human health and ecological receptors, Chapter 6: Air Quality of this ES predicts that the magnitudes of the potential impacts from operation of the Proposed Development are considered to be ‘imperceptible’. Therefore, it is considered that the potential impacts to air quality resulting from operation of the Proposed Development will not contribute to any combined effect.
- 17.7.5 Only one human health receptor (R1, Hazeldene) lies within the potential zone of influence for air quality impacts arising for construction. No ecological receptors are within the potential ZOI.

Traffic and Transport

- 17.7.6 Chapter 7: Traffic and Transport of this ES indicates that where the anticipated change in traffic volume as the result of a development would result in an increase of less than 30% of either the total traffic and/or HGV traffic, then the magnitude of that change can be considered to be negligible. The Chapter continues that this assessment also includes effects on severance, amenity, fear and intimidation, accidents and safety and driver delay.
- 17.7.7 Chapter 7: Traffic and Transport also provides details of the potential changes to total traffic and HGV volumes as a result of the construction of the Proposed Development. The anticipated changes would be less than 5% on all road links assessed. This level of change is significantly less than the threshold above which impacts may be considered more than negligible. Therefore, it is considered that the potential traffic and transport impacts during the construction of the Proposed Development will not contribute to any combined effect.

Noise and vibration

- 17.7.8 Chapter 8: Noise and Vibration of this ES states: “It has been agreed in consultation with NLC that there is only one [noise sensitive receptor] with the potential to be significantly impacted by the Proposed Development.”
- 17.7.9 This receptor is NSR1, Hazeldene; therefore there is the potential for combined effects between the process contributions to air quality and the sound levels experienced at this location. This combined effect would only occur during construction, given that the air quality impact from the operation of the Proposed Development would be imperceptible. Given that both air quality and noise effects are predicted to be within recommended limits and are not significant, there will be no combined effects.

Landscape and Visual

- 17.7.10 There are eight representative viewpoints identified within Chapter 10: Landscape and Visual of this ES. Of these eight, only one (Viewpoint 2, PRoW 50) is considered to have the potential for significant combined effects, based on the discussions above regarding receptors for other impacts. PRoW 50 runs from Station Road, past Marsh Lane where Hazeldene is situated.
- 17.7.11 As assessed, the magnitude of the effects on the local landscape from the Proposed Development is ‘very low’ due to the industrial nature of the local landscape and that the

Proposed Development is of a similarly industrial nature. The significance of all the potential effects is expected to be negligible.

17.7.12 It is therefore considered that the potential landscape and visual impacts will not contribute to any combined effect.

Combined Effects

17.7.13 Potential combined effects have been considered on sensitive receptors. Whilst there is considered the potential for combined effects to impact a single receptor, Hazeldene (R1 under Chapter 7: Air Quality, NSR 1 under Chapter 8: Noise and Vibration and VP2 under Chapter 10: Landscape and Visual), each of the relevant assessments have not identified a significant impact at this receptor.

17.7.14 Therefore, potential combined effects at this location are considered to be not significant.

17.8 Conclusions

17.8.1 The assessment of cumulative impacts has considered a number of other developments within the vicinity of the Site and the potential for cumulative impacts to arise from one or several of the other developments together with the Proposed Development.

17.8.2 Cumulative impacts with existing developments have been accounted for through establishing the current baseline for each technical assessment (presented in Chapters 6 to 16).

17.8.3 All assessment topics have concluded that there are no significant cumulative effects to arise from the construction or operation phases of the Proposed Development when considered alongside other developments proposed within the vicinity of the Site.

17.8.4 The assessment of combined effects has not identified any significant combined effects.

17.9 Limitations

17.9.1 Any limitations that were encountered during the individual assessment area detailed within Chapters 6 to 16 of this ES.

17.9.2 The assessment of potential cumulative impacts presented in this Chapter, and as developed in preparation of the ES, has been based on information published by the respective developers either as part of the respect applications for consent/permission or other publicly available sources, such as project websites.

17.10 References

Ref 17-1 Planning Inspectorate (2015) Advice Note 17 Cumulative effects assessment relevant to nationally significant infrastructure projects.

Ref 17-2 Highways England (1999) Design Manual for Roads and Bridges Volume 5 Assessment and Preparation of Road Schemes Section 1: Preparation and Implementation. TA 79/99 Amendment No 1 Traffic Capacity of Urban Roads